UNIVERSITY OF NAIROBI

WASTE MANAGEMENT PRACTICES, BEHAVIOUR AND PERCEIVED STAKEHOLDERS' ENVIRONMENTAL IMPACTS DURING FOOTBALL KENYA FEDERATION PREMIER LEAGUE GAMES

BY

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DECLARATION

I declare that this is my original work and has not been presented anywhere else for the award of any degree.

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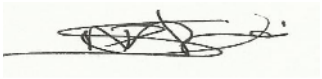
Signature:  Date: 24/11/2023

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ABBREVIATIONS AND ACRONYMS

CDM	Kyotos Protocol Clean Development Mechanism
CER	Certified Emission Reductions
DFFE	South Africa Department of Forestry, Fisheries and Environment
DEAT	South Africa National Department of Environmental Affairs and Tourism
EMCA	Environmental Management and Co-ordination Act
FIFA	Federation Internationale de Football Association
FKF	Football Kenya Federation
GHG	Greenhouse Gas Emissions
NEMA	National Environmental Management Authority
NSWC	National Solid Waste Management Commission
PET	Polyethylene terephthalate plastic bottles
SDGs	United Nations Sustainable Development Goals
UNEP	United Nations Environmental Program
UPOPs	Unintentionally Produced Organic Pollutants

ABSTRACT

Sports fulfils important functions in promotion of good health and peace. However, sports activities can also have detrimental effects to the environment particularly through generation of solid waste. Despite Kenya having a waste management policy draft which has generalized waste management in counties, there remains a gap in waste management during sport events. The key objective of the study was to assess solid waste management practices, behaviour and perceived environmental impact during Football Kenya Federation premier league. Structured questionnaires administered through Kobo Collect and key informant interviews were used for data collection and 228 out of 251 questionnaires were completed and returned. Quantitative data was organized in SPSS and analyzed by use of frequencies, percentages, and tabulations whereas content analysis was used for qualitative data analysis. The study found that more than one third of the participants, practices waste dumping with lack of waste segregation. Plastic water bottles are the most common type of solid waste found before and after games. Participants demonstrated positive attitude on their role in waste management despite lack of sensitization from club and stadium. Findings on stakeholders' behaviour also raised the concern of ignorance as a challenge of littering during FKF games. The study concludes that littering and poor waste management behaviour is a common practice during Football Kenya Federation Premier league games. This practice is occasioned by lack of spectator waste management awareness and distribution of waste collections bins. This finding on backyard burning highlights a significant concern on the knowledge of environment effect and its deleterious effect on human health and climate change. The study recommended stakeholders' collaborative sensitization programs to promote awareness and use of refill water points to reduce use of single use plastic bottles. Further policies can be developed on banning of single use plastic water bottles during sport events to help reduce quantities of plastic waste generated during sport events.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Sport fulfils an important function in the society and is indeed indispensable (Cunningham *et al*., 2021). Sports activities aid in the promotion of good health, social interaction and opportunities for physical experience. More importantly it holds significance in the modern world where it is increasingly becoming difficult to engage in physical activities (Ogunrinde, 2018). Besides, sports has an outstanding capacity to upheave the local economy and development, promote tourism thriving, and improve health of the general public (Pereira *et al*., 2019). However, sports activities increase susceptibility for environmental damage and degradation through waste generation (Kellison *et al*., 2015). Sports related negative environmental impacts result from pollution from the generated solid wastes during sport events (Manni *et al*., 2018).

Solid waste refers to any type of garbage, trash, refuses or discarded material that result from different activities (Saleh & Hassan, 2021). Such wastes, require collection and disposal as they may accumulate and become an eye sore to the environment (Saleh & Hassan, 2021). Solid wastes are a significant contributor to climate change as they tend to increase greenhouse gas emission (GHG) in the atmosphere (Manni *et al*., 2018). It is estimated that in 2016 alone, solid wastes contributed to at least 5% of the total global greenhouse gas emissions. Cumulatively, human activities cause global industrial warming of approximately 1° C, with a weighted margin of 0.8 to 1.2°C (IPPC Secretariat, 2021). This raises concern since anticipated global warming of 1.5° C will exacerbate weather abnormalities such as severe droughts, floods and extremes heat waves (Saleh & Hassan, 2021; UNEP, 2022). Moreover, solid waste is highlighted as the fourth largest source sector of greenhouse gas emissions globally. The treatment of solid wastes

generates at least 83% of the total greenhouse gas emissions, compared to wastewater treatment which only contributes an average of 17% of the total emissions (EU, 2020; Kristanto *et al*., 2020).

Evolution in technology and sport development has contributed to the love of different sports globally. Information technology has enabled virtual spectatorship through television. However, evolution in marketing and construction of large stadiums has facilitated an increased demand for more physical spectators than previous years (Triantafyllidis *et al*., 2018). Large stadiums attract large crowds of spectators for the love of the game. However, such large sport events contribute towards an escalating negative environmental impact due to the quantity of solid wastes generated during events (Kellison *et al*., 2015; Manni *et al*., 2018).

Football is the most popular sport globally by a vast margin. The sport is practiced popularly in over 200 countries with a fan base of 3.5 billion and involves at least 250 million players globally (Low *et al*., 2020; Parnell *et al*., 2021). The sport is popular globally with the exception of North America and Antarctica regions (Low *et al*., 2020). Owing to its large number of spectators, participants and frequency of sport occurrence, football generates the most solid waste cumulatively in sports. The amount of solid waste generated per football game is estimated to double during world cup games and other large sport events such as the Olympics (Jalil *et al*., 2019). In the United States, football is associated with a total season carbon footprint of 154,717,114 kg CO2eq (Cooper, 2020). The total season carbon footprint was estimated over four year's period between 2015 and 2018 (Cooper, 2020). In the English Premier League (EPL), estimates of 2,117tonnes of solid wastes is generated per season. Manchester United, one of the 20 teams in the EPLis estimated to generate the most solid wastes. The club generates at least eight tonnes of wastes per match and a cumulative of 197 tons over a season (Pereira *et al*., 2019).

Attributively, statistics points a direct relation between the number of spectators attending a sport event and the amount of solid waste generated during sport activities. Football matches attract large numbers of spectators who generate waste from water cans and takeaway food (Pereira *et al*., 2019). Football cheering goes hand in hand with snacking or eating and drinking during matches. Most of the time, takeaway foods and drinks are packaged in single use plastic packages. Large amounts of solid wastes during football events are generated from food residues and packaging (Łapko *et al*., 2018). Without proper waste disposal, collection and handling, such wastes become a significant cause of pollution to the environment (Martinho *et al*., 2018). Majorly, waste disposal among attendees is influenced by availability of waste collection facilities (Łapko *et al*., 2018). To practice efficient waste management, the host organizations require waste management policies and practices in place. Effective waste management system reduces cost of waste management and the cumulative carbon footprint related to such wastes (Jalil *et al*., 2019). Effective waste management can be achieved through maximizing on waste recycling, composting and enabling efficient waste separation at source (Jalil *et al*., 2019).

In spite the ecological awareness on the negative environment impact related to sport, sport organizers and sponsors tend to ignore the need to urgently address the issue of environmental degradation. Ecological aspects like impacts related to construction of sport facilities, persistent air pollution associated to transportation to sport activities and environmental pollution associated with waste generated during the sport activities are of significant concern (Kellison *et al*., 2015; Manni *et al*., 2018). Attributively, stakeholders in the previous FIFA world cup tournaments had not put significant consideration on the potential contribution of the sporting event to climate change (Tobías *et al*., 2019).). The concerns highlight the need to investigate the behaviour of the football organizers and sponsors regarding ecological footprints of football events to the

environment.

Environmental conservation during football matches such as replenishing destroyed grounds by spectators minimizing transportation, effective generated waste handling and disposal requires financial resources to facilitate appropriate environmental conservation. Wastes if not properly managed, leads to environmental pollution and degradation and further contribute to climate change (Ferronato & Torretta, 2019). Several stakeholders are involved in the management of football. Globally, Federation Internationale de Football Association (FIFA) is the governing body responsible for overseeing the conduct of football and its development. Other stakeholders include continental and country specific football associations, confederations, clubs, leagues and players (Bank, 2022; Konjer *et al.*, 2022).

The FIFA constitution highlights that all football stadiums must develop a waste management strategy that should aim at decentralizing waste collection and temporary storage of waste during football games (FIFA, 2020). FIFA also highlights that it is crucial for stadiums' waste management strategy to understand how local regulations and policies on waste management and recycling in order to minimize waste generated and avoid use of landfill as much as possible (FIFA, 2020). Moreover, the governing body recommends that the treatment of stadium waste should be based on a hierarchical system, where waste avoidance is preferable and disposal to landfill is avoided (FIFA, 2020).

Confederation of African Football (CAF) is the football governing body in Africa. While the governing body has clear regulations on state and conduct of football within the approved stadiums, there is no clear statuses or regulation concerning waste management (CAF, 2022).

However, the body echoes the principals set out FIFA (FIFA, 2020). Regionally, The Council for East and Central Africa Football Associations (CECAFA) is an association of the football playing nations in Eastern Africa. It is also an affiliate of CAF and like its affiliate, CECAFA also lacks a clear outline regulations and policies regarding waste management during football events (Simiyu, 2022; Ziyati & Akindes, 2014).

The Football Kenya Federation (FKF) governs football in Kenya. The governing body hosts the Kenya Premier League, the country's professional football league that has 18 participating teams in the top tier league and over 290 teams in second to seventh tier leagues (FKF, 2020). The league was started in 1963 and is currently run as a private limited company co-owned by the 18 participating teamsas affiliates of the FKF. However, the exact number of spectator base is not known (FKF, 2020). FKF, different hosting stadium management and participating clubs are the main stakeholders in the Kenya Premier League.

Football attracts participants inform of players, match officials and the spectators. Large number of participants translates to higher waste generation of waste. It is therefore important to develop effective waste management system in order to reduce environmental pollution and degradation (Yao & Schwarz, 2018). Therefore, this study aimed to examine the participants' behaviours and their knowledge on the environmental impacts of generated solid waste during football activities.

1.2 Statement of Research Problem

Sport events generate large quantities of solid waste which directly increases as the number of spectators' increase (Atchariyasopon, 2017). Since football attracts the largest spectator base, it is

associated with high percentage contribution of solid waste generated during sport events (Low *et al*., 2020; Parnell *et al*., 2021). Football activities are important for economic development. However, football activities have been observed to result in environmental degradation particularly with littering and increased production of solid waste. The amount of solid waste generated per football game is estimated to double during world cup games and other large sport events such as the Olympics (Jalil *et al*., 2019). Lack of proper waste management practices during football activities have led to degradation of the environment by destruction of natural habitats (Yao & Schwarz, 2018). Moreover, while the global football governing body highlights recommendations for waste management in line with the local context, regional and local football authorities lacks a clearly outlined waste management policies and regulations (CAF, 2022; Simiyu, 2022; Ziyati & Akindes, 2014).

Studies have been undertaken to assess the various impacts of football activities to the environment (Ferronato & Torretta, 2019; Yao & Schwarz, 2018). Most of previous studies have assessed carbon emissions during transportation as well as solid waste generation by the participants (Triantafyllidis *et al*., 2018). Additionally, previous studies have assessed the negative impacts of the solid waste generated during football activities and their ecological footprint (Ananda *et al*., 2019; Wicker, 2019). However, there remain limited studieson the relationship between football stakeholders' behaviour and solid waste management duringfootball events.

This research therefore aimed to examine solid waste management during football games.This study envisaged to provide information to be used to inform policies towards sustainable waste management during football activities.

1.3 Research Objectives

1.3.1 General Objective

The general objective of the study was to assess solid waste management practices, behaviour and perceived stakeholders' environmental impact during Football Kenya Federation premier league games.

1.3.2 Specific Objectives

The study was guided by the following specific objectives:

1. To assess solid waste management practices and behaviour during Football Kenya Federation premier league games.
2. To assess types of solid waste generated during Football Kenya Federation premier leaguegames
3. To analyze FKF stakeholders' perception on solid waste management and associated environmental impact during Football Kenya Federation premier league matches

1.4 Research Questions

The study adopted the following research questions:

i. What are the solid waste management practices during Football KenyaFederation premier league games?

ii. What are the types of solid waste generated during Football Kenya Federation premier league games?

iii. What are the perceptions of FKF stakeholders on solid waste management and associated environmental impact during Football Kenya Federation premier league games?

1.5 Justification

Sports events and its related activities have significant impact on the environment as the activities involve converging of a large crowd of spectators. Such large crowd travel from points residential areas to attend sports activities and carry food, drinks and other single use materials consumed as the spectators urge on their favourite teams. Food and drinks have been identified as the sole largest source of waste during sport events.

Furthermore, preparations of food sold in these events and their packaging also generate a significant number of solid wastes. Where such enormous amountof solid waste is not well managed, a significant amount may end up in landfills thus contributingtowards exacerbating the impact of climate change. The significance of this study was in alignmentwith the 2021 Kenya waste management policy and sustainable developmental goals that aim to ensure conservation of environment through effective waste management. Developing sustainable sports infrastructure andsponsors may also sponsor campaigns and education programmes like tree planting, education onre-use, recycle and advertisements to spectators before and after games thus promoting social responsibility towards the environment.

The sustainable development goal (SDG) number 12 that is sustainable consumption and production champions for doing more with less as it talks about reducing environmental degradation, increaseof resources as well as encouraging sustainable lifestyles in as much as economic growth is adhered to. The significance of this study with regard to development is that sports create economic growth and development through jobs created for people tasked with waste management, separation segregation and even manufacturing. These can be achieved through production of products from

recycled materials. This promotes sustainable games and leads to environmental conservation in a circular economy perspective. The data generated from this study may be crucial in environmental governance as it may be usedin advancing transformative ways of handling waste generated sustainably. This data may furtheraid in realizing circular economy concept in the games that goes beyond the 3Rs (reduce, re-use, recycle) by introducing re-manufacturing concepts and working towards zero waste during gameshence advancing sustainability.

Through sustainable consumption and production, proper waste management, recycling, reducing and re-use of resources will promote sustainable lifestyle and contribute to green economy at games. The current study undertook to provide policy suggestions on how FKF football league can achieve low ecological foot prints and contribute towards sustainability by assessing solid waste management during football activities in the Kenyan Premier League. The policy suggestion on football activities for environmental conservation may also contribute to other global agenda of sustainable development goals (SDGs) particularly goals 3-good health and well-being, 6 -clean water and sanitation and 15 -life on land.

1.6 Scope and Limitations

The study adopted both qualitative and quantitative research designs and aimed to assess solid waste management practices, behaviour, and perception of stakeholders during FKF premier league games. This study was delimited to Nairobi City County and Football Kenya Federation Premier League as the main sports activity. The study was also conducted during the period of Covid19 when there were restrictions about public events thus affecting time and extent of data collection. However, this delimitation did not affect quality of data analysis and the study findings. Moreover, the study was delimited in terms of scope as it did not quantify the amount of waste generated but highlighted the types of waste generated.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents review of literature on practices of solid waste management, types of solid waste, stakeholder perception, and conceptual/theoretical framework.

2.2 Solid Waste Management in Sport Events

Sport events both small to large-scale generate large quantities of solid waste. The generated wastes require an effective waste management practice to reduce pollution and GHG emissions related to such wastes. However, most generated wastes during sport events end up in landfills and contribute to the release of GHG especially methane gas to the atmosphere (Manni *et al*., 2018; Oluwadipe *et al*., 2022). Landfills are considered to be one of the cheapest waste treatment methods but it raises concern as a major threat to the environment and the public health (Symeonides *et al*., 2019).

Attributively, during the FIFA world cup 2014, the event was attended by over 5.1 million people and in the same year GHG emissions in Brazil went up by 32098 tCO2e (Crabb, 2018). However, Brazil was able to offset these emissions by the end of 2014 through the Kyoto Protocol's Clean Development Mechanism (CDM). The Kyoto Protocol's CDM project allows emission reduction in developing countries through certified emission reductions (CERs), where the CERs are traded and sold to offset emissions generated. One CER is equivalent to one tonne of CO2 and Brazil was able to offset over 545,000 tonnes of CO2 equivalent (UNFCC, 2015). During the FIFA World Cup 2006 in Germany, the organizers reportedly reduced the amount of solid waste generated by 20% (Oldiges, 2015). The event organizers introduced the concept of returnable beaker for drinks,

an approach not practiced before at any mega sports event. Both thedelivery and sale of food and PET bottles for all sorts of drinks adopted this multi-use system in order to minimize the number of single use plastic needed during the event (Oldiges, 2015). The approach banned the use of any unnecessary food packaging materials, advertisement and giveaways. Furthermore, during the event, all bureaucratic issues were solved electronically wherepossible. Paper and plastic waste was strictly avoided; bureaus and stands were built temporary soas to enable re-use for other purposes or events. Where waste reduction was not possible, the issueof recycling was adopted (Oldiges, 2015).

In comparison, sustainability was the focal point during FIFA world cup 2022 that took part in Qatar. The country aimed to achieve carbon neutrality and deliver the first ever carbon neutral mega event (Kucukvar *et al*., 2021; Lundberg, 2023). The goal needed to be realized through efforts that reduce carbon emissions through projects in the country. The country set up tree nurseries with stress tolerant variants to cut down excess emissions in Qatar 2022 hence maintaining long term sustainability. The study used i-Treeassessment tool and USA database to correlate climate conditions analysis between Doha and states in the US which share almost same demographics. Qatar also used water consumption, use of fertilizers and power consumption to assess carbon emission. The analysis revealed reduced carbon emission (Spanos *et al*., 2022). Moreover, the organizers of the Qatar FIFA world cup 2022 adopted world-class waste management by ensuring proper waste segregation, sorting and storing of wastes at source. The organizers outsourced authorized licensed waste contractors to collect, handle and transport generated wastefor safe disposal. The waste management practices were implemented through the construction of the stadiums and aimed to achieve the highest recycling rate of waste generated during the world cup games (Al-Hamrani *et al*., 2021).

Through adopting the principles of the circular economy stadium construction sites were able to channel at least 79% of solid waste from landfill. The practice of waste reduction, reuse and recycling were maximized in order to achieve this success. The constructed achieved a very high reuse and recycling rate of total generated waste, 90% at Al Janoub Stadium and 84% at Ahmad Bin Ali Stadium (Al-Hamrani *et al*., 2021). Such outstanding reuse and recycling rate was achieved through approximation of waste per site and per floor area (Al-Hamrani *et al.*, 2021). Moreover, outlining specific difficulties and obstacles surrounding major construction projects and the importance of waste management during such projects was the hallmark in the presentation (Al-Hamrani *et al*., 2021).

Oluwadipe *et al*. (2022) argues that it is critical to practice waste reduction as a waste management practice during sport events. Waste reduction reduces associated GHG emission from landfills therefore reducing the negative environmental impacts of the generated wastes. Furthermore, waste reduction saves the financial resources that would have been used in waste treatment and the mitigation of the negative impacts (Oluwadipe *et al*., 2022). In the English premier league, waste recycling rate on solid waste was found to increase by 71%, surpassing household waste recycling in England by 40% (Oluwadipe *et al.*, 2022). The increase in waste recycling was attributed to commitment of environmental professionals in the football tiers towards clean environment and the engagement of environmental safety specialist in waste management (Oluwadipe *et al*., 2022). Stadiums are adopting plastic free policies and the promotion of compostable cups and tumblers. The Kia Oval cricket grounds in London, UK has adopted the use of eco-friendly cups to replace plastic pint glasses. The cricket hosting stadium has further installed free water fountains and taps that provide water refilling to attending spectators (UNEP, 2018). Additionally, Sanford Stadium, the campus of the University of Georgia, reportedto transport an

average of 34 tons of waste to the local landfill each and every time the stadium isused (Duc Thanh, 2019).

During the annual Alzheimer marathon held in 2019 in Italy, it was found that among the plastics waste generated, less than 15% was suitable for recycling (Bianchini & Rossi, 2021). The suitability rate for recycling was attributed to the fact that there was lack of waste segregation and sorting at source. Waste segregation and sorting are important stages in waste management since different types of solid wastes require different methods for processing and recycling. Stakeholders in the marathon partnered with research organizations to develop a waste management project dubbed "CORRIPULITO". CORRIPULITO objectives were to promote waste awareness by spectators and other participants at the waste collection stage (Bianchini, & Rossi, 2021). The project carried out awareness campaigns, training of participants, and installation of waste separation containers for four types of plastics and other wastes. The stakeholders further organized waste sorting by volunteers. Beside the labour intensity involved, CORRIPULITO has proved to be effective by increasing the recycling rate of plastics generated from the "Maratona Alzheimer" by a higher value each year (Bianchini & Rossi, 2021).

In India, the Chinnaswamy stadium attracts at least 40,000 spectators per game hosted in the stadium (Goyal, 2018). An average of 3-4 tonnes of mixed waste is generated per game and due to lack of wasteseparation, all the wastes end up in landfills. The stadium has adopted a zero-waste policy, using an army of green-clad volunteers to sort waste and educate spectators during Indian Premier League matches. The zero-waste concept has enabled the implementation of the 5Rs of Zero Waste(refuse, reduce, reuse, recycle and rot) reduction of solid waste management hierarchy

(Goyal, 2018). In Rafiee *et al.* (2018), cross analysis of waste management among most common sport events in Iran was conducted. On average the common practice identified was the disposal of sports generated wastes in landfills. Fifty percent of waste generated in the study period was found to end up in landfills while 45% was composted and only 5% of the total waste was recycled (Rafiee *et al*., 2018).

Atchariyasopon (2017) observes that, in Thailand, solid waste management by football clubs in the Thai Premier League lacks proper management. The impact is environmental damage and climate change since large quantities of the waste generated ends up in landfills and contributes to methane emission. Furthermore, due to low rate of recycling, the plastic waste ends in the ocean thus contributing to endangering the marine and aquatic ecology (Atchariyasopon, 2017). Clubs in the league have not yet embraced environmentally friendly waste management in terms of waste minimization and prior sorting, collection, recycling, composting, energy recovery, treatment and disposal (Atchariyasopon, 2017). Puangmanee and Saearlee (2020) also concluded that most solid wastes in mega events in Thailand are not separated at the source. Wastes are mainly deposited collectively in waste collection bins which are later taken into temporary storage points awaiting collection. During waste collection averagely a third of the collection points practice waste segregation (Puangmanee & Saearlee, 2020).

Duc Thanh (2019) highlights that in Vietnam, Chi Lang Stadium in Da Nang district resolved to solvesport generated waste by installing a waste treatment at the stadium. The treatment plant aimed to achieve zero landfills disposals; reduce emissions of secondary pollutants into the environment and the production of renewable energy products from the generated solid waste (Duc Thanh, 2019). The treatment plant assists the local community to treat at least 900 tonnes of solid

waste daily. Besides treatment of waste and economic development through job creation, the stadium also engages in creating awareness among the local community on proper waste management (Duc Thanh, 2019). Similarly, Skirmantas *et al.* (2020) notes that waste generation at sports event is dependent on waste management approaches employed by the organizers. Adopting policies on effective waste disposal and segregation will minimize waste while lacking proper waste management policies and stakeholders' awareness will lead to significant waste generation. Properwaste management is essential as it contributes to ecology and sustainability of sporting events through minimizing environmental damage (Skirmantas *et al.*, 2020).

In South Africa, the National Department of Environmental Affairs and Tourism (DEAT) since the preparations of the FIFA world cup 2010, set guidelines to be followed in order to minimize sport related solid waste. Primarily, waste management practices in the guidelines include but not limited to; waste minimization, sorting at source, waste avoidance, recycling and re-use, redirection, composting, job creation, art from waste. The main objective for the regulation of sport related in sport is to ensure that all sport and recreation activities are conducted in such a way that the environment is not adversely affected (Department of Forestry, Fisheries and Environment [DFFE]., 2018). However, there is a notable dearth of recent literature on solid waste management in sportlocally and Africa at large. Solid waste generation and management remain unexplored.

The impact of sport events on the environment is a major concern among government and non-governmental agencies and waste management in sport is continuously gaining attention and policy development (Rozhdestvenskaya *et al.*, 2021). Sport event organizations have been observed to increase their efforts on promoting environmental sustainability during sport events by influencing spectators' behaviour through embarking on green event strategies and campaigns (Achu, 2019; Casper *et al.*, 2020; McCullough & Kellison, 2016). Among the European Union

member states, the European Commission is implementing Waste Framework Directive that aims to bring the internal recycling to 65% by 2035 during sports and other events. The goal is to ensure the highest rate possible for waste recycling and minimization at source (Rozhdestvenskaya *et al*., 2021).

2.3 Type of Solid Waste Generated During Sport Events

Sport events mainly generate almost similar type of waste as most events that involve participants and spectators who eat and drink during the event. Food and drinks packaging generate tremendous amount of waste in the sport industry (Wohner *et al*., 2019; Zelenika *et al*., 2018). Martinho *et al*. (2018) also acknowledges that solid wastes in sport events is linked to consumption of food and drinks of visiting spectators and fans. Food and drinks packaging account for 79% of waste generated during sports (Martinho *et al*., 2018). Rozhdestvenskaya *et al*. (2021) while discussing waste management in sport events observes that, ratio of the components of garbage and waste of mass sports events can be categorized as 55% food waste, 13% recyclable plastic waste, 9% recyclable paper waste, 8% non-recyclable paper waste and 8% mixed waste. Ananda *et al*. (2019) indicate that sport events generate wastes comprising of more than half organic waste and about one third of plastic wastes. The type of composition in sport generated wasted is attributed to effects of food consumption from spectators, and solid waste from food vendors around facilities (Ananda *et al*., 2019). Lundberg (2023) also found that about a third of waste generated in athletics training event in England is plastic waste from food packaging materials. During the FIFA world cup 2006, an event that was attended by at least 2 million people, plastics, paper, glass and bio waste, mainly produced through catering -serviettes and food leftovers were the main type of solid waste generated (Oldiges, 2015).

In Puangmanee and Saearlee (2020) single use plastic water bottles were found to be the main type of waste found after analysis of type waste generated in marathon events in southern Thailand. Other general waste comprised of wax or paper cups, bowls and plates, sponges and plastic carrier bags. Compostable waste found commonly in the same study was coconuts, food waste, and fruit peelings from bananas and watermelons (Puangmanee & Saearlee, 2020). In Atchariyasopon (2017), over 85% of the solid waste generated at the in-football matches in the Thailand's premier league were commingled and could not be viably sorted and recycled due to its mixture with food waste in waste bins. However, spectators were able to pinpoint that they mostly generate plastic carrier bags, food packaging materials, plastic and glass bottles, aluminum cans and plastic cups (Atchariyasopon, 2017). The relationship between the previous studies and this study was that similar research needed to be carried out in the context of the local premier league games to investigate the most commonly generated types of solid waste during the premier league games.

2.4 Stakeholders' Behaviour and Solid Waste Management during Sport Activities

Environmental protection in relation to sports is increasingly gaining attention internationally from all political facets. Stakeholders play significant role in policy development, implementation and adherence to set guidelines and standards. In Europe, the European Union (EU) has developed various set of measurement indices to evaluate environmental pollution in the context of the European Green Deal (Wendtlandt & Wicker, 2021). Such monitoring and evaluation measures are aimed to significantly reduce environmental damage and the impact of climate change by addressing waste reduction from all sources. European Union aims to reduce greenhouse gas emissions even further by 2030 in an attempt to become a climate-neutral continent by 2050 (Wendtlandt &Wicker, 2021). Further, development of policies on environmental effects of sports activities in the Swedish sports was investigated and findings of the study revealed that governance in relation to sports and environment were passively adhered to or not strongly enforced

(Hognestad *et al*., 2022). Additionally, regulations of policies related to sports and environment by the organizers during sports practices are mostly not updated with the current climate change demands. Adherence to the policies during the sport activities is also an issue (Hognestad *et al*., 2022). The organizers shed light on the problematic, but urgent, relation between sport and its environmental impact by focusing on the development of internal policies in the Swedish sport movement as well as on external normative pressures for a sustainable environmental development. The materials in this study portray passive (and blind) governance inrelation to an official environmental policy at macro and meso levels, regardless of the manifestations of individual environmental projects in everyday sport practices. The analysis shows that the ideology of the autonomy of sport and the emphasis on self-regulation, regularly upheld by the Swedish Sports Confederation, is obsolete (Hognestad *et al*., 2022).

Additionally, in order to manage solid waste during sport events it is important to consider two trends of practice (Shahri, 2021). First, sports spectators need to be motivated, enlightened, and encouraged to practice ideal waste management practices to facilitate programs such zero wastein sports. Spectator waste management initiatives may focus on effective communication strategies between the organizers, clubs and spectators to foster a waste recycling behaviour (Shahri, 2021). Secondly, sport organizations should take the center stage in ensuring positive uptake of ideal waste management practices. However, it is observed that among most spectators the culture of ideal waste management is usually ignored and tend to have a slow uptake (Shahri, 2021). Pereira *et al*. (2019) verified that more football clubs now get involved in sustainable practice. For instance, in the EPL, only a few premier league clubs like Tottenham Hotspurs, Rochdale and Aston Villa save their energy and maintenance expenses by use of energy saving lighting, which in turn reduces GHG emissions. Travelling fans play a significant role in GHG emission through

transportation. Some clubs in the UK have thus offered tickets that promote use of public transport to reduce GHG emissions by private cars (Pereira *et al*., 2019). Other clubs like Oldham encourage supporters to employ use of public transport systems to football venues through their social media handles andleaflets. Most football clubs rarely put environmental mitigation and policy to show that their clubsare indeed trying to reduce impacts of football to the environment especially GHG emissions generated from travel, energy use and even from waste dumped in landfill. Manchester City football club is the only club with written policies on environmental conservation and policies thateven contain detailed mitigation steps (Pereira *et al*., 2019). While most literature pinpoint to strategiesto ensure proper waste management in Europe, few studies highlight gaps and trends on strategiesadopted by counterparts in developing countries such as Kenya. Therefore, this study will aim tofill this gap.

From the literatures, ecological footprints of sports activities shows that sport organizations are aware about the impact their activities cause on the environment. However, they are proactively addressing the negative environmental impact of their operations producing outcomes including increasing organizational legitimacy, averting legal recourse, saving money and building stronger relationships with key stakeholders (Manni *et al*., 2018). Whereas these studies focused on the environmental sustainability in sports, investigation on behaviour and decisions of the stakeholders and sports organizers on ecological footprints of sports activities on the environment was not done. This research's main aim and focus was on bridging that gap on the behaviour about the ecological footprints of sports activities to the environment to better understand and thus address policies in this field. Furthermore, sports organizer may use predictive models to determine and anticipate spectators waste management practices. Du Preez and Heath (2017) observed that spectators with positive situational intentions are more likely to display desirable behaviour towards ideal waste

management practices. Such spectators are important in the promotion of ideal waste management practices during sport events (Du Preez & Heath, 2017). However, it is also noted that when it comes to waste management behaviours during sports, club members tend to portrayantecedents of environmentally friendly behavioural intentions (Braksiek et al., 2021).

According to Green (Mullenbach & Green, 2018) education on environmental issues was taught alongside mentorship programmes at the University of Georgia for student athletes. An investigation on environmental attitudes, self-efficacy and behavioural intent on environmental related issues was conducted among students in treatment groups. The students in the treatment groups improved their environmental behaviours in the result of the assessment as compared to their environmental behaviour before the assessment (Mullenbach & Green, 2018). In the current study, the environmental behaviour of participants that consists of spectators, the athletes and their officials was examined to assess their behaviour towards the environment. Based on the literature review, used to acquire results based on the knowledge of athletes about environmental issues and how their sports activities impact the environment (Mullenbach & Green, 2018). Spectators' environmental behaviour on their actions like travelling, waste disposal as well as the means of transport they used to attend football matches in relation to their effects to the environment was examined in the study.

Besides the paucity of literature in waste management in sports in Africa, in Cameroon, it was observed that attendees in sport events tend to be more pro-environmentally friendly during sport events as compared to when they are at home (Achu, 2019). Primarily, the behaviour during sport events has been mainly triggered by the emphasis on environmental initiatives and awareness campaigns during the events (Achu, 2019). However, Oseghale and Ikpo (2018) on the contrary

observed that most sports facilities in South West Nigeria have not effectively complied with the requisite national and international standards. The compliance includes standards in waste management thus highlighting lack of spectator's awareness, availability of waste collection bins and lack of waste segregation in general (Oseghale & Ikpo, 2018). According to Schmitt *et al.* (2018) such inconsistencies contribute to negative perception on proper waste management among non-regulatory stakeholders. Lack of awareness and regulatory laxity represent barriers to perform environmentally sustainable behaviours as they influence behaviours to perform sustainable environmental actions (Schmitt *et al.,* 2018). Martins *et al*. (2022) also concludes that the effect of constraints, points of attachment and past sustainable behaviours are key predictors of sports spectators' sustainable environmental intentions. Moreover, accessibility, community attachment, time and past sustainable behaviours influenced sustainable environment behaviours among sports spectators. It was further recommended that it is vital for the organizers of sport events to develop sustainable awareness campaigns that promotes safe environment, strengthening the connection between the local community and the event spectators and improving the availability of information on environmental safety so as to enhance commitment to clean environment and more sustainable practices (Martins *et al*., 2022).

2.5 Theoretical Framework

This study was guided by the theory of planned behaviour (TPB). The theory of planned behaviour describes and predicts human behaviour as an anticipated action by their behavioural control concepts and intentions (Wang *et al*., 2020). The theory of planned behaviour posits that behaviours are determined by behavioural intentions and under certain circumstances, perceived behavioural control. Behavioural intentions are determined by a combination of three factors: attitudes toward the behaviour, subjective norms and perceived behavioural control (Kan &

Fabrigar, 2017). The theory of planned behaviour (TPB) was developed by Icek Ajzen (1985, 1991) as an extension of the theory of reasoned action (TRA) by Fishbein and Ajzen (1975) and Ajzen and Fishbein (1980). TPB represents a general model that aims to predict and explain behaviour across a wide range of different types of behaviours in the human coexistence (Kan & Fabrigar, 2017). A significant issue in the theory of reasoned action (TRA) is the assumption that behaviours are under one's volitional control. However, the postulation has been outlined as unrealistic in several contexts. Volitional control of behaviours tends to be diverse across different situations thus the development of the theory of planned behaviour (Kan & Fabrigar, 2017).

In TPB, behaviour predictors are weighted by the fact that attitudes, subjective norms, and perceivedbehavioural control do not always contribute equally to predicting behaviour intentions (Ryan & Worthington, 2018). From time to time, an individual's behavioural intentions are largely influenced by attitudes and subjective norms may have little or no influence. Occasionally, an individual's behavioural intentions may also be determined largely by subjective norms, and attitudes may have little or no influence (Ryan & Worthington, 2018). The theory of planned behaviour has been largely used across a range of environmental behaviour research in areas of environmental behaviours, waste management, ecological behaviours and climate change (Howell *et al*., 2015; Islam, 2021; Strydom, 2018; Zhang *et al*., 2021). Therefore, this study adopted the theory of planned behaviour as a guide to define the scope for its variables.

In the context of this study, the FKF football league stakeholders' activities interact with the natural environment during matches. This study envisaged providing information which may be used to inform policy and football stakeholders towards sustainable waste management practices. All football activities as well as behaviour of stakeholders, participants and organizers in relation to

ecological footprints of football activities to the environment, policy and decision making may be done to achieve sustainability and also maintain the football activities.

Through theory of planned behaviour, examining the variables assisted the assessment of perceptions regarding effects of sports activities to the environment. This study used Likert scale to elucidate perceptions of participants in solid waste management practices. Their decisions and actions in relation to activities related to the environmental effects of sports like decisions on allocation of financial resources for conservation, waste management protocols and policy implementation during sport events in relation to ecological footprints of football activities were examined.

2.6 Conceptual Framework

The conceptual framework reviews the relationship between independent variables and the dependent variables. The independent variables for this study solid waste management practices and behaviour, types of solid wastes, and stakeholders' perceptions. The dependent variable for this study was solid waste management during FKF premier league games. The independent variables and their sub-variables relate with the dependent in way that positive action will influence solid waste management during FKF Premier league games positively while negative action will lead to negative outcomes.

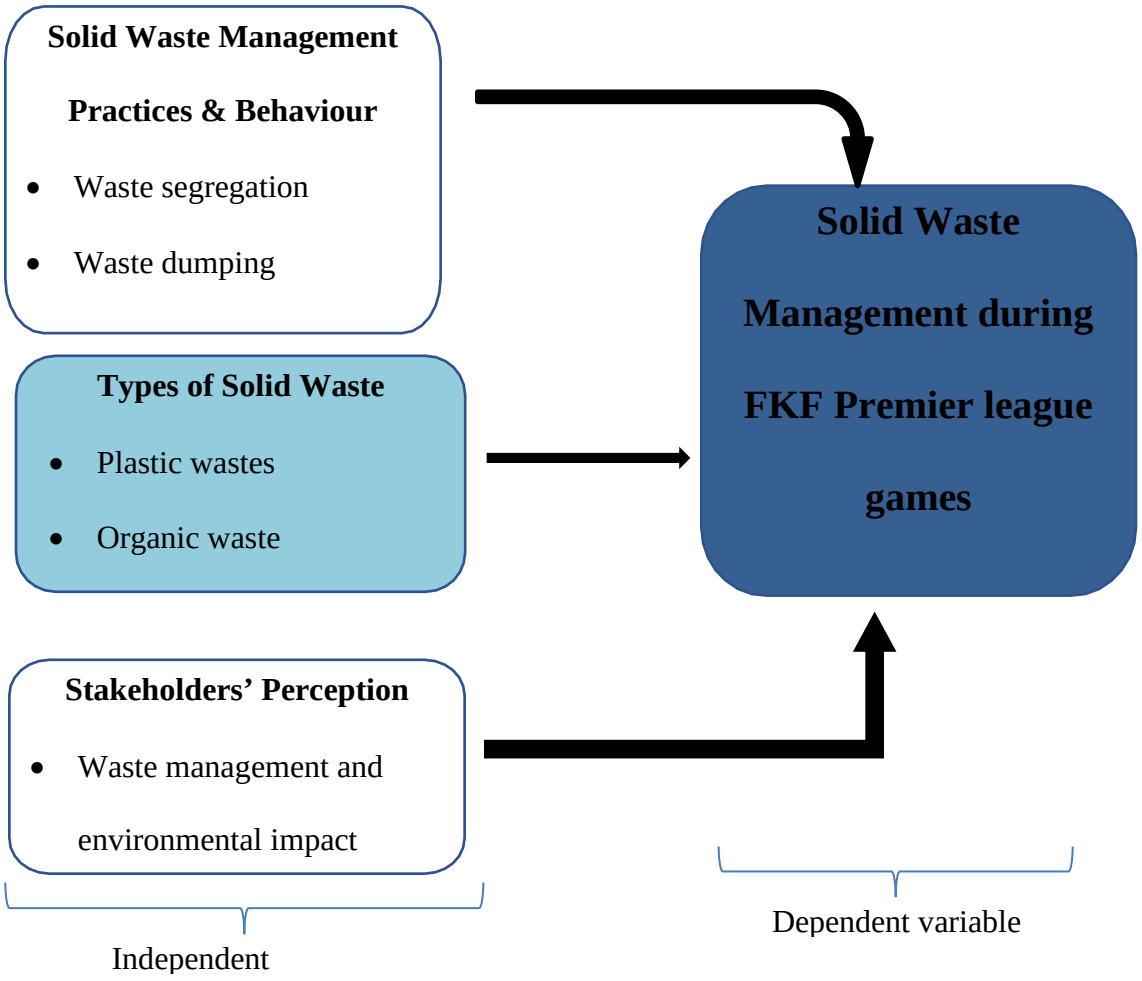

Figure 2-1: The conceptual framework (Source; Author, 2023)

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the research methodology in the following sub topics: study area, research design, sampling and sample size, data collection, data analysis and the expected study outputs.

3.2 Study Area

The study area for this research was Nairobi City County. Nairobi is the hub of East Africa thus important for most economic activities. It is also vital in this study as major football activities in the region are mostly focused in Nairobi thus large population. Moreover, Nairobi has a substantial ecological footprint of solid waste during football activities compared to other counties in the country. This is attributed to better facilities and improved infrastructure in comparison to the rest of the counties. Due to these factors, Nairobi City County is ideal for this study.

3.2.1 Population and size

Peripherally, Nairobi is surrounded by three other counties that also serves to support the livelihood of the population in the vibrant city. Northerly, lies Kiambu County to the North and West, southerly to the city county lies Kajiado County and easterly lies Machakos County. (Nairobi County, 2023). The County lies about 140 Kilometers south of the Equator at longitudes 36^{o} 45’ East and latitudes 1^{o} 18’ South spanning in a total area of 696.1 Km2. It lies at an altitude of 1,798 metres above sea level (Nairobi County, 2023).

The county is divided into 11 sub counties namely; Westlands, Embakasi, Dagoreti, Kamukunji, Kasarani, Langata, Kibra, Makadara, Njiru, Mathare, and Starehe. By population, the county has a population of 4,397,073 people, 2,192,452 (49.9%) being male, 2,204,376 (50.1%) being

female, and 245 (0.006%) being intersex (KNBS, 2019; Nairobi County, 2023). The total number of household in the county is 1,506,888 households with an average household size of 2.9 (KNBS, 2019). Embakasi Sub-County has the highest population size of 492,476 and Kibra sub-County has the least population size of 94,199 people (KNBS, 2019). Population age cohorts 0-4 years, 20-24 years, 25-29 years, and 31-35 years have the highest population size at 524,987, 563,019, 583,548, and 495,470 respectively (KNBS, 2019).

3.2.2 Climate and topography

The proximity to the equator and altitude of 5,889 ft above sea level categorizes Nairobi County with climatic characteristics classified under subtropical highland climate based on the Köppen climate classification. The coldest season is the June/July, during this season, the county exhibit temperature drops to 9 °C (48 °F). The warmest seasons exhibits temperatures that reach a mean maximum temperature of 24 °C (75 °F) (Nairobi County, 2023; Ochola *et al*., 2020). However, the actual temperature in Nairobi County ranges from 10 °C to 29 °C, coldest and warmest respectively. The rainfall pattern is characteristically bimodal as a result of formation of equinoxes by the prevalent Northeast and Southeast winds convergence. The long rains season is experienced from March to June whereas October and December experiences the short rains (Nairobi County, 2023; Ochola *et al*., 2020). On the average, Nairobi County receives rainfall of between 500mm to 1500mm with an annual mean of 900 mm. Due to the inability of black cotton soil to retain water, the county experiences run off which leads to flooding (Nairobi County, 2023).

Nairobi County has three main rivers; the Ngong River, Nairobi River, and River Kabuthi. Due to poor drainage in the county, the rivers are highly polluted by effluence from open sewers and industrial waste. The main water reservoirs in the County are the Nairobi dam and Jamhuri Dam. Nairobi Dam is located along the Ngong River (Nairobi County, 2023). The main types of soils are black cotton and red soils

that form patches in different parts of the County. The county has three forest zones; Ngong Forest, Karura Forest and the Nairobi Arboretum which represent a total area of 3.3% of the total area the county occupies. This is way low than the recommended 10% forest cover (Nairobi County, 2023).

3.2.3 Economic activities and social amenities

Being the major city in the country, Nairobi has the largest percentage of formal sector employment rate in Kenya. Approximately, about 453,000 persons are employed through formal sector in Nairobi County. Majority of the individuals in the manufacturing industries, other sector with high employment rates include hotels, restaurants and trade (Nairobi County, 2019). Other sectors such as transport, and construction provides employment to a significant proportion of the population in Nairobi County. The real estate, finance and business services sector also act as players in the provision of employment. Industrial area zones in along Mombasa road, Thika Road and Ruaraka areas are the main employment zones for manufacturing industries and trade, whereas the Central Business District (CBD) predominantly provides employment from hotels, restaurants and trade (Nairobi County, 2019). Considering the population in Nairobi County and the proportion of the population that is employed, a significant portion are left out of the formal employment group. Majority of those not in the formal employment are absorbed in the informal sector. Approximately, 1,548,100 of persons in Nairobi County are employed in the informal sector. The informal sector covers small scale activities that are semi-organized, unregulated and uses low and simple technologies while employing few people per establishment (Nairobi County, 2019).

While football dominates as the most participated sports, athletics, rugby, cricket and tennis also have a significant share of the sports in Nairobi County. The county also prides as it holds two of the only national stadiums in the country, Moi International Sports Centre Kasarani and the Nyayo National Stadium. Other stadiums and sports facilities include Nairobi City stadium, Ruaraka stadium, Dandora

stadium, Riruta stadium, Ligi Ndogo grounds (Nairobi County, 2019; Okuthe, 2019).

3.2.4 Solid waste Management

Solid waste management emerges as a significant issue in Nairobi County. At least 3200 tons of waste is generated per day and it is projected to increase proportionately with the increase in population size (Nairobi County, 2019). It is estimated that only 60% of total waste generated is appropriately disposed while only 10% is recycled. Quite a significant amount of waste find its way in to rivers and other undesignated places (Nairobi County, 2019).

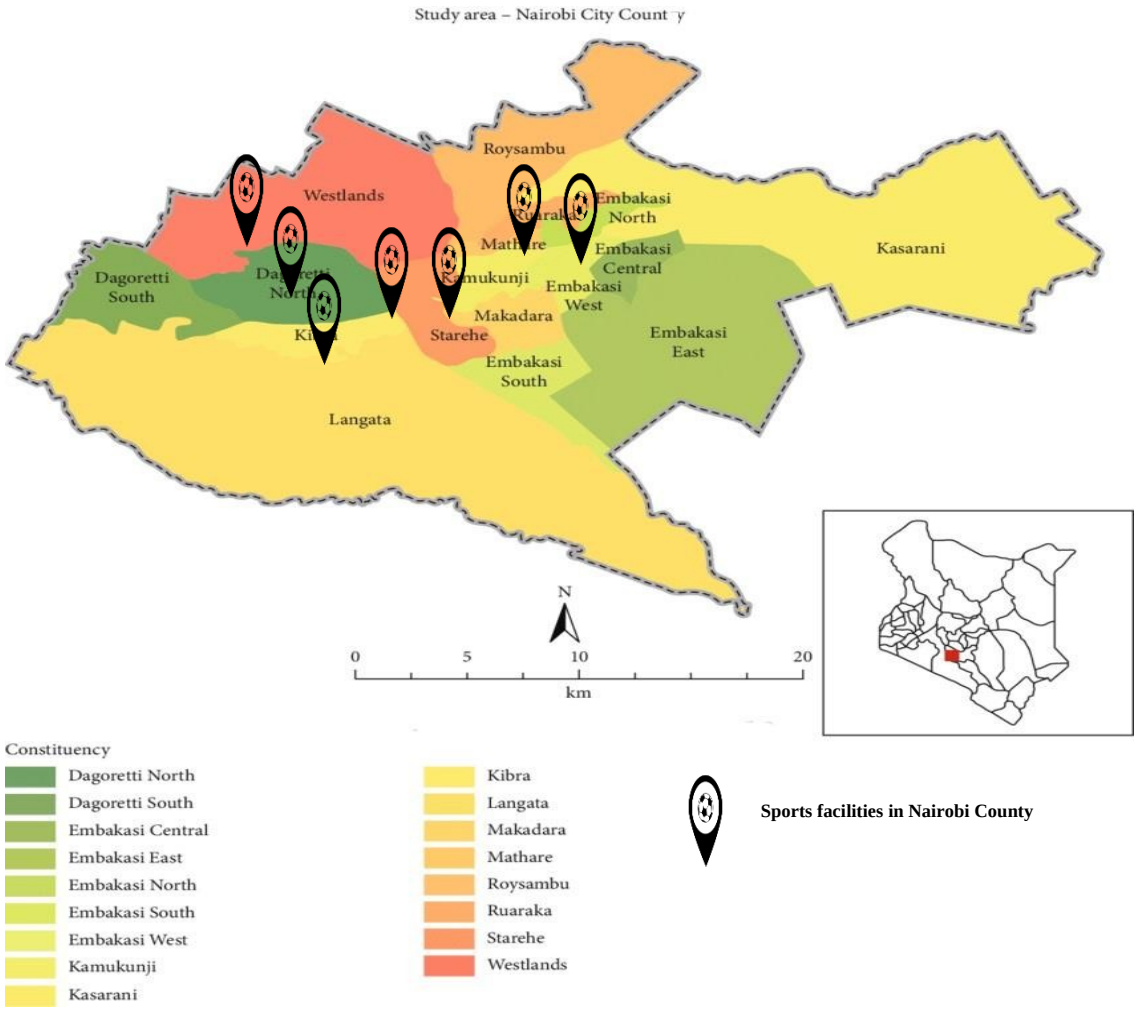

Figure 3-1: Nairobi City County Map, Source: *(Author, 2023)*

3.3 Research Design

The study adopted the use of both qualitative and quantitative methodologies as a mixed. Mixed method design employs both quantitative and qualitative data in one single study provides stronger inference than using either approach on its own. It helps bring out a holistic understanding from meanings obtained from interviews or observation to the prevalence of traits in a population obtained from surveys. This allows mixed methods to increase the depth and breadth of a study (Wasti *et al*., 2022). The focus was on gaining insights and familiarity for later investigation or undertakings when a research problem is in a preliminary stage of investigation. This is suitable for the current study as there are few studies regarding assessment of solid waste management

framework during football activities. Moreover, mixed methodology is flexible and address research questions of all types (what, why, how) which was pivotal in qualitative and quantitative data collection (Creswell, 2014).

3.4 Sampling and sample size

3.4.1 Sampling procedure

The Football Kenya Federation Premier League hosts 18 teams, nine teams in Nairobi County and nine from other parts of the country (FKF, 2019, 2020). Given Nairobi's central location and the major economic activities centered in Nairobi, hence its selection as the study area. The sampling was done during Covid-19 restriction period.

Each team has 25 participants and ten officials. The target population of participant players will be 225 from Football Kenya Federation premier league Nairobi based teams (FKF, 2019). This was arrived at by confirming the number of participants per team that is 25 participants per team and totaling all of them for the nine teams. The target population of officials is 90 arrived at by multiplying 9 by 10 officials per team (FKF, 2019). Due to the COVID-19 pandemic, it was estimated that at least 45 of spectators/fans turned up per game thus giving a population of 405 for at least 9 league teams games. This is majorly due to restricted number of attendees by the Kenya Ministry of health of spectators allowed per sports event due to the Corona Virus (COVID-19) pandemic control measures. Thus, a total of 720 participants who included players, officials and spectators was the target population.

Stratified random sampling and probability sampling technique were used in the study to ensure that each group of the target population was well represented. Nine strata were used to represent the teams in Nairobi City. Based on the study's methodology, a sample size of 80% for each stratum was found to be more appropriate to reduce sampling error. Key informants were a representative from the

Football Kenya Federation, representatives from Nairobi City Council and environmental representatives from National Environmental Management Authority (NEMA)

3.4.2 Sample size calculation

Fisher's formula in Mugenda and Mugenda (2003) was used to determine the sample size as follows:

$n = Z^2pq/d^2$

Where;

n= the desired sample size for target populations that are larger than 10,000.

Z = the standard normal deviate at 95% confidence level

p = the proportion in the target population estimated to have characteristics of being measured, 50% was used in this case.

q = 1-p

d = the level of statistical significance set.

Therefore,

$N= \frac{(1.96)^2 (0.5)(0.5)}{(0.05)^2}$

= (3.8416) (0.25)/ 0.0025

= 0.9604/0.0025

=384

However, for a population of less than 10,000 Fisher *et al* formula will be used

Whereby the required sample will be:

$$n_f = \frac{n}{1 + \frac{n}{N}}$$ where;

nf = the desired sample size when the population is less than 10,000,

n = the desired sample size when the population is more than 10,000,

N = the estimate of the population size.

Therefore, with an estimate population of 720, the sample size for this study was;

$$n_f = \frac{384}{1 + \frac{384}{720}} = 251 \text{ participants}$$

Therefore, a sample size of 251 was used in this study.

The sample size was proportionately allocated among the 3 groups using the following method:

The three groups comprise of 25 players, ten officials and 45 spectators/fans per match. This gives a total of 8. To get the proportionate allocation out of the sample of 251, each group is divided by total sum of the three which is 80 and multiplied by total sample of the three groups of 251.

For Players: (25/80) *251= 78

For spectator: (45/80) *251=142

For the officials: (10/80) *251 = 31

From the study's sample size of 251, the sample size of players was therefore 78 participants. The sample size of officials was 31 and a sample of 142 spectators was used from games conducted in Nairobi City County.

3.5 Data collection

3.5.1 Quantitative data collection

A questionnaire containing closed ended questions was developed and distributed to participants within in the study area and 251 questionnaires were distributed. The participants cumulatively included football players, football spectators/fans, match officials. The questionnaire was used to gather information on sports related environmental activities such as level of education, types of waste generated in the stadiums, waste management and awareness of environmental impacts of football activities to the environment. Benefits from thisapproach are that the data is more homogenous from the respondents since it was closed ended. Questionnaires were distributed using simple random sampling technique as highlighted in **Table 3.1** below for all the present attendees.

Table 3-1: Target Population and Sample Size of the Study

TARGET POPULATION		**SAMPLE SIZE**	
Group	**Total Number**	**Group**	**Total Number**
Players	225	Players	78
Spectators	405	Spectators	142
Officials	90	Officials	31
Sum Total	**720**	**Sum Total**	**251**

3.5.2 Qualitative data collection

Semi-structured interviews schedule was used to focus on acquiring qualitative data through open-ended questions, allowing for elaboration on specifically awareness levels of the different identified groups (sports organizers and sponsors), select sports participants and select authorities and the provision of more unique answers. It provided the opportunity for gathering an understanding of the wide variety of perspectives on awareness levels of football activities to the environment.

3.5.3 Key informant Interviews

An interview schedule was used to conduct interviews with selected members who are representatives of the main stakeholders concerning the environmental authorities, sponsorships and organizing of sports activities. In this study, the key informants were representative from the major stakeholders; Football Kenya Federation (FKF), environmental representative from National Environment Management Authority (NEMA) and the county government of Nairobi City

3.5.4 Participant's Observations

Field observations in form of participant and non- participant observations was also used in this research to achieve data in all directions and triangulation of data from other forms of data collections like interviews. Behaviour of spectators and vendors were observed before, during and after games in the stadiums and around the stadiums regarding their environmental behaviours such as disposing of wastes, kinds of products sold and their packaging. Clubs' match day management was also observed. Relevant environmental equipment such as trashcans, toilets, green spaces, vendors, types of bulbs, and public relation posters were also inspected through observations.

3.6 Data Analysis

The aforementioned observations were triangulated with collected data from interviews and questionnaires for analysis comparatively to find reliability of data. Quantitative data collected was cleaned, collated and electronically entered for analysis using online surveying software. The R- package and SPSS were used to organize the data and information into theme tables, figures and bar charts for data analysis. Qualitative data from the interviews was recorded and transcribed to permit detailed coding (Strauss & Corbin, 1998). The data was analysed using tabulations.

3.7 Ethical Considerations

To carry out the study, permission was sought and granted from University of Nairobi, Wangari Maathai Institute for Peace & Environmental Studies. Additionally, informed voluntary consent was sought from all the respondents before participation in the study.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This chapter present data analysis results interpretation and discussion. The chapter covers the following subsections; socio-demographic characteristics, assessing waste management during FKF Premier league games, post-match waste management, assessing the types of waste generated during FKF Premier League games.

This study had a response rate of 91%, 228 out of the 251 distributed questionnaire were filled and returned, according to Mugenda and Mugenda (2003), a response rate of 50% is adequate for analysis and reporting; a rate of 60% is good and a rate of 70% and over is excellent. Based on this assertion, the response rate was excellent for analysis. The responses from the questionnaires were used to analyze the data and the findings are presented under this chapter.

4.2 Socio-Demographic Characteristics

Slightly more than half of the participants, 57% (n=129) were aged between 18-25 years. Participants in the age bracket 26-35 were the second in majority, 32% (n=72), while participants above the age of 50 were only four, representing 2% of the total participants. **Table 4.1** below elaborates the findings. The findings from the study demonstrates that most of the participants were aged between 18-35 years. The finding confers with Tainsky and Xu (2019) where most football spectators were found to be youths below the age of 35 years. Furthermore, the competitiveness of a team in the local league was observed to determine an enhanced affinity and fanaticism among the youths as compared to older adults. Moreover, whereas youths below the age of 35 years in this study, are the majority, (Debrah *et al*. (2021) notes that youths tend to have a high level of solid waste management awareness but are ignorant on the practice. Therefore, spectators' age trends can be used to pinpoint waste management behaviour among

sports spectators and advice on targeted sensitization.

All the participants, 100% (n=228) resided in Nairobi County. Thirty- eight percent (n=87) of the participants resided in Makadara Sub County, 37% (n= 83) resided in Kasarani, while about a quarter of the participants (n=58) resided in Westlands Sub County as shown in Table 1 below. More than half, 59% (n=134) reported to have attended last match in 2022, 40.7% (n=93) attended last match in 2021, while only one participant attended last match in 2020. From the findings, the results indicate that the participants are active football spectators and attend football events regularly. However, owing to the spectatorship characteristics, there is a lower tendency of the participants to travel outside Nairobi City County to for games. Therefore, it can be deduced that games attract majority of local spectatorship, however, Covid19 and related movement restriction would have played a role for this trend in 2020 and 2021. While this can result in low spectator turn out and low stadium collection, it results to a positive impact on the environment. Motor vehicles are heavy CO2 emitters releasing about 1.4 billion tons of greenhouse gases (GHGs) into the atmosphere each year globally. The emission from motor vehicles contributes to global climate change by approximately 13% thus negative impact on the climate policy targets such the Paris Agreement on climate change (Miotti *et al*., 2016; Warren *et al*., 2018). Therefore, reduction in upcountry football spectators' travel can play a huge role in reduction of transport sector related GHG emissions. However, its sustainability in GHG emission reduction needs to be reviewed further.

Further, based on KIIs findings, six stakeholders emerged as the key players on waste management during any FKF premier league games. The stakeholders include the fans, football clubs, stadium management, FKF, FIFA, NEMA, and the government. The fans have role in ensuring disposal of wastes and reduction of careless littering. KII-4 highlighted that;

"First, there is the fans, they are the ones that make the game be a sensation, but they are the ones who generate most of the wastes. If the fans reduce littering, waste management will be easy."

Football clubs have a role on ensuring their fans are well sensitized on waste management while the stadium management plays the role of waste collection and handling. FIFA through FKF only supports football development projects and corporates organization funds the league. The county government regulates and supervises waste management at the county level. NEMA's role was highlighted as more of a regulator; it coordinates and supervises environmental issues and licensing. KII1 pointed the following;

"Everyone has their roles, clubs have a role, FIFA and FKF have their role and since we live in a devolved nation, the counties have their role to play."

Table 4-1: Socio-demographic characteristics of the participants

Item	**Subset**	**Frequency**	**Percentage**
Age	18-25	129	57
	26-35	73	32
	36-50`	22	9
	Above 50	4	2
	Total	**228**	**100**
County	Nairobi	228	100
Sub County	Westlands	58	25
	Makadara	87	38
	Kasarani	83	37
	Total	**228**	**100**

4.3 Assessing Waste Management during FKF Premier League Games

4.3.1 Knowledge of Solid Waste Management

The study examined the participants on awareness of waste management practices and policies. Majority of the participants, 93% (n=211) responded that they are aware of waste management practices while only 7% (n=17) reported that they were not aware of solid waste management practices during football events. **Figure 4.1** below illustrates the results. Additionally, 83% (n=189) of the participants highlighted that they were aware of policies regarding waste management while 17% (n=39) highlighted that they were not aware of policies on waste management. The findings demonstrate a higher proportion level of awareness on solid waste management practices and policies related to sport events. The findings support conclusions in Bartis *et al*. (2021) that most football spectators aged above 20 years generally understand the environmental impact of waste during sport events and are aware of waste management practices.

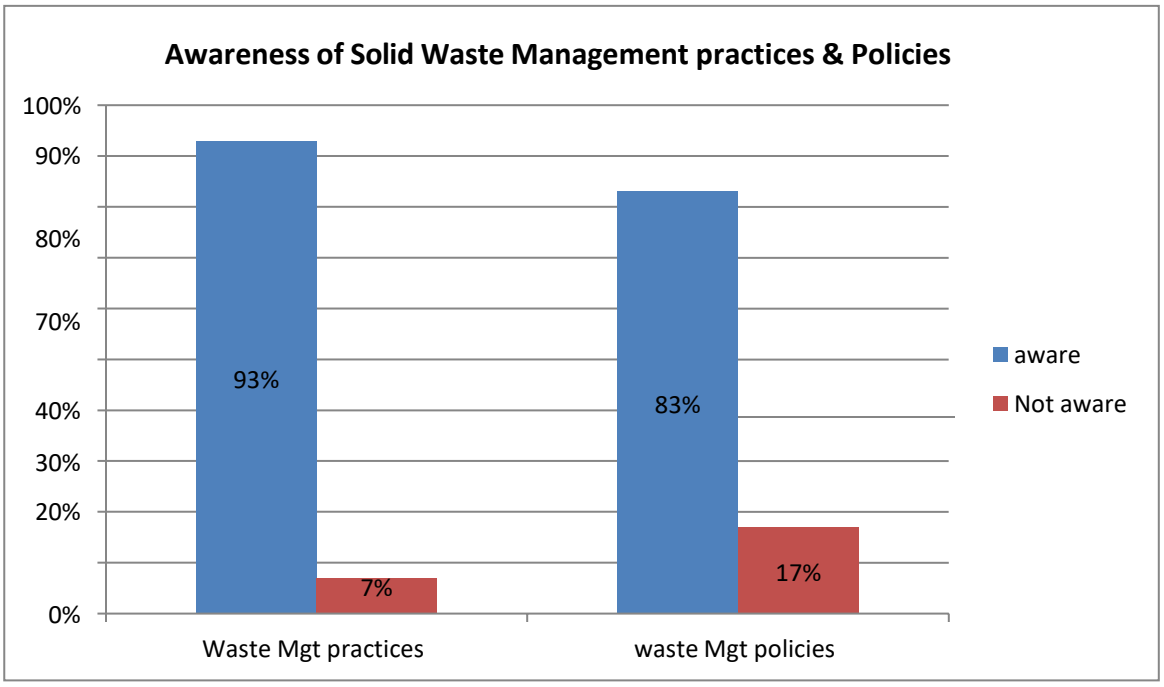

Figure 4-1: Awareness of Solid Waste Management Practice and Policies

Further more than half, 69% (n=158) of the participants outlined that they were aware of NEMA polices on solid waste management, 10% (n=23) were aware of NEMA and EMCA Policies while

18% (n=41) were not aware of any solid waste management policies. At least more than three quarters of the participants are aware of at least one solid waste management policies related to sport events. NEMA solid waste management policy is demonstrated as the most familiar policy among the participants. Findings by Oyake-Ombis *et al*. (2015) on general public awareness on solid waste management policies in Kenya are in line with the findings in this study.

Table 4-2: Specific Policies **Participants are Aware of**

Specific Policies aware of	**Frequency**	**Percentage**
None	41	18%
NEMA	158	69%
NEMA EMCA Policies	23	10%
NEMA NSWMC Policies	4	2%
NEMA EMCA NSWMC Policies	3	1%

***Participants selected more than one option**

The study further evaluated on the knowledge of specific policies. The findings demonstrated that majority, 92% (n=211) of the participant stated that they do not know any specific solidwaste management policies applicable in FKF premier league. Only two percent (n=5) highlighted they know policy regarding plastic bottles recycling. Three percent (n=6) stated that they know NEMA policies on unnecessary littering carrier bags respectively as elaborated by **Figure 4.2** below.

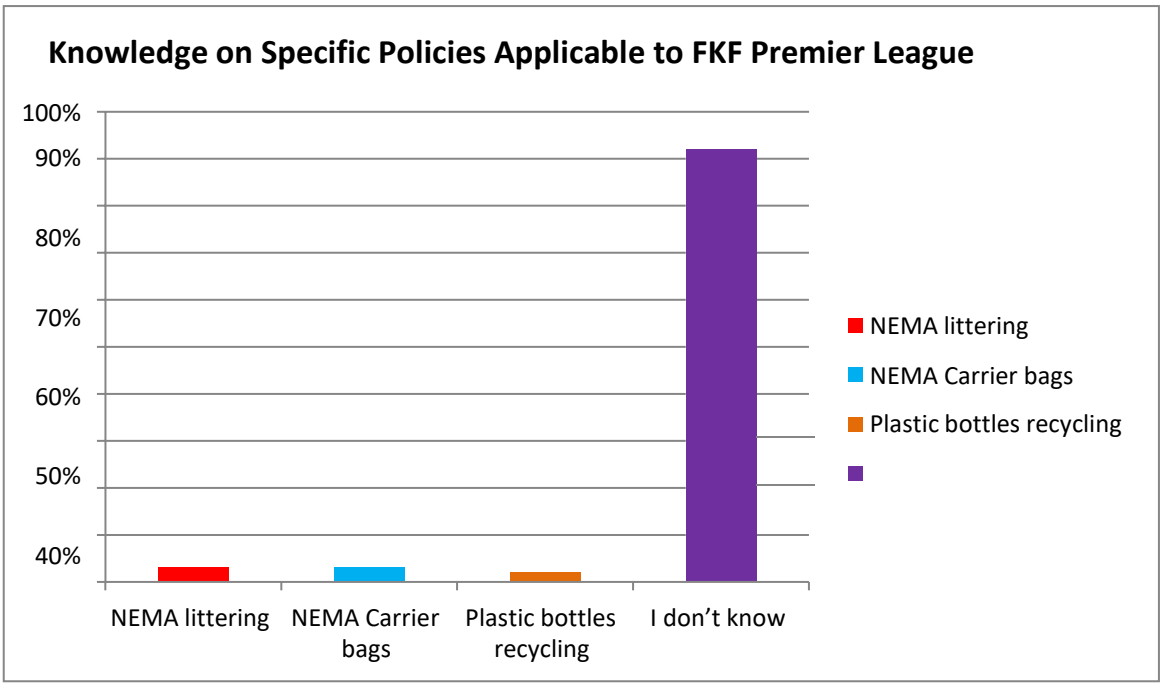

Figure 4-2: Knowledge on Specific Policies Applicable to FKF Premier League

The findings further show that, 93% (n=212) of the participants responded that they were familiar with the use of recycle bins for waste management. Only seven percent (n=16) responded that they were familiar with the use as illustrated in **Figure 4.3** below. Seventy-six percent (n=174) of the participants acknowledged awareness of policies regarding waste management. Twenty-four percent (n=54) responded thatthey are not aware of any policies regarding waste management.

Seventy-seven percent (n=175) of the participants highlighted that they have not been sensitizedby their favourite football club on waste management. Only twenty-three percent (n=53) of the participants highlighted that their club had taken an initiative to educate them on waste management during football games. Further, among the participants, 68% (n=155) responded that the stadium management has not educated them on waste management during games while slightly more than one third (n=73) stated that they have been educated on waste management bythe

stadium management. **Figure 4.3** below show the results.

Several regulatory policies guide waste management during FKF premier league games. Holistically, from the KIIs, it emerged that waste management regulations during FKF premier league games are anchored under the Constitution of Kenya 2010 and regulations. Article 42 of the constitution highlights the right of every person to a clean and healthy environment. The Environmental Management and Co-ordination Act (EMCA) prohibits against dangerous handling and disposalof wastes while the Kenya Gazette notice 120/2006 on environmental waste management regulation. KII-2 highlighted that;

> *"Regulation of waste management in Kenya is enshrined in the constitution. First, fans are protected with article 42, giving them a right for clean stadiums"*

It also emerged that the devolved function of waste management to counties mandates the Counties to oversee waste management in the counties. The Nairobi City County waste management practice is regulated under the Nairobi City County Solid waste management act (2015). Moreover, FKF, NEMA and County government emerged as the key policy developers on waste management used during FKF premier league games. All the stakeholders reported to engage all other relevant stakeholders when developing or updating solid waste management policies. KII-2highlighted that;

> *"All our policy developments pass through policy development procedures, i.e. Draft, public participation, vetting etc. Then it goes through parliament and presidential approval."*

Notably, the FKF premier league is regulated by good and favourable waste management practices. The regulatory framework includes the constitution of Kenya, the Environmental Management and Co-ordination Act (EMCA), NEMA, and various county government solid waste

acts courtesy of the devolved government. However, the key challenge as noted from the key informant interviews is laxity of enforcement officers and lack of awareness among players. Furthermore, there is an open policy development process involving all the stakeholders including the public. In order to achieve sustainability in healthy sporting environments, the coreof the matter remains the promotion of awareness on waste management. Lack of awareness and public participation are a significant challenge that calls for collaborative actions to mitigate the environmental impacts from solid waste.

The study findings further show that football clubs and stadium management have taken little or no initiative in sensitizing spectators on waste management. Seventy seven percentof the participants highlighted that their favourite football club on waste management has not sensitized them. Similarly, majority of the participants, 68% indicated that the stadium management has not sensitized them on waste management during FKF premier league games. The findings concur with Ráthonyi-Ódor *et al*. (2020) who concluded in their study that most sport spectators in Africa are not sensitized on matters of waste management during games. Compared to their counterparts in the English premier league, premier league clubs have intensively developed the concept of spectators' waste management during games.

The major revolution is the concept of adopting sustainable solutions to waste management (Ráthonyi-Ódor *et al*., 2020). The findings indicate that football clubs in FKF premier league have not embraced the bottom-up approach of sport ecology and sustainability. McCollough *et al*. (2020), highlightsthat the bottom-up perspective in sports is where individual teams or clubs promote sustainable environmentally friendly behaviours without a mandate from a government, governing body, or league. Whitmarsh *et al*. (2018) argues that good waste reduction behaviours at source not

only saves money on waste management procedures but also saves the environment from careless pollution and reduces risks to climate change. Furthermore, Atchariyasopon (2017) also found out that due to poor waste segregation behaviour and waste separation at source, less than 15%of the recyclable waste in stadiums proceed to recycling. The rest go to landfills in the form of commingled solid waste. Spectators may be sensitized on the waste management hierarchy as a waste reduction behaviour that includes waste reduction, reuse and recycling as a strategy to develop sustainable waste management during sport events. Recycling and reusing recyclable waste can significantly reduce landfills related CO2 emissions.

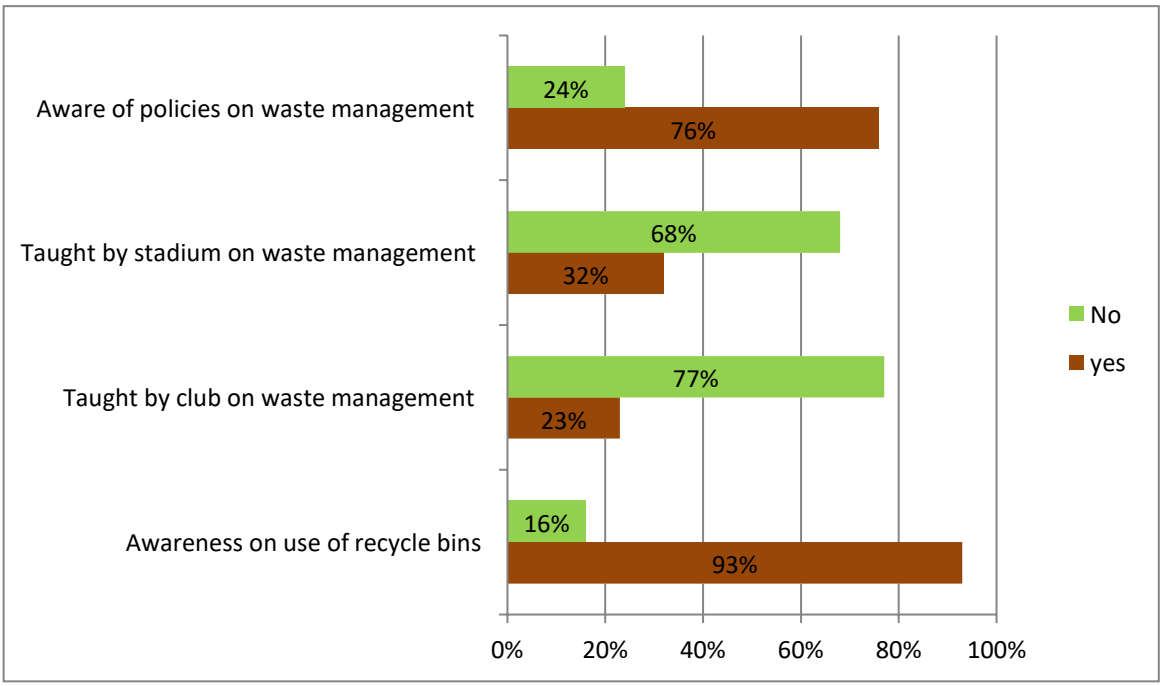

Figure 4-3: Awareness and Sensitization on Solid Waste Management

Upon analysis of the key informants' interviews, the theme of waste management sensitization during FKF premier league games also emerged. Attributively, it emerged that sensitization and education of club specific fans on waste management during FKF premier league games are delegated to the football club's management. FKF only undertakes general public sensitization through social and mainstream media. The stadium has the responsibility of placing pitch banners

to sensitize spectators on waste management during games. KII-1 highlighted that;

> *"FKF does not get involved on club's fans sensitization; it is entirely role of the club's management to sensitize their fan"*

Even though FKF hosts the games, they only hire out the stadiums for matches. Therefore, they do not allocate funds for waste management during games as the stadium entrance fee collection is driven towards waste collection and management initiative. Waste collection and management is the key responsibility of the host stadium. However, it emergedthat there is lack of awareness among general football fans in regard to waste management during games. Among those aware on waste management, there is the aspect of ignorance thatplays a role in poor waste management among spectators. KII-3 highlighted that;

> *"There is an obvious lack of awareness among many football fans on how to manage waste during football games. However, there is a bit of ignorance among others"*

Enforcement officials' laxity also emerged as a contribution poor waste management practice.

4.3.2 Solid Waste Management Practice

Solid waste management practice determines environmental impact in any particular setting. More than one third of the participants, 38%(n=87) reported that they practice waste dumping in their day-to-day activities, 21% (n=48) reported to practice rebottling, 14% (n=33) practiced composting, 29% (n=67) practiced burning of waste and 25% (n=58) practiced waste recycling. **Table 4.3** below demonstrates the results. The findings indicate that on the average, participants practice good waste management practice. The finding also highlights that traditional waste management practice of burning waste, is still a common practice. The findings are in line with Ramadan *et al*. (2022) conclusions that open burning of waste is still a routine practice across several communities globally, more so in developing countries. However, it is noted that, while

open burning of waste is a concern strategically discussed among policy developers in developing countries to fulfil sustainable development goals (SDGs), there is an obvious challenge when it comes to implementing effective solution and strategies (Ramadan *et al*., 2022). While burning of waste is an easy method of getting rid of solid waste, open burning of wastes is not only a global health disaster but also significantly contribute to global warming and climate change (Cogut, 2017). Open burning of waste practice highlights a significant concern on the knowledge of environmental impact and its deleterious effect on human health and climate change. The Stockholm Convention highlights guidelines on minimizing and eliminating unintentionally produced organic pollutants (UPOPs) such as those produced throughopen burning (Sun *et al*., 2016). However, its implementation by relevant stakeholders and public awareness plays a significant role on the reduction and regulating open burning practice.

Besides, based on the findings on awareness, majority of the participants, 93% (n=212) reported knowledge on the use of recycle bins for waste management. However, only 25% of the participants highlighted that they practice solid waste recycling. The findings resonate with Debrah *et al*. (2021) conclusion on awareness verses practice concept on waste management. While many individuals have high level of awareness on waste management, very few practice its concept (Debrah *et al*., 2021). From our KII findings, the stakeholders also raised the concern of ignorance as a challenge of careless littering during FKF games. The key informants acknowledged the challenge of lack of awareness in some instance and where awareness was not an impeding factor, ignorance was noted to be dominant.

Table 4-3: Solid Waste Management Practices

Solid Waste Management Practice in day-to-day activities		
	Frequency	Percentage
Dumping	87	38%
Rebottling	48	21%
Composting	33	14%
Burning of wastes	67	29%
Recycling	58	25%

***Participants stated more than one waste management practice**

4.3.3 Availability of waste collection bins in the stadium

The study aimed at assessing waste collection strategies at source during FKF premier league games. At least one third of the participants, 30% (n=69), reported that there is lack of waste collection bins in the FKF premier league host stadiums. Seventy percent (n= 159) reported availability of waste collection bins within the stadiums. **Figure 4.4** captures the frequency of waste bins placement in the stadiums during FKF football events.

Further, among the stadiums with waste collection bins availability, 42 % (n=95) of the participants further reported an even strategic distribution of the waste collection bins. Fourteen percent (n=32) highlighted that uneven waste collections bins distribution while 13% (n=30) observed that the bins were randomly distributed within the stadiums as demonstrated in **Figure 4.5** below.

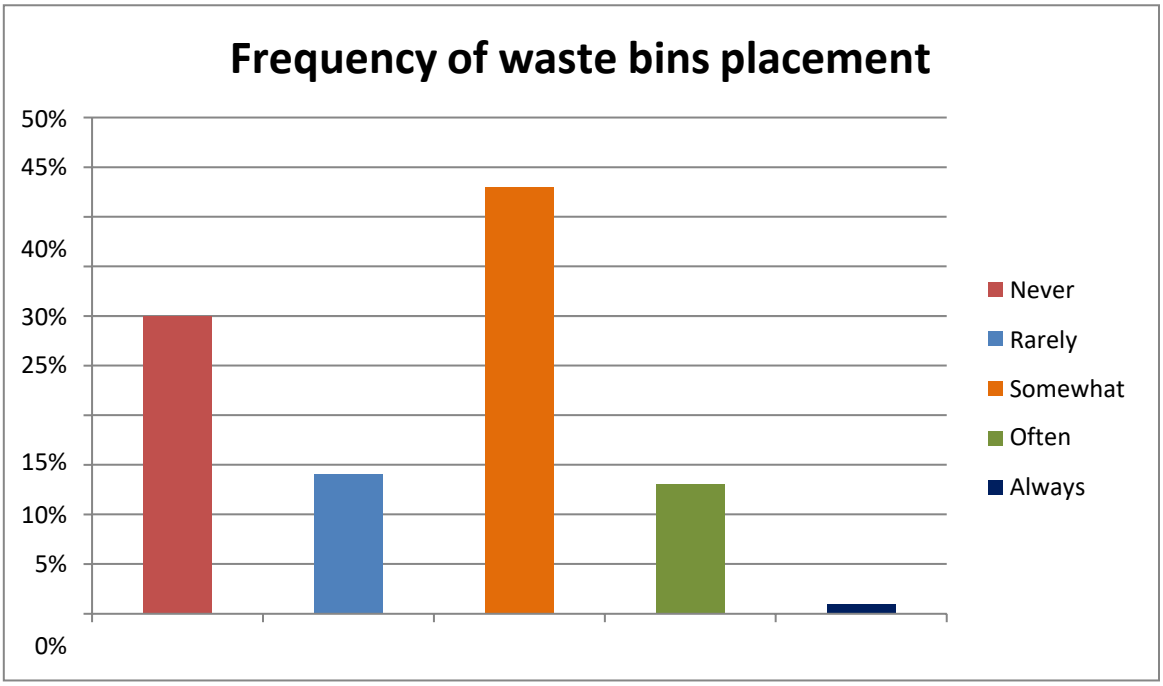

Figure 4-4: Frequency of Waste Bins Placement

Besides bins availability, strategic distribution and ability to facilitate waste segregation is equally very important towards attaining a good solid waste management. Majority of the participants, 87% (n=198) highlighted that the bins available in host stadiums did not allow solid waste segregation. Only thirteen percent (n=30) responded that the available bins were categorized for waste segregation. Furthermore, at least 62% (n=142) responded that the waste collection bins were placed in strategic location while 38% (n=86) responded that waste collection bins were not distributed strategically. **Figure 4.5** highlights strategic distribution and waste segregation factors as reported by the participants. The above findings positively relate with Atchariyasopon (2017) conclusions that showed that during the Thailand Football League tournaments, the host stadiums were observed to have lower distribution rate of waste collection bins. Waste collection bins distribution was uneven compared to the total number of attendees (Atchariyasopon, 2017). Moreover, it is noted that uneven distribution of waste collection bins and lack of waste segregation practice creates waste disposal challenges among spectators during sport events therefore,

facilitating careless littering (Kiani *et al*., 2019).

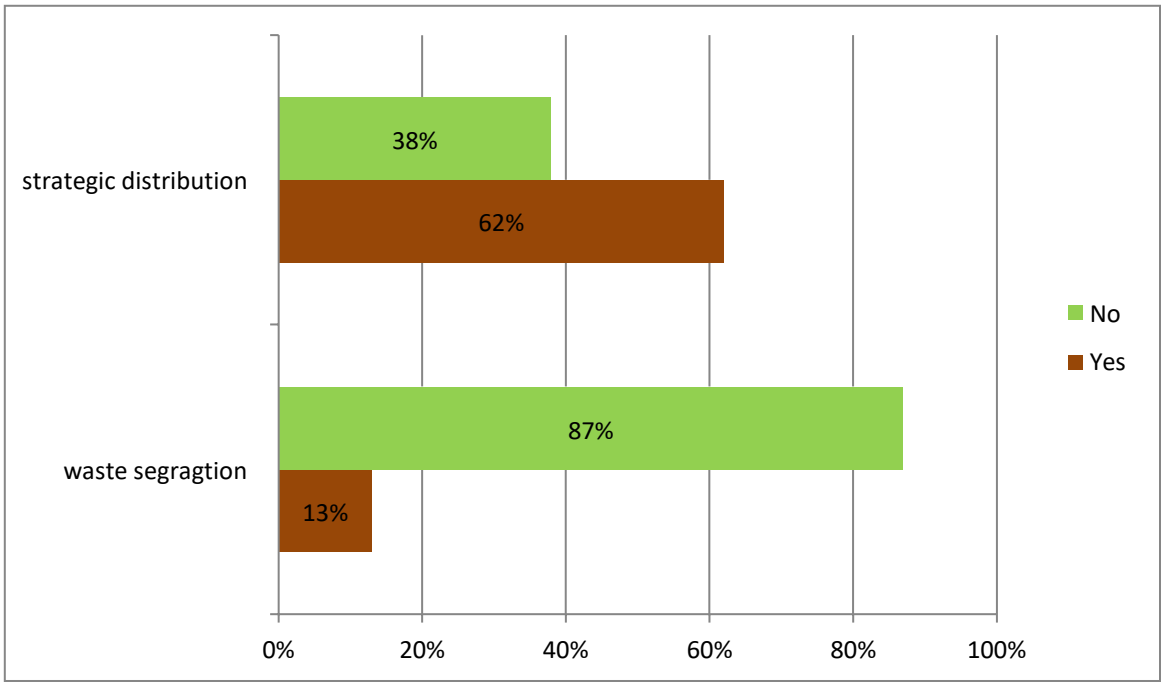

Figure 4-5: Waste Distribution and Waste Segregation

4.3.4 Post-Match Waste Management Practice

Depending on the game outcome, waste management behaviour after the games has a role in the solid waste management process. The study sought to understand participants' waste management after FKF premier league games. From the findings, majority of the participants, 83% (n=189) reported that they collect and dispose left overs and other wastes after games. Twenty-three percent (n=52) highlighted that they leave wastes to be collected by the stadium cleaners. Only six percent (n=13) highlighted that they carry wastes to dispose them at home. Three percent (n=8) did not know what they do with leftovers and other wastes after football games as shown in **Figure 4.6**. Our findings confer with Jalil *et al*. (2019) who concluded that based on the total amount of waste generated during sport events that spectators have a higher tendency of disposing waste in the

stadium than carrying the waste to dispose at home. In the theory of planned behaviour (TPB), the findings can be explained in relation to personal attitudes.

The attitude of going to pile the waste at home and the inconveniences of waste collection influences the waste disposal behaviour (Ajzen, 1991; Kan & Fabrigar, 2017). In this case, the spectators tend to dispose the generated wastes in the available collections bins rather than go with the waste at home. Where there are no available waste collection bins, the spectators may leave wastes undisposed for collection by the stadium cleaner.The behaviour can be perceived based on the assumption that the hosts have made waste collection and environmental cleaning arrangement. Personal attitude also influences such perception and behaviour based on the TPB model.

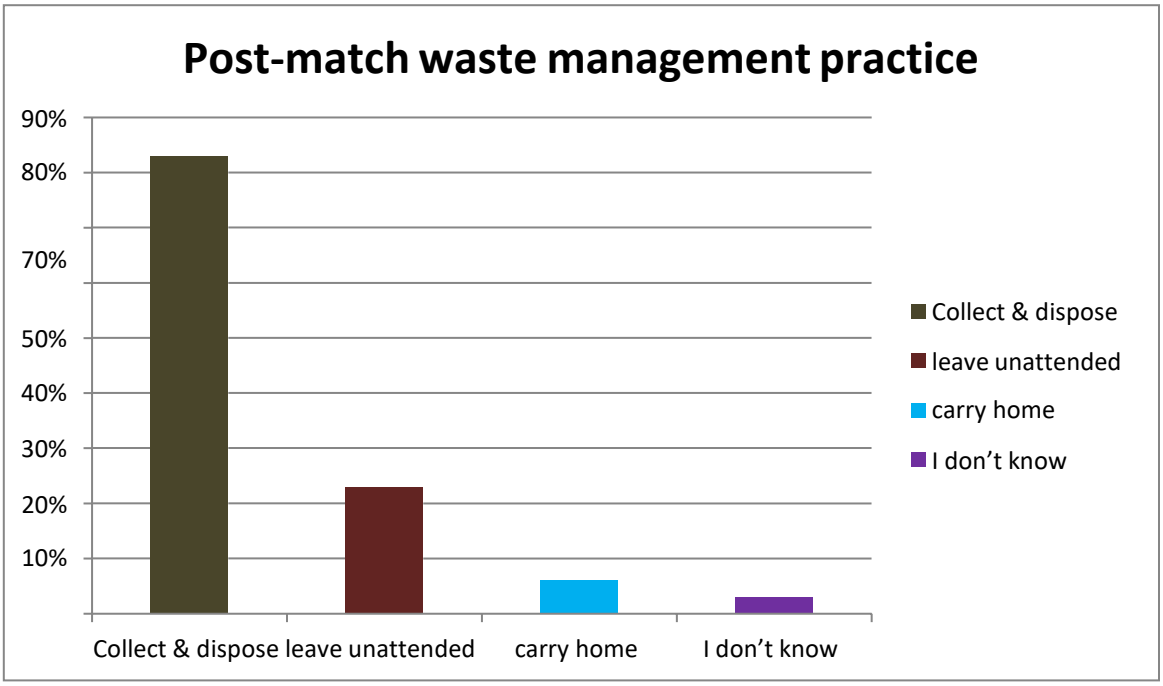

Figure 4-6: Post-Match Waste Management Practice

Further, the findings show that among the participants who collected and disposed their wastes, thirty-one percent, (n=70) highlighted that they carried their wastes to dispose at home. Eighty-six percent (n=195) of the participants stated they just discard their wastes while only six percent (n=13) throw waste

in the dustbins. Only three percent (n=6) stated that they ask where to take their wastes while in the stadium. Only 10% of the participants highlighted that they carry their wastes back home.

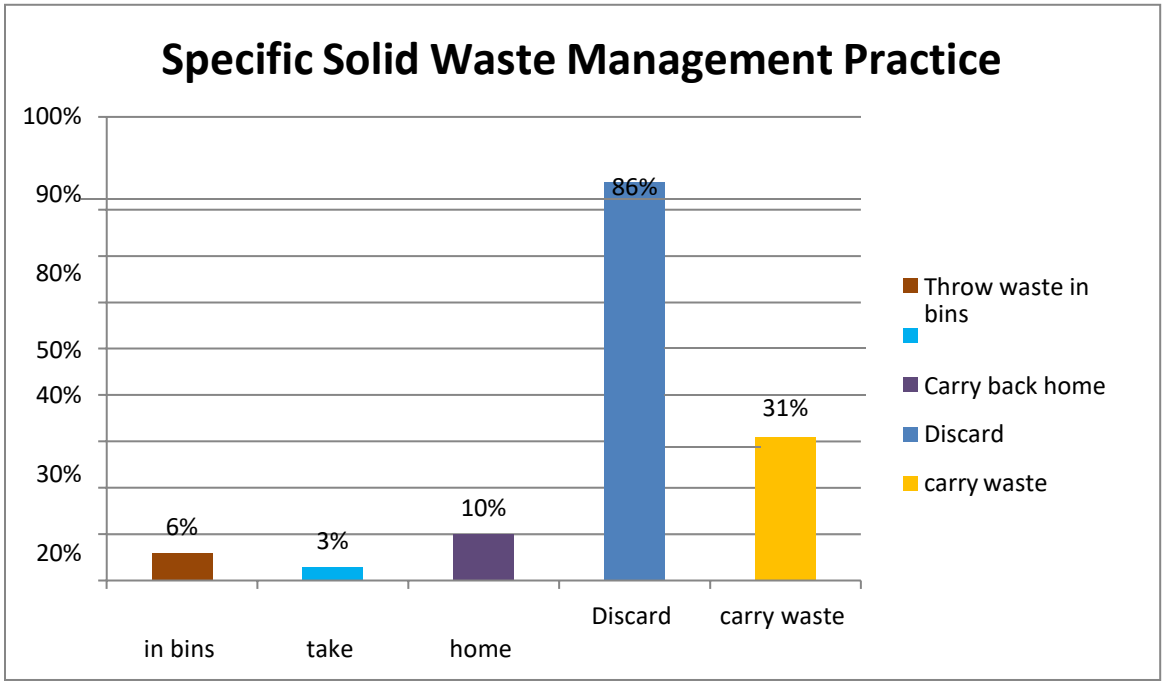

Figure 4-7: Specific Solid Waste Management Practice

For those that carried waste home, half of the participants, (n=11) stated that they re-use wastes generated while attending FKF premier league games. Forty-one percent (n=9) reported that they recycle waste while 28% (n=6) highlighted that they practice rebottling. Twenty percent (n=4) of the participants reported to practice waste composting as a waste management practice as demonstrated in **Figure 4.8** below.

Majority of the participants practice the behaviour of leaving the stadium clean after attending a game and more often, tend to discard their wastes in the provided waste collection bins. The findings also indicate that participants practice other good solid waste management practices such as reusing and recycling wastes. Water bottles rebottling practice was observed to be the most

common practice among the participants. Bruchmann *et al*. (2021) support the finding withthe observation where majority of participants were found to own a re-usable water bottle while attending sport events.

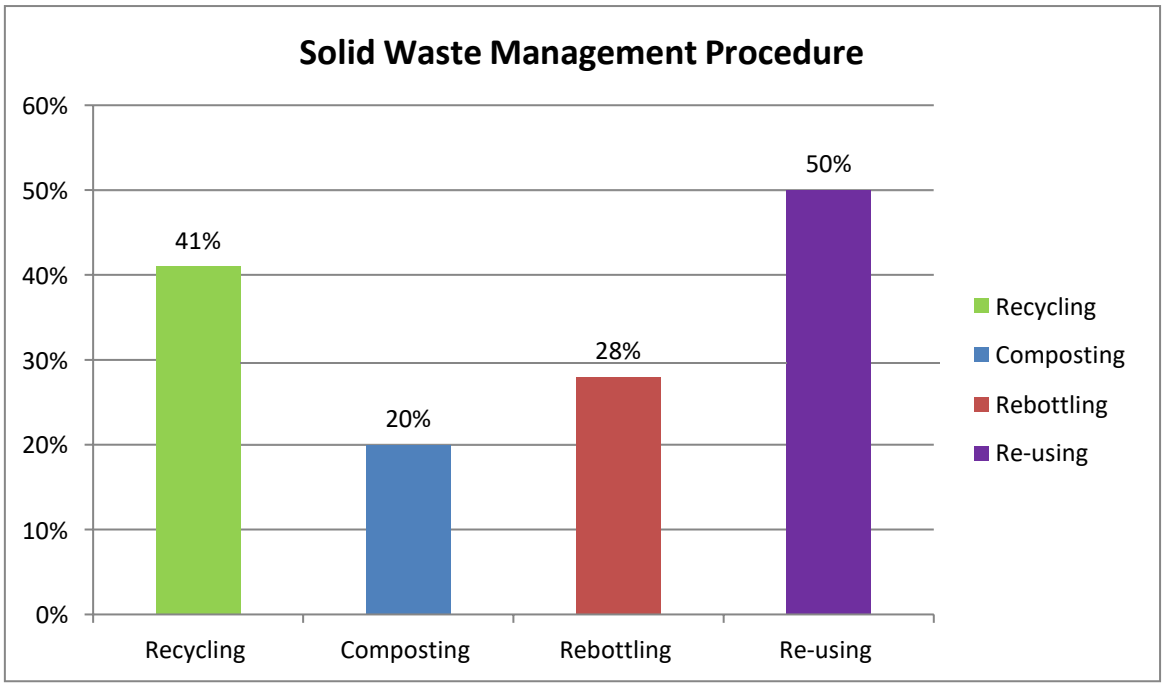

Figure 4-8: Solid Waste Management Procedures

4.4 Assessing the types of waste generated during FKF Premier League games

4.4.1 Common items carried to the stadium by the participants

To understand the type of waste generated during football games, assessing the type of items carried to the stadium by spectators is important. The findings show that, slightly less than half, 46% (n=104) of the participants carried snacks while going to watch a football game, 90% (n=206) carried water bottles, 19% (n=44) carried face masks. Only three percent (n=7) highlighted that they carried other items besides water bottles, face masks and snacks to the stadium as demonstrated in **Figure 4.9** below.

The findings point out that water and snacks form the most common itemscarried to the stadium during FKF premier league games. The findings agree with Koenigstorfer (2018) conclusion that sport events involve participants and spectators who eat and drink throughout the event. Owing to the activities involved in supporting their favourite team, spectators tend to carry take away food and snacks such as hotdogs, soft drinks and water (Koenigstorfer, 2018). Scholz (2020) also observed in their study that majority of fans attending a football game carried a bottle of water and their favourite club flag.

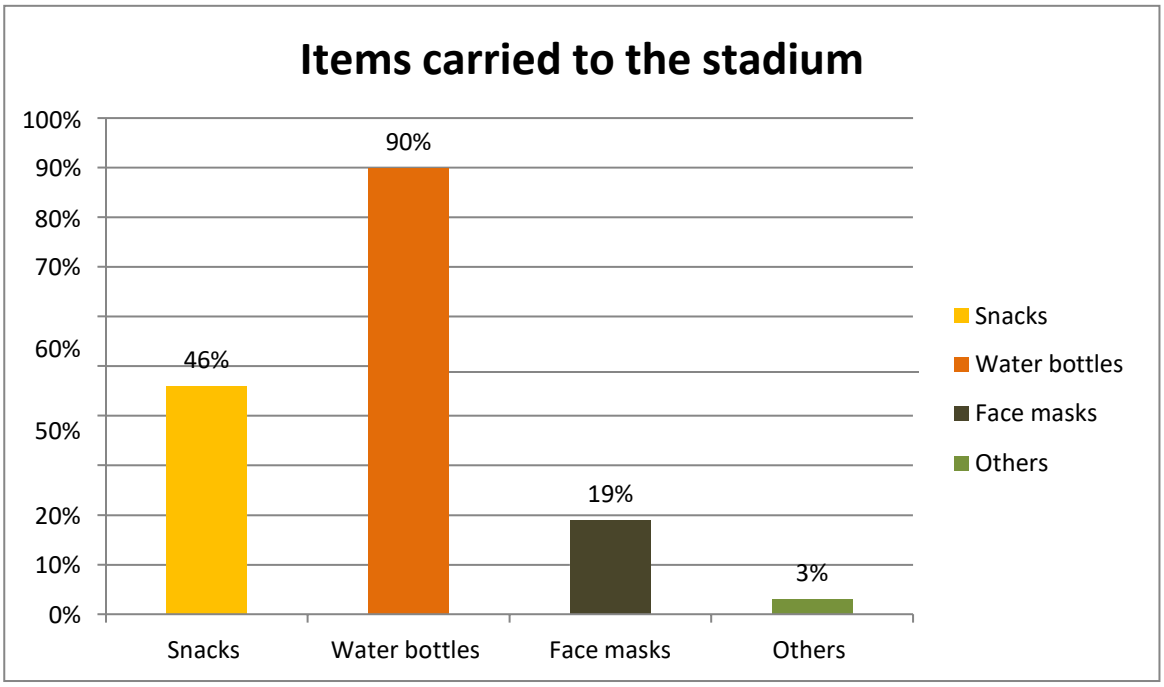

Figure 4-9: Items Carried to the Stadium by Participants

4.4.2 Type of Solid Waste Found in the Stadium before games

Equally important, assessing the type of solid waste found in the stadium before a football game will help in the assessment of type of solid waste generated during football games. As per the findings, majority of the participants, 96% (n=218) reported that they find plastic bottle in the stadium before a football game begins. Twenty-four percent (n=54) reported to findbiodegradable bags, 18% (n=41) found organic wastes, and 14% (n=31) reported to find facemasks as wastes in

the stadium. Only four percent (n=8) reported to find other types of solidwastes in the stadium before a football game begins as illustrated by **Figure 4.10** below. The findings indicate that plastic bottle wastes and biodegradable wastes are the most found in the stadiums before the FKF premier league games commence. From the findings, this may indicate that waste collection is not done after events in the stadium. Poor waste collection process and intervals indicates poor waste management practice, wastes tend to accumulate over time.

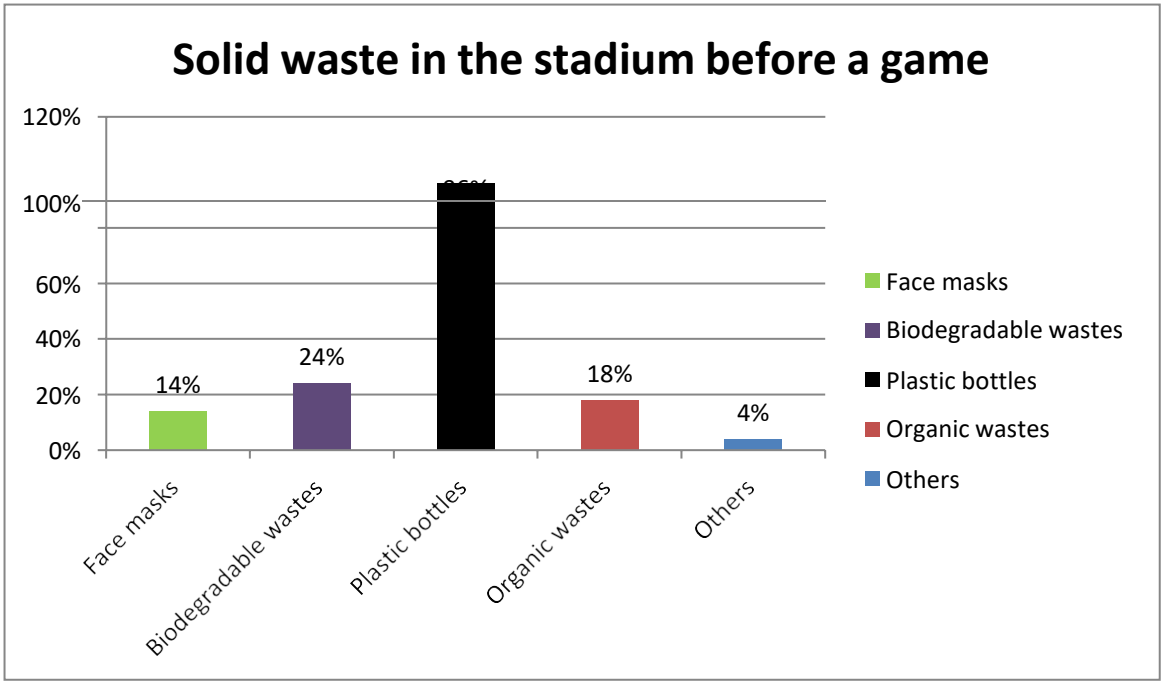

Figure 4-10: Solid Waste in the Stadium before a Football game

4.4.3 Type of solid waste found in the stadium after games

Similarly, assessing wastes found in the stadium after games is important to deduct the type of solid wastes generated during football games. Based on the findings, ninety-seven percent (n=222) of the participants reported they find plastic bottles in the stadiums after games. Twenty-seven percent (n=62) reportedly found biodegradable bags, 23% (n=52) reported to find organic wastes and 19% (n=44) reported to find facemasks as solid wastes after games. Six percent (n=14) reported to find other type of solid wastes in the stadiumsafter football games as illustrated by

Figure 4.11 below. The finding highlights that food, drinks, and related packaging are responsible for the most type of solid waste generated during FKF premier league games. The findings are in line with the findings that food and drinks packaging generate tremendous amount of waste in the sport industry (Wohner *et al*., 2019; Zelenika *et al*., 2018).

Besides, it is also observed by Martinho *et al*. (2018) that food and drinks packaging account for 79% of wastegenerated during sports. Therefore, the findings acknowledge that the attending spectators and fans link solid wastes in sport events to consumption of food and drinks. This implies that, wherethe carried bottles are not recycled, they will generate tremendous solid waste during the sport event. Additionally, takeaway snacks are carried in carrier bags hence the type of wastes identified to be generated during the FKF premier league games. Moreover, the number of bottles carried will contribute towards the bulk of the generated solid waste (Costello *et al*. (2017). also agree with the findings concluding that after football games, the most identified wastes were recyclable materials that accounted for 43% and food waste accounting to about 24%.

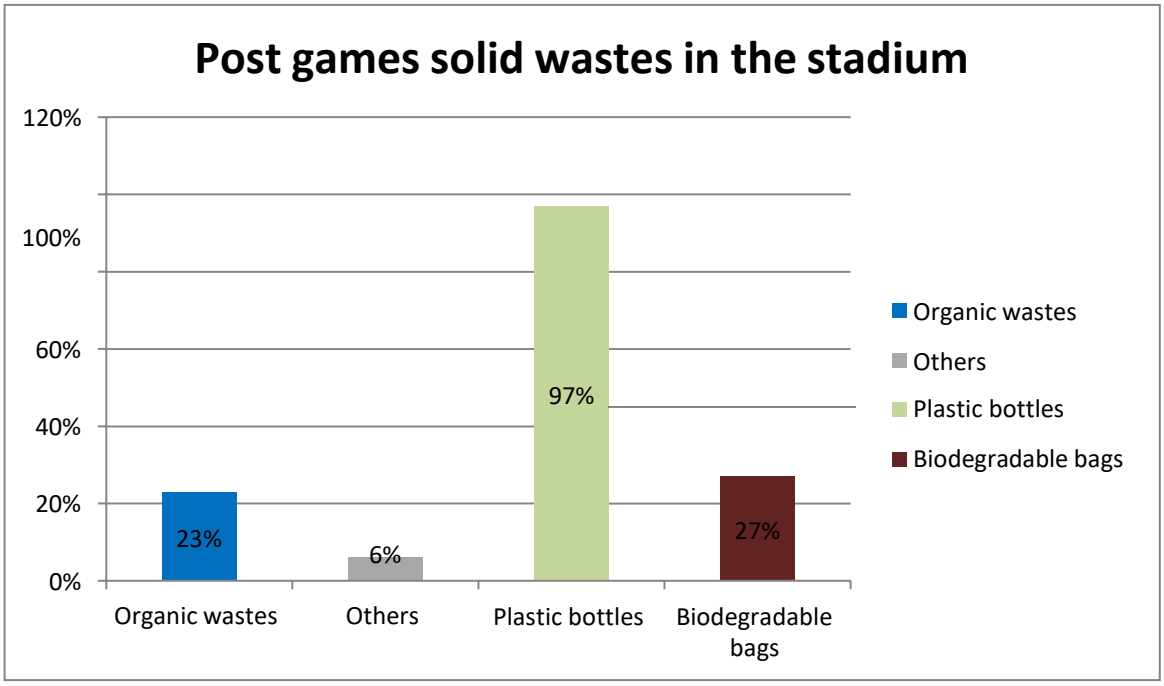

Figure 4-11: Post games solid wastes found in the stadium

4.5 Stakeholders' Perception on Solid Waste Management and Associated Environment Impact During FKF Premier League Games

The study evaluated the perception on solid waste management and associated environmental impacts as a determinant to waste management behaviour. The findings demonstrate that slightly more than half 57% (n=130) of the participants disagreed that they have been trained on waste management by FKF while 38% (n=85) strongly disagreed. Four percent (n=10) agreed with the statement and only one percent (n=3) strongly agreed. More than half, 67% (n=152) of the participants disagreed that clubs have their own policies on waste management, 19% (n=44) strongly disagreed while nine percent (n=20) agreed. Only five percent (n=12) strongly disagreed. Slightly more than half of the participants, 51% (n=117) agreed that their knowledge had helped them better understand waste management practices while 44% (n=101) strongly agreed. Three percent (n=6) disagreed and only two percent (n=4) strongly disagreed.

About a half, 51% (n=116) of the participants agreed cleanliness and hygieneis maintained through proper waste management and 48% (n=110) strongly agreed. Only one percent (n=2) disagreed and none of the participants strongly disagreed. The findings show that there is a significant lack of sensitization on waste management among the stakeholders involved the FKF premier league. This negatively impacts stakeholders' practices and behaviour which in turn translates to negative environmental impacts.

Table 4-4: Perception on Solid Waste Management Practice

	Strongly agree		**Agree**		**Disagree**		**Strongly disagree**			
	F	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**Mean**	**SD**
FKF has trained us on waste management	3	1	10	4	130	57	85	38	3.7	0.65
Clubs have their own policies on waste Management	12	5	20	9	152	67	44	19	3.5	0.47
My knowledge has helped me better my waste management Practices	101	44	117	51	6	3	4	2	1.7	0.76
Cleanliness and hygiene is maintained through proper waste Management	110	48	116	51	2	1	0	0	1.6	0.57
Reliability test	**0.81**									

4.5.1 Perception on Role in Waste Management

From the findings, slightly more than half (n=119) of the participants agreed that they believe in clean environment when enjoying sports. Forty-one percent (n=93) strongly agreed that they enjoy sport in a clean environment, four percent (n=10) disagreed and only three percent (n=6) strongly disagreed that they believe in clean environment when enjoying sports. Slightly more than one third, (n=78) of the participants agreed that they practice waste management because they will be fined by their club, 24% (n=54) strongly agreed while 29% (n=67) disagreed. Thirteen percent (n=29) strongly disagreed that they practice waste management because they will be fined by their

club. Less than half of the participants, 43% (n=99) agreed that their attitude affects how they treat waste while watching FKF premier league games while 32% (n=72) strongly agreed. Twenty percent (n=46) disagreed that their attitude affects how they treat waste while watching FKF premier league games and only five percent (n=11) strongly disagreed as presented in **Table 4.5** below.

Further, the findings indicates that more than half of the participants, 61% (n=138) strongly agreed that clean environment influences why they watch FKF premier league games while 37% (n=85) agreed. Only two percent (n=5) disagreed that clean environment influences why they watch FKF premier league games. Sixty-eight percent, (n=154) of the participants disagreed that they have been taught by their club to clean environment while nine percent (n=25) strongly disagreed. Eighteen percent, (n=41) agreed that they have been taught by their club to clean environment while only five percent (n=12) strongly agreed. Forty-five percent, (n=102) of the participants agreed that they practice waste management because they want a clean environment, 35% (n=79) strongly agreed, 14% (n=32) disagreed and six percent (n=15) strongly disagreed. The findings in **Table 4.5** show that spectators have a positive perception on their role in waste management during sport events. Atchariyasopon (2017) findings are contradictory, as spectators in their study did not perceive themselves to be part of the waste management solution.

Therefore, they did not participate in the attempt to leave the stadium environment clean through good solid waste management practice. More than three quarters of spectators perceived that that football clubs and the host stadium management should be responsible for proper solid waste management. Atchariyasopon (2017) notes that there is need to create awareness and spectator's education on the need for collaborative effort in ensuring the environment that benefits us is clean

and healthy. Nevertheless, Kotsori et al. (2022) concurs with our findings highlighting that waste management is a collective responsibility for everyone participating in the game and waste generation. However, football clubs have a collective responsibility of sensitizing their fans and spectators on waste management as part of their corporate social responsibility. However, it is noted that sensitization among local sport clubs is impeded by several perceived constraints such as high business costs, reduced profitability for football clubs and lack of funds (Kotsori *et al*., 2022).

From the KII findings, the burden of sensitizing spectators has been placed on the stadia management and football clubs. Waste management is funded only through stadium collections during games as a primary source of income stadium maintenance. Underfunding contributes to inadequate number of waste management personnel and equipment. Inadequacy factor can be attested to in this study where the findings elicited that at least one third of the participants did not find waste collection bins in the stadium.

In line with the theory of planned behaviour, personal attitude influences the intentions towards a particular behaviour (Ajzen, 1991; Brookes, 2022). Zhang et al. (2015) agree with the findings of the current study in the context of attitude and waste management behaviour. It is observed that attitude is a major predicting factor towards good solid waste management behavioural intention. Further, Zhang et al. (2015), highlights that positive public awareness is effective for promoting positive waste management behaviours. However, Wu *et al*. (2022) finding highlights that attitude does not have significant influence on solid waste management behaviour.

Predominantly, solid waste management behaviour tends to be influenced through personal norms. Furthermore, the context of subjective norms on waste management behaviour may be partially mediated by personal norms rather than attitude (Wu *et al*., 2022). Although the concept is backed in Oehman *et al*. (2022) conclusions that personal norms and perceived behavioural control are the main predictors of waste prevention behaviour. Therefore, from this study the findings elaborate that, while attitude influence waste management behaviour, personal norms and perceived behavioural control determines solid waste reduction behaviours among football spectators.

Table 4-5: Role in waste management

	Strongly agree		**Agree**		**Disagree**		**Strongly disagree**			
	F	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**Mean**	**SD**
I believe in clean environment when enjoying sports	93	41	119	52	10	4	6	3	1.7	0.85
I practice waste management because I will be fined by my club	54	24	78	34	67	29	29	13	1.9	1.06
My attitude affects how I treat waste during matches	72	32	99	43	46	20	11	5	1.8	0.97
Clean environment influences why I watch Matches	138	61	85	37	5	2	0	0	1.6	0.68
I have been taught by my club to clean environment	12	5	41	18	154	68	21	9	3.1	0.94
I practice waste management because Iwant a clean Environment	79	35	102	45	32	14	15	6	1.7	1.03
Reliability test	**0.87**									

4.5.2 Waste Management Perception and Behaviour during the FKF Premier League Games

The study analyzed how stakeholders' perception affect and behaviour. Majority of the participants believe they have a role in solid waste management during sport events. Only four percent do not believe they have a role to play in solid waste management during sport events. Further highlights that sixty-seven percent, (n=152) of the participants highlighted that they recycle plastic bottles. Slightly more than one third (n=76) responded that they do not recycle plastic bottles. Additionally, eighty-five percent, (n=194) of the participants stated that they leave the stadium clean after attending a game and 15% (n=34) responded that they do not leave the stadium clean after attending a game. **Figure 4.12** below presents the findings on stakeholders' perception and behaviour. Moreover, notably from the findings, majority of the participants believe that they have a role to play in waste management. This is remarkable despite the observation on the lack of sensitization by the clubs and stadia management involved in FKF premier league.

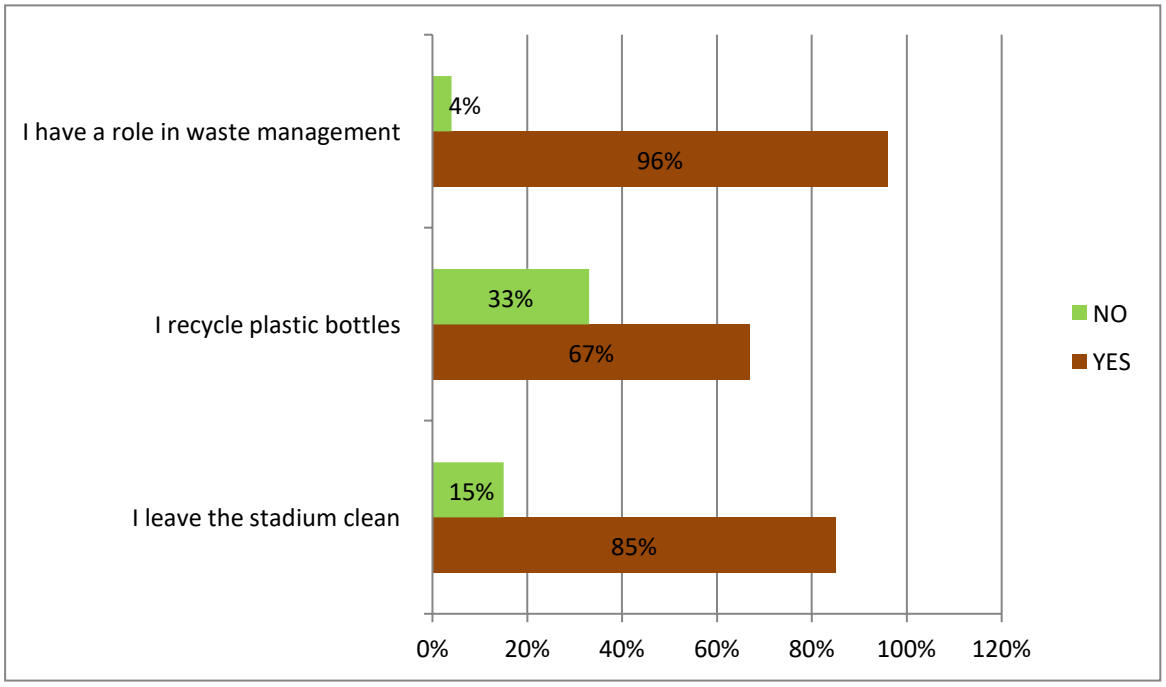

Figure 4-12: Stakeholders' Perception and Waste Management Behaviour

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter discusses the study's results and outlines the conclusions and recommendation based on the study findings on the assessment of solid waste management in the FKF premier league games.

5.2 Summary of the Study

The main objective of this study was to explore solid waste management practices and behaviour of stakeholders of football activities in the FKF premier league. Specific objective aimed to highlight the focus of the study and entailed; (i) assessment of waste management practices during Football Kenya Federation premier league games. (ii) Assessment of types of waste generated during Football Kenya Federation premier league games. (iii) To analyse perceptions of FKF stakeholders' behaviours and its impact on the environment during FKF premier league matches. Pertinent literature by different authors was discussed to indicate the role and the importance of this study in the current setting. The study adopted a mixed design to explore the study objectives. The methodology was ideal for the study to bring out a holistic understanding from meanings obtained from the data collected.

The findings of the study were discussed in relation to previous literature. The theory of planned behaviour (TPB) was adopted to correlate and provide evidence-based prediction of spectators' behaviour on waste management. The study identifies that majority of the spectators, 89% are youths aged between 18 to 35 years. The findings also demonstrate a higher proportion level of awareness on solid waste management practices and policies related to sport events, 93% and 83% reported positive awareness level respectively. The findingsindicate that on average, participants

practice good waste management practice.

However, it is highlighted that traditional waste management practice of burning waste is still a common practice as reported by 29% of the participants. The findings notes that that uneven distribution of waste collection bins and lack of waste segregation practice creates waste disposal challenges among spectators during sport events therefore, facilitating careless littering. Eighty seven percent of the participants reported that waste collection bins available in the stadium did not promote waste segregation. Moreover, items carried to the stadium by the spectators were found to contribute holistically to the waste generated during the FKF premier league games. Food, drinks and related packaging are responsible for the most type of solid waste generated during FKF premier league games. Ninety percent of the items carried to the stadium were plastic water bottles.

The study findings also elicit that football clubs and stadium management have taken little or no initiative in sensitizing spectators on waste management. Despite the lack of sensitization by the club and stadia management, majority of the participants still believe that at a personal level they have a role to play in waste management. Majority of the participants practice the behaviour of leaving the stadium clean after attending a game and more often, tend to discard their wastes on the provided waste collection bins.

Notably, the FKF premier league is observed to be regulated by good and favourable waste management practices. Laxity of enforcement officers, lack of awareness and public participation are a significant challenge that calls for collaborative actions in order to mitigate theenvironmental

impacts from solid waste. The study notes that to achieve sustainability in healthy sporting environments for all, the core of the matters still remains to promote public and spectator awareness on waste management.

5.3 Conclusions

Based on the findings, the study concludes that youths are the majority active stadium spectators in the FKF premier league games. Besides the COVID-19 restrictions, stadium spectatorship was actively revived in 2022. However, few spectators were observed to travel to upcountry club games thus positively contributing to reduced transport sector related GHG emissions.

The study concludes that careless littering and poor waste management behaviour is a common practice during Football Kenya Federation premier league games. This practice is contributed by lack of spectator waste management awareness and distribution of waste collections bins in the FKF premier league. Furthermore, majority of the participants in the FKF premier league do not practice waste segregation. The practice of backyard burning is also a common practice among many spectators. This finding on backyard burning highlights a significant concern on the knowledge of environment effect and its deleterious effect on human health and climate change.

The study attributively concludes that plastics water bottles are the most common solid waste found in the stadium before and after FKF premier league games. Biodegradable bags are the second most common type of solid waste generated during football activities in the FKF premier league. The primary source of waste is items carried to the stadiums during the FKF premier league.

From the findings, the study also concludes that there is a high level of awareness on waste recycling, however very few practice the concept of recycling waste. Besides, majority of the spectators in the FKF premier league believe that they have a role to play in waste management during games. Waste collection bins in most stadiums hosting the FKF premier league are observed to be unevenly distributed and do not promote waste segregation. Additionally, the findings conclude that there is lack of stakeholders' collaboration in terms of spectator sensitization on waste management during FKF premier games that contributes waste management awareness disparities among spectators and participants in the FKF premier league. The study also concludes that the FKF premier league has good and favourable regulatory framework on waste management but it is faced by challenges of enforcement laxity and lack of awareness

5.4 Policy Implication

1. The findings demonstrates that waste littering among spectators is contributed by uneven distribution and lack of waste collection bins including provision of waste segregation at source among the stadiums. The County Governments should liaise with NEMA to dedicate efforts in revising waste management policies in stadiums and sport events. Otherwise, the clean and healthy environment as provided in Kenya Constitution 2010 may take longer to be realized.
2. Plastic wastes are the most common generated solid waste during FKF premier league games; thus stadium management and team management should ensure implementing of clear and strict rules and policies regarding use of single use plastics during matches. Besides actualize the recycling, reduce and reuse initiative as provided in the solid waste management act.

5.5 Recommendation

In view of the above research findings, the researcher recommends the following to achieve a sustainable waste management during FKF premier league games and related sporting activities.

1. The county government and NEMA should implement and adhere to strict waste management protocols and policies during football events. This will reduce technical challenges such as lack of waste collection bin and lack of waste segregation at source.
2. Football clubs participating in the FKF premier league should adopt reusable water bottles as part of their merchandize and sensitize their spectators on the benefits of using reusable waterbottles during games. This will promote circular economy and significant reduction of waste.
3. The FKF and stadium management should enhance awareness promotion on waste management during football events as a call to action. Sensitization can be tailored and implemented in collaboration with the local relevant authorities. This will enhance perception vs action on waste management.

5.5.1 Suggestions for Further Research

Based on the findings, the following suggestions are made for future research.

1. Measure and quantify the amount of solid waste generated during FKF premier league.
2. The level of awareness and knowledge and effect of burning of waste among different stakeholders and the effects of Unintentional Persistent OrganicPollutants (UPOPs).

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Appendix 1: Questionnaire

Assessment of solid waste management in the FKF premier league gamesIntroduction

My name is **Francis Waweru**, a student pursuing a **Master of Science degree in Environmental Governance at the Wangari Maathai Institute for Peace and Environmental Studies at the University of Nairobi**. In partial fulfilment of the requirement ofthis course, I am conducting my academic research entitled 'Assessment of Solid Waste Management in the FKF Premier League Games.' The University has permitted me to carry out this research and engage with stakeholders of the FKF Premier League. Please spare us 30 minutes of your time to answer our questions. The information you will avail will provide crucialinsights and help attain the above goals. Your responses will also be recorded. All information given will be treated with the highest confidentiality and only used for the purposes of this study.

1.1. County:

1.2. Sub county:

1.3. Age of respondent

18-25 years

26-35 years

36-50 years

Above 50

1.4. Which team do you support in the FKF Premier League?

1.5. Which stadium do you usually frequent to watch the matches?

1.6. When was the last time you attended a match?

1.6.1. Which teams were playing?

1.6.3. Where was the match held?

Assessing waste management practices during football matches

This section will explore practices with a focus on waste management and disposal in the course of a match

2.1. Are you aware of waste management practices?

Yes No

2.2. Do you know of any policies regarding waste management?

Yes No

2.3. Mark the policies that you know regarding waste management

a. NEMA policy on waste management Statutory Instruments 2020 No. 49

1. Responsibility for waste management.
2. Littering.
3. Waste management hierarchy.
4. Waste streams.
5. Intractable waste.
6. Use of good waste management practices.

b. EMCA policy on waste management Section 87 (5) of the Environmental Management and Co-ordination Act (EMCA,) emphasizes the need to treat the waste that is generated by any source. The Act provides that every person whose activities generate wastes shall employ measures essential to minimize wastes through treatment, reclamation and recycling.

c. National Solid waste management Commission (NSWMC) Resolution Directing the Department of Environment and Natural Resources (DENR) to Prepare and Implement the Banning of the Use of Unnecessary Single-use Plastics by National Government Agencies (NGAs), Local Government Units (LGUs) Offices and All Other Government Controlled Offices

d. None

2.4. Select the policies you are involved in

NEMA Policies

EMCA Policies

NSWMC Policies

None

2.5. Which waste management practices do you do?

Recycling

Rebottling

Composting

Burning of Waste

Dumping

2.6. Does the stadium have bins for waste collection?

Yes No

2.7. How often do you come across dustbins or places to discard waste during matches?

Never

I rarely do

I somewhat do

I often do

I always do

2.7.1. Do the bins allow for segregation during disposal i.e. different components for different types of wastes?

Yes No

2.8. Bins are distributed in strategic places for access by spectators and players

Agree

Disagree

2.9. After matches what do you usually do with leftovers and used material? (Tick all that apply)

Collect & dispose

Leave unattended to be collected by stadium cleaners

Carry my leftovers to dispose home

I don't know

Statement **Agree/Strongly Agree** **Disagree/Strongly Disagree**

a. FKF policies support waste management practices by all stakeholders

Agree Strongly Agree Disagree Strongly Disagree

b. Inadequate knowledge on waste management hinder waste management

Agree Strongly Agree Disagree Strongly Disagree

c. Limited knowledge of recycling practices hinders waste management

Agree Strongly Agree Disagree Strongly Disagree

d. Waste management practices like banned plastic paper and installation of recycling points enhance clean environment in stadia

Agree Strongly Agree Disagree Strongly Disagree

e. Waste management can create jobs from recycling

Agree Strongly Agree Disagree Strongly Disagree

Assessing the types of waste generated during football matches

This section assesses the types of waste generated during football activities

3.1. Do you know what waste management is?

Yes No

3.2. What are the most common items you carry/buy when you are going to watch a game?

Snacks

Water Bottles

Face Masks

Others

3.3. What type of solid waste is mostly found in the stadium before games? (Tick all that apply)

Plastic bottles

Biodegradable bags

Organic wastes

Face Masks

Others

3.4. What type of solid waste is mostly found in the stadium after games? (Tick all that apply)

Plastic bottles

Biodegradable bags

Organic wastes

Face Masks

Others

Analysing effects of FKF stakeholders' behaviours towards the environment during FKFpremier

league matches

This section analyses effects of FKF stakeholders' behaviours towards the environment during FKF premier league matches

3.1. Do you know the use of recycle bins on waste management?

Yes No

3.2. Has your club taught you on waste management?

Yes No

3.3. Has the stadium management taught you on waste management?

Yes No

3.4. Do you know of any policies regarding waste management?

Yes No

3.5 List some of the FKF policies that you know regarding waste management (write N/A if you don't know)

3.6. Mark the policies you are involved in

NEMA Policies

EMCA Policies

NSWMC Policies

FKF Policies

None

Statement Strongly Agree/Agree Strongly Disagree/Disagree

a. FKF has trained us on waste management

Strongly Agree Agree Strongly Disagree Disagree

b. Clubs have their own policies on waste management

Strongly Agree Agree Strongly Disagree Disagree

c. My knowledge has helped me better my waste management practices

Strongly Agree Agree Strongly Disagree Disagree

d. Cleanliness and hygiene is maintained through proper waste management

Strongly Agree Agree Strongly Disagree Disagree

3.7. Do you believe you have a role in waste management?

Yes No

3.8. What role do you have in waste management? (Tick all that apply)

a. I believe in clean environment when enjoying sports

Agree Strongly Agree Disagree Strongly Disagree

b. I practice waste management because I will be fined by my club

Agree Strongly Agree Disagree Strongly Disagree

c. My attitude affects how I treat waste during matches

Agree Strongly Agree Disagree Strongly Disagree

d. Clean environment influences why I watch matches

Agree Strongly Agree Disagree Strongly Disagree

e. I have been taught by my club to clean environment

Agree Strongly Agree Disagree Strongly Disagree

f. I practice waste management because I want a clean environment

Agree Strongly Agree Disagree Strongly Disagree

3.9. Do you recycle plastic water bottles?

Yes No

3.10. When you leave the matches do you leave the stadium clean?

Yes No

3.11. Specify waste management practices you carry out

I carry my waste

I discard waste in the binI

carry waste back home

I throw food waste in the dustbin

I ask where the waste is taken

Statement Strongly Agree/ Agree Strongly Disagree/ Disagree

a. FKF has been enhancing practices of waste management in stadia

Strongly Agree Agree Strongly Disagree Disagree

b. Merchandize sellers sell environmentally friendly products

Strongly Agree Agree Strongly Disagree Disagree

3.14. What role do you play in waste management practices? (Tick all that apply)

Recycling

Rebottling

Composting Re-using

Thank you very much for your time and response. This is the end of our questions!

Appendix 2: Key Informants Interview Guides

UNIVERSITY OF NAIROBI

ASSESSMENT OF SOLID WASTE MANAGEMENT IN THE FKF PREMIER LEAGUE GAMES

Interview Guide — NEMA Representative

Date: _

Introduction

My name is **Francis Waweru,** a student pursuing a Master of Science degree in Environmental Governance at the Wangari Maathai Institute for Peace and Environmental Studies at the **University of Nairobi**. In partial fulfilment of the requirement of this course, I am conducting my academic research entitled '**Assessment of Solid Waste Management in the FKF Premier League Games.'** The University has permitted me to carry out this research and engage with stakeholders of the FKF Premier League.

Please spare us 30 minutes of your time to answer our questions. The information you will avail will provide crucial insights and help attain the above goals. Your responses will also be recorded. All information given will be treated with the highest confidentiality and only used for the purposes of this study.

Research goals:*This section will explore waste management policies concerning NEMA and stakeholders in the FKF league games and planning*

1.1. Let's talk about the waste management practices and protocols during games

- What regulations do you have in place regarding waste management?

1.2. Do you have solid waste management policies specifically that apply in sports / football setting?

- If yes, state some of the policies

1.3. Has FKF committee invited NEMA representatives to their meetings during planning and preparation of games to talk about solid waste management policy implementation during the games?

1.4. Has any Kenyan Football Club in the FKF league committee invited NEMA representatives to their meetings during planning and preparation of games to talk about solid waste management policy sensitization during the games?

1.5. Do you believe stakeholders (footballers, fans and FKF organizing committee) have knowledge on waste management policies?

1.6. Do you visit stadiums where matches are held to inspect if waste management protocolsare observed / adhered to?

1.7. Do you engage stakeholders in the FKF when updating solid waste management policies to keep them up to date?

Thank you for your cooperation and response.

UNIVERSITY OF NAIROBI

ASSESSMENT OF SOLID WASTE MANAGEMENT IN THE FKF PREMIER LEAGUE GAMES

Interview Guide — FKF Management

Date: _

Introduction

My name is **Francis Waweru,** a student pursuing a Master of Science degree in Environmental Governance at the Wangari Maathai Institute for Peace and Environmental Studies at the **University of Nairobi**. In partial fulfilment of the requirement of this course, I am conducting my academic research entitled '**Assessment of Solid Waste Management in the FKF Premier League Games.'** The University has permitted me to carry out this research and engage with stakeholdersof the FKF Premier League.

Please spare us 30 minutes of your time to answer our questions. The information you will avail will provide crucial insights and help attain the above goals. Your responses will also be recorded. All information given will be treated with the highest confidentiality and only used for the purposes of this study.

2. Getting-to-know-you questions

Research goals:*This will serve as ice breakers with the sole aim being to know the respondent including their age, location, gender and motivations.*

2.1. County: _____

2.2. Subcounty: _____

2.3. Age of respondent

⌗ 18-25 years

⌗ 26-35 years

⌗ 36-50 years

⌗ Above 50

2.4. Which team do you support in the FKF Premier League?

_____

2.5. Which stadium do you usually frequent to watch the matches?

_____

3. Assessing waste management practices during football matches

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Research goals:*This section will explore practices and experiences through the eyes of an FKF official with a focus on waste management and disposal in the course of a match*

3.1. Do you offer education/sensitization to teams and spectators on solid wastemanagement?

If **yes,**

- How is this done?
- What platforms are used?
- Is the participation of teams mandatory? How is this ensured?

3.2. Do you allocate funds specifically for solid waste management when doing your budget for the football season?

—If **yes,**

- What percentage of the total budget was this?
- How did you decide on this percentage?
- Which stakeholders are involved in this process?
- What amount was allocated for this in the last year?

—If **no,**

- Why was there no allocation?
- How is waste management facilitated?

3.3. Let's talk about the waste management practices and protocols during games

- What regulations do you have in place regarding waste management?
- Which stakeholders do you involve? What roles do they play?
- Who is responsible for waste collection, handling and management during league games?
- How do you enforce quality assurance and control?

3.4. Let's talk about the sale of merchandise during matches by teams

- Do you allow the sale of merchandise during matches?
- Do you inspect the types of merchandise for environmental compliance? *Please explain*

UNIVERSITY OF NAIROBI

ASSESSMENT OF SOLID WASTE MANAGEMENT IN THE FKF PREMIER LEAGUEGAMES

Interview Guide — County Govt. Representative

Date: _

Introduction

My name is **Francis Waweru,** a student pursuing a Master of Science degree in Environmental Governance at the Wangari Maathai Institute for Peace and Environmental Studies at the **University of Nairobi**. In partial fulfilment of the requirement of this course, I am conducting my academic research entitled '**Assessment of Solid Waste Management in the FKF Premier League Games.'** The University has permitted me to carry out this research and engage with stakeholders of the FKF Premier League.

Please spare us 30 minutes of your time to answer our questions. The information you will avail

will provide crucial insights and help attain the above goals. Your responses will also be recorded. All information given will be treated with the highest confidentiality and only used for the purposes of this study.

Research goals:*This section will explore waste management policies concerns in regard to NEMA and stakeholders in the FKF league games and planning*

3.5. Let's talk about the waste management practices and protocols during games

- What regulations do you have in place regarding waste management?

3.6. Do you have solid waste management policies specifically that apply in sports / football setting?

- If yes, state some of the policies

3.7. Has FKF committee invited County Government representatives to their meetings during planning and preparation of games to talk about solid waste management policy implementation during the games?

3.8. Has any Kenyan Football Club in the FKF league committee invited County Government representatives to their meetings during planning and preparation of games to talk about solid waste management policy sensitization during the games?

3.9. Do you believe stakeholders (footballers, fans and FKF organizing committee) have knowledge on waste management policies?

3.10. Do you visit stadiums where matches are held to inspect if waste management protocols are observed / adhered to?

3.11. Do you engage stakeholders in the FKF when updating solid waste management policies to keep them up to date?

Thank you for your cooperation and response.