

Use of Performance Enhancing Substances and Methods, Traditional Herbs and Supplements among Mixed Martial Arts Athletes in Kenya

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Abstract

Mixed Martial Arts (MMA) has seen a surge in popularity in Kenya, with athletes from various backgrounds participating in the sport. However, with this growth comes an increased risk of performance-enhancing substances (PES) use. The intense physical demands of MMA may drive athletes to seek an edge through these substances, leading to significant concerns about health risks and sports integrity. The aim of this study is to assess the practices regarding PES, traditional herbs (TH), and food supplements (FS) among Kenyan MMA athletes. Additionally, the study explores the sources of PES, the factors motivating their use, and the efficacy of current anti-doping testing practices. To conduct the study, a cross-sectional survey design was employed, sampling 800 athletes from a target population of 4,000 across six MMA federations. Data were collected using structured questionnaires adapted from the World Anti-Doping Agency (WADA) with pre-testing to ensure reliability. Data analysis involved descriptive statistics and One- and Two-Way Analysis of Variance (ANOVA) using SPSS version 22. The results indicate that the majority of MMA participants are male (79.9%), with a median age of 25 years and a mean age of 26.8±4.1 years. Over half of the athletes perceived PES as a problem, but less than one-third viewed traditional herbs as a concern. Food supplements were used by nearly a fifth of the athletes, with bodybuilders showing the highest usage rate (44.4%). Coaches, team doctors, and physiotherapists were primary sources of these substances, while some athletes reported chemists and medical practitioners as suppliers of PES. The study found that the primary reasons for using PES and FS were to boost economic status through prize money, with additional pressures from coaches, family, and colleagues. Anti-doping testing revealed that 20.6% of athletes had been tested out of competition, while 34.4% believed they could provide a sample that wasn't theirs, indicating flaws in the testing process. The study concludes that while many MMA athletes recognize the risks associated with PES, there is a lack of consistent understanding regarding the risk of taking traditional herbs and food supplements. This inconsistency, combined with external pressures, may lead to risky behavior, compromising the athletes' health and the sport's integrity. To address these issues, the study recommends implementing comprehensive education programs for MMA athletes, coaches, and support personnel to raise awareness of PES risks. Strengthening anti-doping regulations and monitoring sources of PES and FS is also crucial. Additionally, promoting ethical coaching practices and addressing external pressures can foster a safer environment and uphold the values of fair competition in Kenyan MMA.

Keywords: Mixed Martial Arts (MMA), Performance-Enhancing Substances (PES), Traditional Herbs (TH), Food Supplements (FS), Anti-Doping, Kenya Sports, Athlete Attitudes, Sports Ethics, Doping in Sports, Anti-Doping Testing, Sources of Performance-Enhancing Substances, Athletic Performance.

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INTRODUCTION

The use of substances to enhance athletic performance has a long history, dating back to ancient times. As early as 668 BC, athletes competing in the Olympic Games were provided with special diets to enhance their performance. However, the modern era of doping in sports is typically traced to the 1960s, when amphetamines became widely used among European

cyclists, leading to tragic consequences such as the death of Tom Simpson during the Tour de France (El-Hamadi & Hunien, 2013).

The rapid growth of the global sports industry, now valued at over \$500 billion, has led to a professionalization of sports, where athletes are motivated by fame, wealth, and a desire for superiority. This has driven some to seek performance advantages

through both legal and illegal means (El-Hamadi & Hunien, 2013). As the sports industry in Kenya continues to grow and diversify, with increased government investment in sports infrastructure, mixed martial arts (MMA) has emerged as a competitive and lucrative field (Weldon, 2015).

Mixed martial arts encompasses a range of combat sports, including Judo, Karate, Jujitsu, Boxing, and Muay Thai. This demanding sport requires a combination of physical strength, endurance, and mental resilience, which can tempt athletes to resort to PES to meet the high demands of training and competition (Souza-Junior et al., 2015). The intense physical demands of MMA often result in injuries, motivating athletes to use substances to expedite recovery and maintain competitiveness.

The World Anti-Doping Agency (WADA) plays a central role in regulating doping in sports, establishing guidelines and testing procedures to maintain fair competition. The Kenyan government, in compliance with WADA, enacted anti-doping laws and established a National Anti-Doping Organizations (ADAK) to monitor and enforce anti-doping regulations. These efforts are complemented by public education campaigns aimed at raising awareness about the dangers of doping and promoting clean sports (Chebet, 2014).

Despite these measures, the use of performance-enhancing substances persists, often due to the high stakes of competitive sports and societal pressures. In Kenya, traditional herbs and food supplements are commonly used, which may sometimes contain banned substances (Henning & Dimeo, 2014). The lack of rigorous quality control during the production of food supplements can lead to contamination, further complicating the issue (Newmaster et al., 2013).

The unique context of MMA in Kenya, with its high physical demands and growing popularity, creates a challenging environment for combating doping. The study seeks to understand the beliefs and practices associated with the use of PES, traditional herbs and supplements among Kenyan MMA athletes. It aims to identify the underlying factors driving athletes to use performance-enhancing substances. These factors may include societal influences, the pressure to succeed, and the pursuit of financial rewards and recognition.

The findings of this study have important implications for anti-doping policies and the broader sports community in Kenya. By understanding the beliefs and practices that contribute to doping in mixed martial arts, stakeholders can develop targeted interventions to promote clean sports and ensure the health and safety of athletes.

METHODS

Research Design

The study utilized cross-sectional survey research design in guiding the research process. Appropriateness of the research design was attributed to ability to integrate different variables whose measurement is cost effective and consumes less time (Weiss et al., 2001). Weiss et al., (2001) argues that the design is crucial in the development of a representative picture about the characteristics of people including their attitudes. The research design was implemented by adopting a descriptive approach, where in this case, the study sought to investigate the practices, and beliefs about the use of performance-enhancing substance, traditional herbs and food supplements among Kenyan mixed martial artists. Quantitative techniques on the other focused primarily on numeric data to help in finding out accurate analysis of the knowledge, beliefs and attitude levels regarding the consumption of traditional herbs, performance enhancing substances and food supplements together with the methods of administration employed while primarily focusing on athletes engaging in mixed martial arts in Kenya.

Study Location

The research was undertaken in 23 county's in the country. By doing so, the diverse locations provided the researcher with athletes in the sport from diverse backgrounds whose opinions are likely to be unique and thus a rich source for information for this study. The sampled counties were Nairobi, Kisumu, Kisii, Homabay, Kakamega, Bungoma, Busia, Uasingishu, nyeri, Nakuru, Marsabit, Garissa, Mombasa, Kwale, Elgeyo -Marakwet, Kilifi, Narok, Nakuru, Laikipia, Machakos, Meru, Tharaka-nithi and Kirinyaga.

Target Population

In the study, the researcher targeted respondents from the six federations associated with mixed martial arts where the estimated population was 4000 athletes.

Sampling Technique

Table 1: Sampling was done using the Population Proportionate to Sample (PPS) technique was utilized during the study in selecting respondents who participated in the study

No.	Sport	Athlete Population	Sample Athletes
1	Boxing	3000	591
2	Weightlifting	60	12
3	Wrestling	300	59
4	Body Building	200	39
5	Tackwondo	200	39

No.	Sport	Athlete Population	Sample Athletes
6	Karate	300	59
Total Sampled			800

Research Instruments

Questionnaires were the primary research instruments to collect data from the athletes. The individual questionnaires were divided into two sections based on the objectives of the study including doping education, knowledge of the concept of doping and how the substances are used, and beliefs about performance enhancing substances, traditional herbs and food supplements. The researcher adapted the questionnaire from a social package developed by WADA (WADA, 2012). Furthermore, the researcher incorporated Petroczi's (2002) Performance Enhancement Attitude Scale (PEAS) in measuring the attitude of athletes in mixed martial arts towards doping and the methods involved. Measure of attitude was based on a 6-point Linkert scale ranging from strongly agree at 6, agree 5, slightly agree 4, slightly disagree 3, disagree 2 and strongly disagree 1.

Pre-test of the tools

The researchers undertook a pre-test of the questionnaire to test the effectiveness of the research instrument in collecting the required information before being taken to the field for actual data collection.

Data Collection Procedures

The researchers required respondents to sign the consent forms and taken through the research objectives before allowing them to participate in the study. The research assistants helped in guiding the mobile data collection data collection process and were present to respond to any inquiries raised by the respondents.

Data Analysis and Presentation

Having collected data through the aid of an Open Data Kit (ODK), the researchers downloaded from the server and cleaned ready for analysis using SPSS version 22. Descriptive statistical methods were used to summarize the analyzed data including aspects such as standard deviation, frequencies, mean, percentages and associated measures. The researcher used One and Two-Way Analysis of variance in testing the differences in the mean scores of the various variables at 0.05 level of significance.

Approval Consideration

Before undertaking the actual data collection process, the researcher sought Approval from Anti-Doping Agency of Kenya. Other necessary logistical arrangements were done with the relevant mixed martial arts federations who in addition gave the contacts of their various athletes in the various areas of the country.

RESULTS

Gender

Majority of the participants in Mixed Martial Arts are male at 79.9%. Taekwondo registered the highest percentage of females participants while weight lifting recorded the least number of female participants. The mixed martial arts participants' age ranged from 18 to 54 years old with a median age of 25. The mean age was 26.8 ± 4.1 . The number of years with which an athlete have in participating in any sports is important in that the longer the experience the more the exposure to risks of doping. Wrestlers reported the highest mean years of experience followed by those participating in Karate. Taekwondo participants reported the lowest mean years of experience.

Table 2: Mean age (years) and Experience in their sport (years)

Discipline	Athlete Age (years)	Athlete Experience (Years)
1. Body building (n=169)	28.7 ± 3.6^b	6.3 ± 3.4^b
2. Tae Kwondo (n=146)	25.4 ± 3.9^a	4.8 ± 2.9^a
3. Weight lifting (n=113)	28.0 ± 4.1^b	6.6 ± 3.5^b
4. Boxing (n=162)	25.8 ± 3.7^a	6.3 ± 3.3^b
5. Karate (n=128)	26.4 ± 4.8^a	6.6 ± 4.6^b
6. Wrestling (n=53)	25.8 ± 2.7^a	7.2 ± 2.2^b
p-value	<0.001	<0.001
Means in the same column with the same superscript are not significantly different		

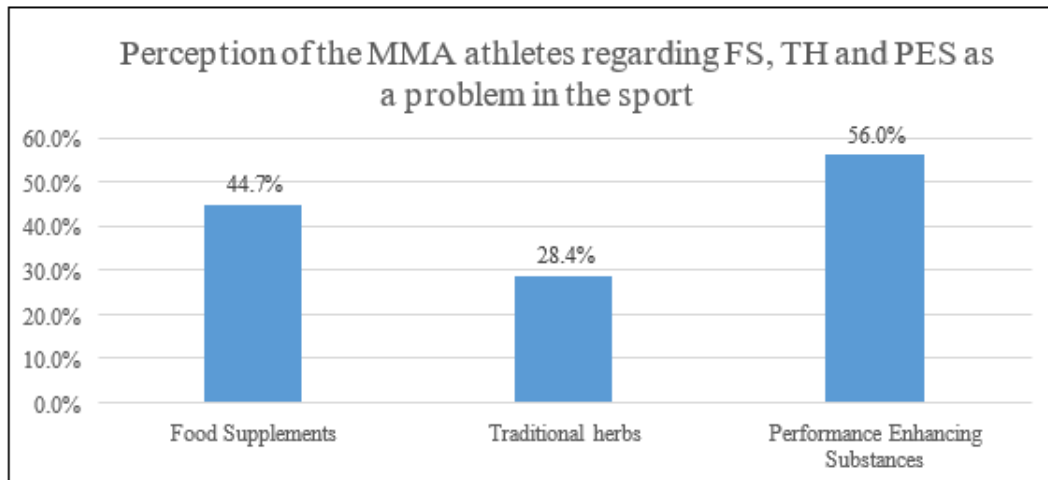
Beliefs of the MMA athletes regarding FS, TH and PES

Over half of the MMA athletes perceived that PES was a problem in the sports, while 44.7% thought that food supplements was a problem in sports. However, it is noted that less than a third of the MMA athletes perceived TH as a problem in their sport. It can be interpreted that athletes interviewed, did not consider

that TH as a problem in sports compared to NS and PES. This is clearly demonstrated by the fact that nearly a third said that use of TH is not a problem at all. It agrees further with their knowledge that they use TH for treatment of diseases and not for enhancing performance. The perception of using a substance as a problem in sport is highest in the PES followed by NS and lastly TH. This infers that athletes are more likely to use a TH compared

to the NS and PES because they perceive TH as less of a problem than the others. Further guidance is therefore needed to be given to these athletes with regards to TH,

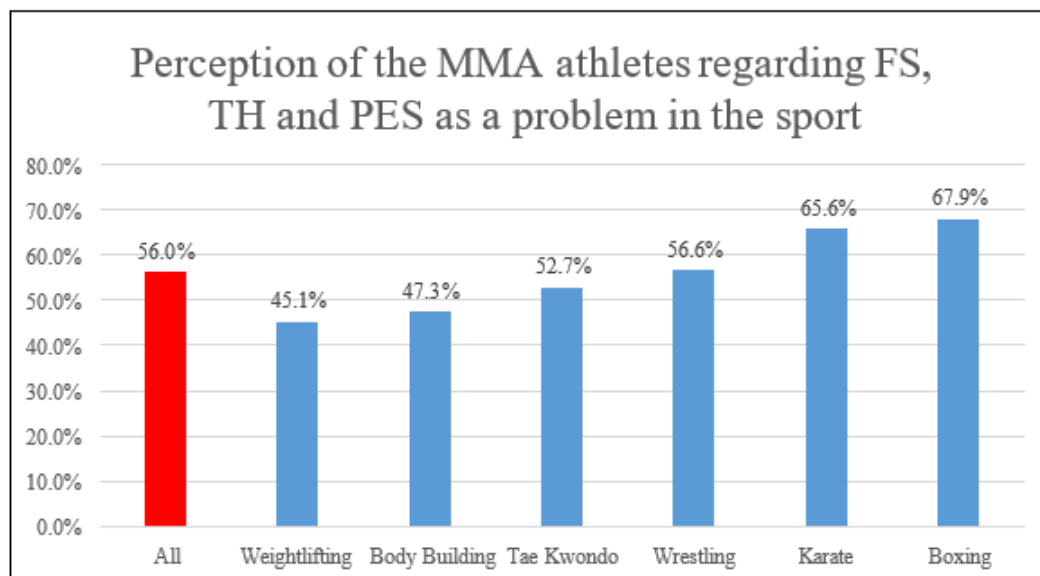
that they can also be equally as dangerous or a problem to sports as the NS and PES.



Perception of FS, TH and PES as a problem in MMA sports

In general, over half (56.0%) perceive that the FS, TH and PES are a problem in their sport. The lowest is 45.1% among the weightlifting athletes followed by the body building athletes at 47.3%. On the higher end, 67.9% the boxers and 65.6% of the Karate athletes perceived that the use of PES was a problem to their

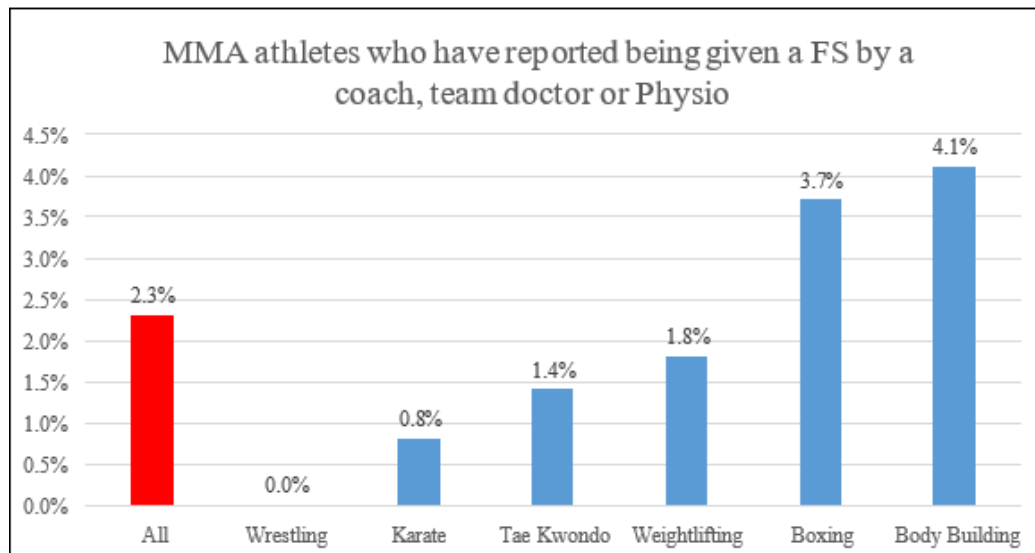
sport. Less than half of the body builders (47.3%) and Weightlifters (45.1%) reported that use of PES was a problem in their sport. It is clear here that these two categories are underreporting the use of PES as a problem. This could be an indication that they are comfortable with the use of the PES in their sport. It could also allude to rampant use of PES in their sport.



Use of Food supplements by the MMA athletes

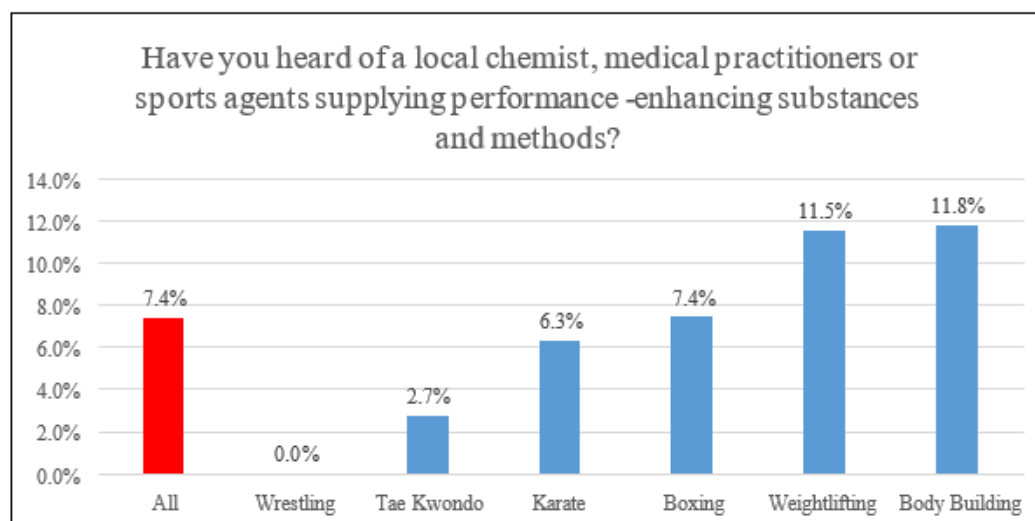
Nearly a fifth (18.3%) of all MMA athletes have used supplements to improve their performance. The body builders reported a significantly higher proportion (44.4%) compared to the other MMA athletes. Weightlifters were the second highest in proportion at 20.4% of them having used food supplements. Whereas

the bodybuilders and weight lifters do not consider the use of FS and PES as a problem in sport, they report to have used these supplements in their sports. It is clear from the figure below that food supplements are mostly used by the MMA athletes with the weightlifters and bodybuilders being the main users.



The coach, team doctor and physiotherapists are the people who interact with athletes on a day-to-day basis. It is intriguing that these athlete support personnel were reported to be supplying food supplements to the MMA athletes. The most rampant case are amongst the body builders followed closely by the boxers. It is also notable that none of the wrestlers reported to have been given a food supplement by the coaches. Among the

MMA sportsmen, 7.4% have heard of a local chemist, medical practitioners or sports agents who supply PES. The highest proposition is observed amongst the bodybuilders and the weightlifters at 11.8% and 11.5% respectively. It is noted that none of the wrestlers reported to have heard of any chemist, medical practitioner or sports agent who is supplying PES.



Of all the athletes, money prize to boost economic status was the main reason that Kenyan athletes would use FS, TH and PES. The proportion was lowest among the Wrestlers while it was highest among

the Boxers at 56.6% and 79.0% respectively. Majority of the Wrestlers (79.2%) reported that pressure from coaches, family and other colleagues was the main reason for use of PES.

Table 3: Factors best represent the reason why Kenyan athletes would use FS, TH and PES

	All	Boxing	Karate	Wrestling	Tae Kwondo	Body Building	Weightlifting
Money prize/to boost economic status	72.00%	79%	65.60%	56.60%	75.30%	75.70%	66.40%
Pressure from coaches, family and colleague athletes	47.50%	38.90%	49.20%	79.20%	39.70%	52.10%	46.00%
Lack of	47.10%	25.90%	47.70%	54.70%	49.30%	56.20%	56.60%

	All	Boxing	Karate	Wrestling	Tae Kwondo	Body Building	Weightlifting
confidence/pressure from self							
Lack of knowledge of health consequences of doping	18.50%	25.30%	21.90%	34.00%	19.20%	5.90%	15.90%
Lack of knowledge of doping control practices and regulations	10.80%	13.00%	10.20%	5.70%	13.00%	4.70%	13.30%
Desire to get famous	15.80%	6.80%	10.90%	3.80%	16.40%	30.20%	17.70%

The coaches were found to be the most influential amongst all the MMA athletes since athletes prefer information to reach them through the coaches.

Table 4: Preferred ways of communication

	All	Boxing	Karate	Wrestling	Tae Kwondo	Body Building	Weightlifting
Phone	26.6%	29.6%	27.3%	37.7%	31.5%	21.9%	16.8%
SMS	34.4%	31.5%	23.4%	24.5%	37.0%	46.7%	33.6%
Email	10.9%	10.5%	14.8%	13.2%	8.9%	8.3%	12.4%
Coach	23.2%	19.8%	32.0%	18.9%	17.8%	18.3%	34.5%
Agent	4.9%	8.6%	2.3%	5.7%	4.8%	4.7%	2.7%

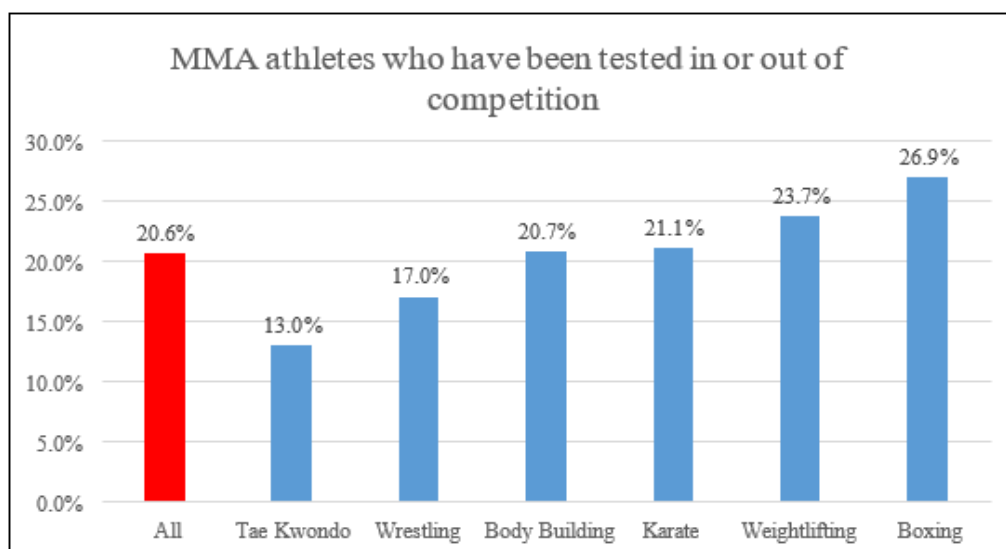
Information regarding testing for doping amongst the MMA athletes

It is noted that one in every five (20.6%) MMA athlete in general have been tested out of competition. Tae-Kwondo athletes reported the lowest proportion that have been tested at 13.0% while the boxers reported the highest (26.9%) proportion having been tested out of competition.

Nearly 80% of the athletes who were interviewed in this study have participated in competition in their specific sport. This infers that they are generally elite athletes with a small proportion of

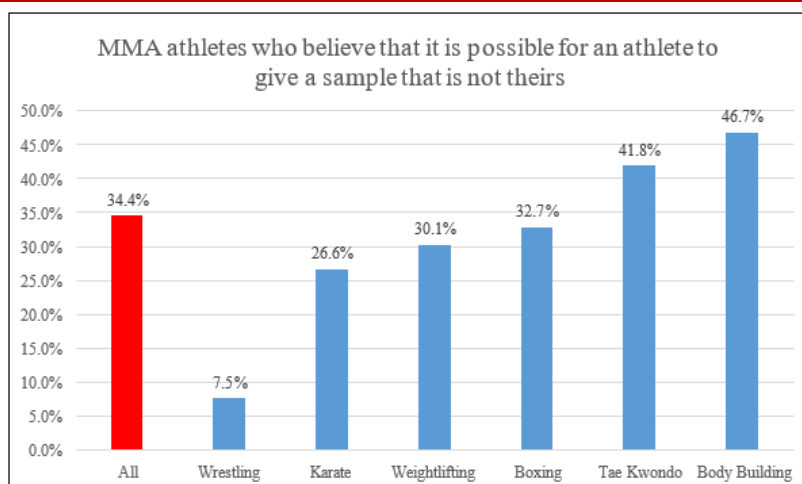
amateur athletes who have not participated in any competition in their sport. The highest was the wrestlers at 88.7% having participated in competitions before the study while the lowest proportion was among the weightlifters. This infers that the results of this study can be extrapolated among the elite MMA artist and is representative of the MMA sports in Kenya.

Nearly half (40.3%) of the athletes interviewed have been tested for doping. This proportion is lowest amongst the Tae Kwondo athletes at 31.6% and highest among the wrestlers at 66.7% of them having been tested for doping before the study.



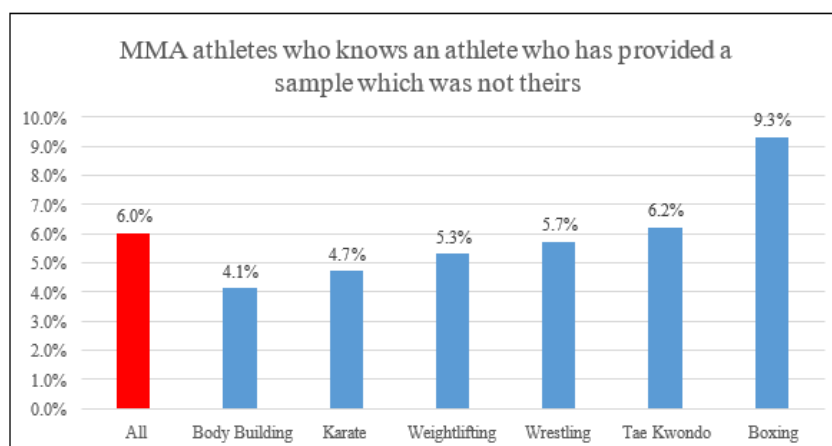
A third (34.4%) of the MMA athletes, belief that an athlete can provide a sample, which is not theirs. The highest proportion is amongst the Body builders and the lowest amongst the Wrestlers. This infers that, based on their beliefs, there is a significant number of athletes

who are likely to provide a sample that is not theirs. This is alarming because it is a waste of time and money for ADOs who conduct testing on samples from people who are not the selected athletes.



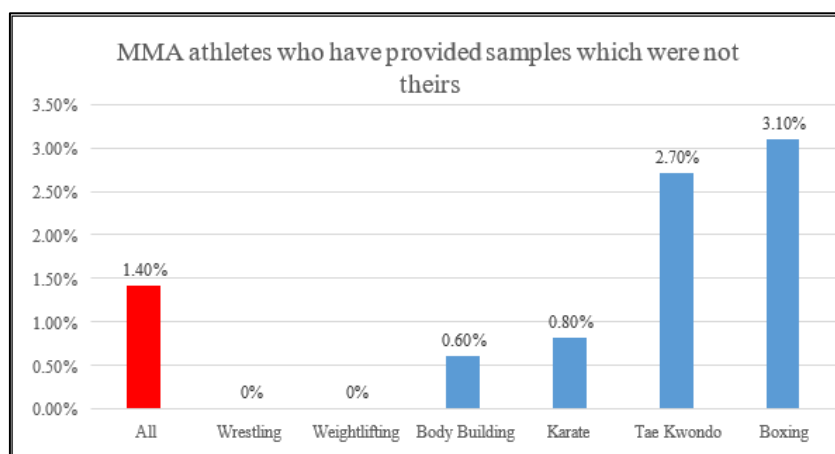
A small percentage (6%) of MMA athletes reported to know an athlete who has provided a sample that was not theirs. This is highest amongst the Boxing athletes at 9.3%. It is still alarming that there are, even if

few, athletes who are known to provide samples that are not theirs. It also alludes to the conduct of sample collection which is flawed and allows for athletes to provide samples without direct observation as expected.



Of the MMA athletes who have been tested for doping, a small (1.4%) reported that they provided a sample which is not theirs. This proportion is particularly high among the Boxing and Tae Kwondo at 3.1% and 2.7% respectively. This is alarming in the sense that few

athletes are tested at any time due to cost and integrity implications. If these athletes provide samples that is not theirs, then the testing process is a flaw and the results will be wrong, denting the integrity of the sport by doping.



DISCUSSION

Gender and Age

The predominance of male participants in Mixed Martial Arts (MMA) aligns with existing research, indicating a male-dominated environment in these sports (J. Woolf *et al.*, 2021). The age range and median age also reflect the typical demographic for combat sports. This finding aligns with previous studies suggesting that younger athletes, especially males, are more likely to engage in high-intensity sports due to physical requirements and societal expectations.

Beliefs about Performance-Enhancing Substances

The perception of performance-enhancing substances (PES) as a problem among MMA athletes varies. Over half of the participants view PES as problematic, while fewer consider food supplements or traditional herbs as a concern. This indicates that athletes may lack comprehensive knowledge about the potential dangers of traditional herbs and supplements. Similar inconsistencies in perception were reported in other studies, indicating that athletes often differentiate between legal and illegal substances, sometimes overlooking the risks posed by traditional herbs (M. Labotz & B. Griesemer, 2016).

Use of Food Supplements

The usage of food supplements by MMA athletes varies, with bodybuilders reporting the highest proportion of use. This suggests a possible acceptance of supplements in certain sports, which might be influenced by the perceived benefits for muscle growth and recovery. These findings align with other research indicating that athletes in strength-based sports are more likely to use supplements to enhance their performance (Wanjiku Agnes Mandu *et al.*, 2023).

Sources of Food Supplements and PES

Coaches, team doctors, and physiotherapists are primary sources of food supplements for MMA athletes. This highlights the influence of support personnel on athletes' decisions to use supplements or PES. In some cases, these support personnel may unknowingly or knowingly provide substances that could be harmful or lead to doping violations. This finding is consistent with other research suggesting that athletes often rely on coaches and medical staff for guidance, which can lead to improper use of substances (J. Woolf *et al.*, 2021).

Reasons for Using PES and Food Supplements

The primary reason for using PES, traditional herbs, or food supplements is to boost economic status through prize money. External pressures from coaches, family, and colleagues also contribute to this trend. This finding is in line with studies suggesting that financial incentives and societal expectations can drive athletes to use performance-enhancing substances (C. Goulet *et al.*, 2010). The influence of coaches and family members indicates a complex network of pressures that impact athletes' decisions.

Anti-Doping Testing and Practices

The fact that 20.6% of MMA athletes have been tested out of competition and that nearly half have undergone doping tests suggests that anti-doping practices are present, but may not be uniformly effective. The belief among athletes that they can provide a sample that is not theirs raises concerns about the integrity of the testing process. This aligns with research indicating that anti-doping measures need constant improvement to ensure reliability and prevent athletes from circumventing the system (Amit M. Momaya *et al.*, 2015).

CONCLUSION

The study of Mixed Martial Arts (MMA) athletes in Kenya reveals significant insights into the use and perception of performance-enhancing substances (PES) and food supplements, as well as the underlying factors influencing these practices. The key findings suggest that while the majority of athletes recognize PES as a problem in sports, there is inconsistency in perceptions about traditional herbs and food supplements, with many athletes underestimating their potential risks. The prevalence of PES uses among MMA athletes, along with the influence of coaches, team doctors, and physiotherapists in providing these substances, underscores the need for comprehensive education and tighter anti-doping regulations. The reasons for using PES, driven by economic incentives and external pressures, further highlight the complex factors affecting athletes' choices.

The study also points out discrepancies in anti-doping testing practices, with a considerable number of athletes believing they can provide a sample that is not theirs. This calls into question the reliability of current anti-doping measures and suggests that more robust testing procedures are required.

Recommendations

Based on the findings and conclusions, the following recommendations are proposed:

1. **Comprehensive Education Programs:** Implement extensive educational programs aimed at MMA athletes, coaches, and support personnel to raise awareness about the risks associated with performance-enhancing substances, food supplements, and traditional herbs. These programs should highlight the health risks, legal implications, and ethical considerations of doping in sports.
2. **Strengthening Anti-Doping Regulations:** Strengthen anti-doping regulations in Kenya by enhancing testing protocols, ensuring the integrity of sample collection, and implementing more frequent out-of-competition testing. Collaboration with international anti-doping agencies such as WADA can provide additional resources and expertise.
3. **Promoting Ethical Coaching Practices:** Encourage sports organizations to promote ethical coaching practices and accountability. Coaches,

team doctors, and physiotherapists should be trained to understand the risks of PES and the importance of guiding athletes toward safe and legal alternatives.

4. **Addressing External Pressures:** Address external pressures that drive athletes to use PES by fostering a culture of fair play and healthy competition. This can be achieved by engaging with families, coaches, and sports organizations to create supportive environments that prioritize athletes' well-being over winning at all costs.
5. **Monitoring Sources of PES and Food Supplements:** Implement stricter monitoring of the sources of PES and food supplements to ensure that athletes are not exposed to banned substances through coaches, team doctors, or local chemists. Establishing clear guidelines for the provision of supplements can reduce the risk of inadvertent doping.
6. **Further Research:** Conduct further research to understand the broader implications of PES use in MMA and other sports. This includes exploring the psychological factors influencing athletes' decisions, the impact of societal expectations, and effective interventions to reduce doping practices.

Declarations

Competing Interest: The author declare that they have no competing interests.

Authors & Contributions: Martin Sisa Yauma conceived the paper, designed and performed the study. The author read and approved the final manuscript.

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