

# Use and Consumer Perceptions of Dietary Supplements in the Fitness Community of Gaborone, Botswana



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A mini-thesis submitted in partial fulfilment of the requirements for the degree of Master of Science in

Pharmacy Administration and Policy Regulation in the School of Pharmacy, University of the

Western Cape

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## ABSTRACT

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**Motivation:** Health authorities around the world, including stringent ones, struggle to regulate dietary supplements. Health claims and actual effects of these products on users therefore are not adequately studied and monitored. In Gaborone, there has been a notable rise in the presence of these products in health stores, retail pharmacies, and gyms. The purpose of this study is to explore the prevalence of use and consumer perception of dietary supplements in the fitness community of Gaborone, Botswana.

**Problem:** The purpose of this study is to explore the prevalence of use and consumer perception of dietary supplements in the fitness community of Gaborone, Botswana. There is currently no literature to help guide the regulation of dietary supplements.

**Methods:** A descriptive, cross sectional qualitative method was conducted using a semi-structured, self-administered questionnaire to gather information. Participants were randomly selected from different fitness communities in Gaborone. The results were analyzed using Microsoft Excel.

**Results and discussion:** Dietary supplements are mostly used by educated young adults, both male and female. The internet is the biggest sources of information of dietary supplements in Gaborone. About half of the survey participants were not aware of adverse side effects before beginning their use. Only manufactures are aware of the safety, quality and efficacy of these products. Dietary supplements have great potential to damage the health and career progression of users if they remain unregulated.

**Conclusion:** The increasing prevalence of the use of dietary supplements and the limited evidence of their safety and efficacy pose a challenge for their regulation. Future studies should focus on the clinical effects of these products in Botswana, and the knowledge of healthcare professions.

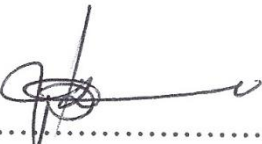
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Key words: Regulation, dietary supplements, fitness, fitness community, BoMRA, Gaborone.

## DECLARATION

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This thesis is a presentation of my original research work. Wherever contributions of others are involved, every effort is made to indicate this clearly, with due reference to the literature, and acknowledgement of collaborative research and discussions.

Signature: .....  


10<sup>th</sup> December 2019



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## DEDICATION

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I would like to dedicate this work to my daughter Rorisa, who was born when I was working on my master's. Her birth replaced my stress with a lot of peace. For that I was thankful.

I also want to dedicate this work to my family who have been supportive throughout the whole processes of completing my master's program. This program stole a lot of family time from them, and without a lot of complaining they graciously gave me time to complete my master's program.

My wife stands above all. She has been a source of encouragement, motivation and comfort. Her support throughout has been world class.

Lastly, my grandmother, who has been like a human pillar in my life from the first time my eyes opened.



## ACKNOWLEDGEMENTS

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I would like to acknowledge my supervisor Dr K Obikeze and Mr Rafik A Bapoo, my supervisors, for giving me direction and encouragement to start and finish my mini-thesis.

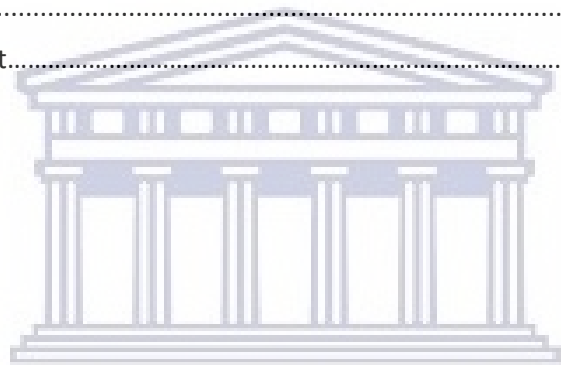


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Appendix 1: Ethical Approval

Appendix 2: Questionnaire

Appendix 3: Informed Consent



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## TABLE OF ABBREVIATIONS

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- BoMRA - Botswana Medicines Regulatory Authority  
DRU - Drugs Regulatory Unit  
DSHEA - Dietary Supplements Health and Education Act  
EMA - European Medicine Agency  
EU – European Union  
FDA – Food and Drugs Administration  
HIV/AIDS – human immunodeficiency virus/ Acquired Immunodeficiency Syndrome  
MRSA - Medicines and Related Substance Act  
WADA – World Anti-Doping Agency



# CHAPTER ONE

## INTRODUCTION AND LITERATURE REVIEW

---

### 1.1 INTRODUCTION

Botswana has a stable and growing economy. As the country recovers from a high HIV/AIDS incidence, the government has encouraged good diet and exercise as a part of a healthy lifestyle. Over the last few decades, there has been a visible response to that recommendation, and the pursuit of fitness has become important to many Batswana. In 1992, Botswana introduced the Drugs and Related Substances Act and established the Drug Regulatory Unit (DRU) to regulate drugs and related substances. DRU has increasingly regulated medicines but has not regulated dietary substances used by the fitness community, even though there has been a notable rise in the presence of these products in health stores, retail pharmacies, and gyms.

According to Schmidt (2014), sports nutrition products have evolved to support active people in getting the right amount of nutrients at the right time and within a convenient format. After conducting a study in the European Union (EU), Varvaštian (2015) concluded that nutritional substances are widely used by various athletes and the fitness community at large. They are used for a wide variety of purposes, including weight gain/ loss, muscle building, recovery, and others. There is a significant influx of dietary supplements in Botswana, particularly formulated for the fitness community. They come in the form of powders, capsules, tablets, caplets, and solutions. There has been a concurrent increase in the number of retail stores opening and selling dietary supplements in Botswana, possibly a reflection of the increasing demand for these products. In 2013, a new Medicines and Related Substance Act was gazetted, to establish a new health authority with a broader scope and greater stringency, particularly on previously not well-regulated like dietary supplements. The new Botswana Medicines Regulatory Authority (BoMRA) was officially opened on 11 July 2019 by the Minister of Health.

By exploring the use, consumer knowledge and experiences of products consumers are taking in Botswana this study aims to contribute to improving what is known about the use of these products in Botswana and inform regulatory authorities as they seek to develop sound regulatory policies.

## **1.2 PROBLEM STATEMENT**

There is no literature about the perceptions, use, and effects of dietary supplements in the fitness community of Botswana. Therefore, there is little known about the effect of these products on the health and fitness of those who take them, making their regulation challenging. This study aims to survey the perceptions of dietary supplements, prevalence of use, and consumer experiences of supplements in the Gaborone fitness community.

## **1.3 AIM**

To explore the prevalence of use and perceptions of people using dietary supplements in the fitness community of Gaborone.

## **1.4 OBJECTIVES**

- Determine the prevalence of dietary supplements among the fitness community in Gaborone.
- Explore consumer knowledge of dietary supplements.
- Identify consumer sources of information on the use of dietary supplements in Gaborone.
- Explore consumer experiences in using dietary supplements.

## **1.5 LITERATURE REVIEW**

Sporting has long brought cultures and peoples together. The games of Olympia began 776 B.C., and were repeated at least every fourth summer until at least A.D. 261 without a single cancellation (Scambler, 2005). The development of the culture and beauty of sports came along with great pressure for athletes to perform. Along with a strict commitment to win, athletes have become expected to observe dietary restrictions and have also begun taking nutritional supplements (Scambler, 2005).

Varvaštian (2015) concluded that today, dietary substances are widely used by both amateur and professional athletes. They are used for a wide variety of purposes, including weight gain and loss, muscle building, recovery, and others (Varvaštian, 2015). However, many of these products are not sufficiently studied for human use (Varvaštian, 2015). Geyer et al. (2004) conducted an international study, analysing nutritional supplements, and discovered that even in countries with stringent regulators like the USA's Food and Drug Administration (FDA) and the European Medicine Agency (EMA), supplements contained unlisted doping substances. In recent decades, attention has been drawn to molecules which serve to give athletes an unfair advantage over their competitors - doping. Use of such products led to the establishment of the World Anti-doping Agency (WADA) in 1999, which aims to ensure that athletes can compete in a doping-free sporting environment (World Anti-Doping Code, 2009). Regulation of dietary supplements has proven difficult for regulatory bodies, as the products have limited academic publications and seem to fall somewhere between food and drug products. Different countries have addressed the problem differently but for many, the regulation has not proven sufficient. Varvaštian (2015) argues that there is a need for an "adequate regulatory system" to protect consumers from accidentally taking undeclared constituents. Alves and Lima (2009) noted that supplement regulation could enhance health professionals' ability to educate the general population about using such products safely and effectively. They assume that if there is adequate regulation of the manufacturing and the use of dietary supplements, risks associated with their use may be reduced.

Dietary supplement use is common for people in the fitness community, from those involved in recreational sports to elite athletes. Originally, as the name indicates, dietary supplements were designed to supplement a normal daily basic diet for general health purposes. Healthcare professionals indicate that dietary supplements were recommended for special groups of people like the elderly, vegans, and women of childbearing age in order to address minor nutritional deficiencies, but were not generally used by healthy individuals on a balanced diet (Williams, 2004). The aim of consumers is now to improve their fitness with dietary supplements. Maughan, King and Lea, (2004) noted that as training programmes become more demanding, nutrition can make the difference between success and failure. They observed that it can be difficult for athletes, coaches and nutritionists to identify the early signs of nutritional deficiencies, so athletes often take supplements in concentrated form to avoid the possibility of nutritional deficiencies

(Maughan, King and Lea, 2004). In one study, vitamin use was the most prevalent form of supplement use, especially among those who are not professional athletes (Vinnikov et al., 2018).

Regulation of nutritional supplements has proven difficult for regulatory bodies. Geyer et al. (2004) concluded their regulation has proven to be challenging even for stringent regulatory authorities like the USA's FDA and the EMA. Varvaštian (2015) argues that there is a need for an "adequate regulatory system" to protect consumers. The challenge is that, many of these products are not sufficiently studied for human use (Varvaštian, 2015) and there is limited academic information about dietary supplement use in sports and fitness.

### **1.5.1 Dietary Supplements**

The National Institute of Health (1994) defines a dietary supplement as a product (other than tobacco) containing or bearing at least a vitamin, mineral, herb, amino acid, concentrate, metabolite, constituent, extract or any dietary substance intended to increase the total dietary intake. They are orally administered and often used for the purpose of nutritional deficiencies. (Alves and Lima, 2009). Their use by athletes is legal, ethical and not even prohibited by the World Anti-Doping Agency (Williams, 2004). Today, most supplements are formulated with recognizable ingredients like milk and vegetable proteins, dietary fibres, sugars, cereals, starches, vitamins and minerals (Tallon & O'Byrne 2009). The stress of modern life coupled with a belief that supplements can compensate for a poor diet has led to increasing demand for dietary supplements (Maughan, King and Lea, 2004). This demand has led to the development of an enormous multinational industry (Maughan, King and Lea, 2004). Dietary supplements are taken by a wide variety of individuals looking to achieve results that specific nutrition can give them (Varvaštian, 2015). Use is varied in different types of users, whose type of sporting and cultural background impacts usage. Athletes engaged in strength and power sports, for example, typically use supplements (Maughan, King and Lea, 2004), and Alves and Lima (2009) noted that users typically exercise in gyms and have products recommended to them by friends or coaches. As the market has evolved, people are increasingly looking to the sports nutrition market to improve their general health and fitness by meeting daily nutritional needs through dietary supplements (Tallon & O'Byrne 2009).

Vitamins influence many physiological processes which are important to fitness performance by working as metabolic regulators in the body (Williams, 2004). Armstrong and Maresh (2009) note that a deficiency in several B vitamins and vitamin C may lead to a significant decrease in VO<sub>2</sub>max and anaerobic threshold in less than four weeks. Williams (2004) describes in detail:

*“...many of the B-complex vitamins are involved in processing carbohydrate and fats for energy production, an important consideration during exercise of varying intensity. Several B vitamins are also essential to help form hemoglobin in red blood cells, a major determinant of oxygen delivery to the muscles during aerobic endurance exercise. Additionally, vitamins C and E function as antioxidants, important for preventing oxidative damage to cellular and subcellular structure and function during exercise training, theoretically optimizing preparation”.*

However, as these benefits are marginal they would only be likely to make an observable difference for professional athletes, not the average fitness enthusiast (Lawrence and Kirby, 2002).

### **1.5.2 Consumer motivation for using dietary supplements**

Consumers have a wide variety of reasons to use dietary supplements. Many people use dietary supplements for weight management or reduction. Pittler and Ernst (2004) noted that more than half of the adults in the USA can be classified as overweight or obese, and the desire to lose weight provides the main reason for dietary supplement consumption, although evidence of their effectiveness is not convincing.

Others use supplements for the purpose of gaining weight or muscle and post-workout muscle recovery. Vitamins and minerals are most commonly used for healing and rehabilitation, whereas creatine and protein are most commonly used for sports performance (Burns et al., 2004).

### **1.5.3 Knowledge**

The knowledge of supplements is critical for their proper use as products claim to offer strength, weight loss, improved body definition, but rarely mention potentially harmful side effects (Lawrence and Kirby, 2002). Williams (2004) notes that supplementing vitamins is generally

regarded as safe when limited to 100% of the recommended daily intake. However, excessive intake of some vitamins can cause serious health problems.

Martin, Sherley and McLeod (2018) note that the use of dietary supplements containing protein or creatine may cause a rise in blood urea or creatinine in individuals who would otherwise have normal levels. Some pre-workout products contain a high level of caffeine which stimulates blood pressure and heart rate and leads to nervousness, irritability, and insomnia. Of even greater concern, they report that one in five sports supplements contain banned substances which may include androgenic steroids. Post-pubertal patients taking such substances may experience symptoms of androgen deficiency such as lethargy, fatigue, low mood, irritability and poor concentration as well as more specific symptoms such as male pattern hair loss, acne, liver injury, increased cardiovascular risk, osteopenia or osteoporosis, reduced muscle mass and strength, increased fat mass and gynecomastia (Martin, Sherley and McLeod, 2018).

Some dietary substances may be adulterated with substances such as ephedrine, so it is important that consumers purchase only reputable products (Williams, 2004). In their study, Haller and Benowitz (2002) investigated adverse events in subjects who took dietary supplements containing ephedrine and ephedra alkaloids. They observed clinical responses like, “anxiety, tremulousness, insomnia, palpitations, and personality changes that are well known to occur with the use of stimulant drugs” (Haller and Benowitz, 2000).

Most athletes take information, guidance and advice about taking sports supplements from physicians, nutritionists (Aljaloud and Ibrahim, 2013), coaches, parents, and teammates (Maughan, King and Lea, 2004), however the knowledge of these sources of information may also be inadequate. Maxwell, Ruth and Friesen (2017) conducted a study in Georgia, USA to rate CrossFit instructors on their “sports nutrition knowledge.” The study found that they obtained most of their knowledge from the internet and many had never talked with a Registered Dietitian. Their average score corresponded to a “D” letter grade, whereas they estimated their score to be a “B+.” This demonstrated a significant overestimation of their own knowledge (Maxwell, Ruth and Friesen, 2017). Although this study is only inclusive of one type of trainer, it suggests that many consumers of dietary supplements may be receiving incorrect or incomplete information.



#### **1.5.4 Prevalence**

In their paper, Vinnikov et al. (2018) explored the prevalence of supplement use in a university in Kazakhstan. They found that supplement use is common (about 33%) in people in the fitness community, from those involved in recreational sports to elite athletes. In their study, vitamin use was the most prevalent form of supplement use, especially among those who are not elite athletes. Those whose exercise was described as part of their healthy lifestyle had a lower supplement use prevalence (Vinnikov et al., 2018). Swimmers (including recreational swimmers) were the most frequent supplement users (Vinnikov et al., 2018). In Germany, Braun et al., (2009) found that protein products were more frequently used by men than women (42% vs 20% respectively). However, there was no significant different dietary supplement use by men and women. The percentages of supplements taken were: Minerals (87%), vitamins (76%), sport beverages (69%), and carbohydrate preparations (64%), protein/amino acid products (30%), ergogenic aids (24%), fatty-acid preparations (6%), and other supplements (27%) was less widespread. (Braun et al., 2009).

#### **1.5.5 Constituents and Labelling of Dietary Supplements**

Although supplements hold great promise for the increased health and athletic performance for their users, they have also been associated with doping, contaminants, and have in some cases contained unlisted ingredients. Coleman (2008) conducted a study in the USA on a variety of supplements and reported that labels of some supplements considered safe contained substances prohibited by the National Collegiate Athletic Association, the International Olympic Committee, and World Anti-Doping Agency. Maughan, King and Lea (2004) also reported that, instead of the expensive ingredients reported on the packaging of some supplements, they contained inexpensive replacements, which could not be known by the user. In his conclusion, Coleman (2008) noted that it is not uncommon for supplements to contain undeclared contaminants. William (2004) posed a concern that some dietary supplements may contain banned substances. In the results of a study on sports supplements conducted and reported by Maughan, King and Lea (2004) which included chrysin, tribulus terrestris and guarana, researchers found that nandrolone, testosterone and other steroids were identified. And when these supplements were given to healthy volunteers, the results showed urinary norandrosterone concentrations of up to 360 ng/ml. They noted that the threshold

for a positive test is 2 ng/ml for men and 5 ng/ml for women. Couzin-Frankel (2015) found that in the United States, some supplements sold for weight loss, enhanced brain function, and improved athletic performance contained a synthetic stimulant, while Coleman (2008) reported the presence of anabolic androgens and ephedrine. Geyer et al. (2004) in their study on supplements found that “Out of the 634 samples analysed, 94 (14.8 %) contained anabolic androgenic steroids not declared on the label.” Williams (2004) noted that some athletic supplements may include banned substances, such as ephedrine. Although this may be due to poor manufacturing processes, there was clear evidence of deliberate addition of these molecules during the manufacturing (Coleman, 2008).

So, instead of delivering the promised health benefits, the use of sports supplements can contribute to or cause serious health problems, or even death if not adequately regulated (Jones, 2002). The Banned Substance Control Group (2017) referred to the negative reputation the industry has suffered as a result of this inconsistency as “unfortunate.” However, contrary to their view, the reality that the quality and safety of these products are often compromised has warranted consumer speculation and hopefully is encouraging greater regulatory vigilance in the industry.

### **1.5.6 Regulation of Dietary Supplements**

Rägo and Santoso (2017) note that the catastrophic effects of diethylene glycol (1937) and thalidomide (1958 to 1960) to humanity facilitated the introduction of regulatory legislation like the USA’s Federal, Food and Cosmetic Act in 1938 and the Drug Amendment Act of 1962. Other governments in the European Union (EU) and all across the world introduced local legislation to protect consumers of therapeutic molecules (Rägo and Santoso, 2017). They also noted that the safety, quality and efficacy of a product should not be based on solid science alone, but also on inspection of manufacturers and evaluation of products produced by the manufacturer (Rägo and Santoso, 2017). Williams (2004) observed that dietary supplements are poorly regulated in most jurisdictions. As a solution to his concerns, he suggested that athletes should only consume dietary supplements from reputable manufacturers, like those whose products have the United States Pharmacopeia (USP) on them. Although an option, Williams’ solution is not adequately rigorous because, as stated above, manufacturers are misleading consumers through labelling, and no one is enforcing correct labelling. Secondly, this large and growing market is international and all

athletes are not able to access USP certified products. Alves and Lima (2009) conclude their paper by noting that dietary supplement regulation could improve the relationship between health providers and their constituents, allowing professionals to help people to understand how to use these products safely and effectively.

#### *1.5.6.1 Regulation in the United States of America (USA)*

Regulation of sports supplements in the USA falls under the Food and Drug Administration (FDA). A law called The Dietary Supplements Health and Education Act 1994 (DSHEA) was passed, stating that supplements without health claims are not subject to FDA regulation, and therefore are not required to prove claimed benefits, show safety, assure quality, or require specific labelling (Maughan, King and Lea, 2004). Jones (2002) in a paper outlining the potential dangers of supplements containing ephedra, concluded that, under current law (DSHEA) and with budgetary restrictions, the FDA is unable to adequately regulate these supplements. Coleman (2008) also noted that the FDA does not review supplements before they enter the market. Under US law, manufacturers and distributors of dietary supplements and dietary ingredients are prohibited from marketing products that are adulterated or misbranded. That means that these firms are responsible for evaluating the safety and labelling of their products before marketing to ensure that they meet all the requirements of DSHEA and FDA regulations (FDA, 2018).

#### *1.5.6.2 Regulation in the European Union*

The European Union (EU) has been in regulatory limbo for some time when it comes to supplements (Leser, 2015). The Banned Substances Control Group (2017) noted that the issues of safety and quality and efficacy are rated differently by different member states, leading to this limbo. Because EU law does not include provisions for dietary supplements, products are marketed as “food supplements, fortified foods, dietetic foods, and/or foods with nutrition or health claims” (Varvaštian, 2015). The result of this state of limbo is that, although the dietetic foods framework was adopted, different member states have adopted their own rules to manage these products (Banned Substance Control Group, 2017). In most EU countries, they are viewed as food (REGULATION (EU) No 609/2013 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 12 June 2013, 2013).

### 1.5.6.3 Regulation in the United Kingdom

In the United Kingdom, dietary supplements fall under the Food Safety Act of 1990 (amended by subsequent legislation) which comes from the European Union legislation (HSIS, 2017). Due to changes brought in by the Brexit, The United Kingdom may or may not make significant changes to their current food legislation.

### 1.5.6.4 Regulation in Australia

The Therapeutic Goods Administration of Australia is probably the most advanced regulator of dietary supplements in the world. According to the Australian Regulatory Guidelines for Complementary Medicines (2016), all swallowed products are either medicines or food. The Therapeutic Goods Administration (2014) highlighted that some dietary supplements are regulated as food and others as therapeutic goods/medicines. The guidelines state that;

*“often, claims made about a product or the appearance of the product may suggest that it is a therapeutic good. However, the fact that health claims are made about a product does not automatically make it a therapeutic good. Nor does the fact that the product comes in capsules or powders, or is labelled as a 'dietary supplement'”.*

This health authority acknowledges that there is a regulatory overlap between food and medicines which they call ‘food-medicine interface’. The Australian legislation and guidelines give regulators freedom over the ingredients, formulations or claims of any dietary supplement they evaluate.

## 1.6 OVERVIEW OF DISSERTATION

A wide variety of consumers use dietary supplements. Dietary supplements have proven to enhance both the lifespan and quality of life of consumers when used within recommended dosages, and their existence should be protected. They ensure that athletes can engage in rigorous training programmes while keeping their nutritional needs met. However, as literature has demonstrated, the quality of some of these products in the market has been compromised in various

ways. Products may contain banned or illegal substances which are undeclared on the label, and can also include labels that falsely declare ingredients which are not there. The literature demonstrates that in some cases the manufacturing standards of these products are poor. As it stands, dietary supplements are allowed to enter markets containing banned substances, either due to poor management of contaminants, or intentional introduction of those substances. Sub-par dietary supplements are prematurely ending athletes' careers, and possibly their lives. There are stringent health authorities who manage the regulation of dietary supplements differently, from doing nothing to adequately regulate dietary supplements.

For consumers in Botswana, inadequate information coupled with a lack of regulation of dietary supplements is a cause for concern. For regulators in Botswana, there is a lot that can be learned from other authorities, but authorities around the world continue to struggle to regulate dietary supplements because of limited information. This study aims to build upon the existing body of knowledge particularly for Botswana regulators' use.

For future studies, there is a need for more analysis of supplements in different jurisdictions to determine their manufacturing standards, quality, safety and effectiveness. More studies could also be done to determine why most regulators don't seem to prioritize protecting their people from potential harm from these products. More studies could also be conducted to investigate cases of serious harm to consumers due to dietary supplements containing banned substances. Lastly, studies can be done to assess and determine the most effective ways of regulating sports supplements.

# CHAPTER TWO

## RESEARCH METHODOLOGY

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### 2.1 SETTING

The study was conducted in Gaborone, Botswana. The city is the capital of Botswana, located in the South-East district with a population of 231,592 (UN Data, 2018). Gaborone has a growing number of gyms. Some are international brands like Virgin Active, as well as multi-site local gyms like Jack's Gym and independent gyms across the city. There has been an observable growth of the fitness community in recent years, with growth in the gym membership, marathon participation, biking competitions, and other fitness events and competitions. English is one of the official languages of Botswana and it is widely understood and used in both official and casual settings.

There is no data on the population of the fitness community of Gaborone, however for the purposes of this study, gym membership was used as a starting point to estimate the population of the fitness community. Gaborone has two main gyms and three small gyms. The largest of these is Virgin Active, and the second is Jack's Gym which has 5 different sites. Average gym membership was obtained from each gym's management for the year 2018. Virgin active had approximately 5100 members while Jack's Gym had 4200 members across all five gyms. Approximately 30% of gym members were not utilizing their membership, yielding an active gym member population of approximately 6,510.

### 2.2 STUDY DESIGN

The study was a descriptive, cross sectional quantitative study, using a semi-structured questionnaire (appendix 2) for data collection.

## 2.3 SAMPLING

Purposive sampling was used in recruiting participants into the study. Participants were randomly recruited from attendees at different fitness environments including gyms, powerlifting, bodybuilding, running and other general fitness sessions. Data was collected over a period of 60 days.

According to recent studies, the use of dietary supplements in a given population can vary from 13.4% (Muwonge *et al.*, 2017) in Uganda to 71% (Sousa *et al.*, 2016) in Portugal. Prevalence is higher in developed countries than in developing countries. For the purpose of this study, an average of 17% was used to estimate the fraction of the fitness community using dietary supplements in Gaborone as 1,107 persons. Based on this population, a confidence level of 95% and a margin of error of 5%, a sample size of 286 participants was calculated for this study using the FluidSurveys University calculator (FluidSurveys, 2018).

## 2.4 INCLUSION AND EXCLUSION CRITERIA

The following inclusion criteria were applied to participant selection for the study;

- Participants had to be aged over 18 years
- Participants had used or were currently using dietary supplements
- Participants were part of any form of fitness group in Gaborone.

The exclusion criteria applied to participant selection for the study included the following;

- People who used dietary supplements but were not part of the fitness community in Gaborone.
- People who were part of the fitness community but who did not take dietary supplements.

## 2.5 DATA COLLECTION

A semi-structured questionnaire (appendix 2) comprising of a mix of closed and open-ended questions was used to collect data from each subject. Some of the questions were adopted from related studies with slight modifications to meet the objectives of this study. The questionnaire



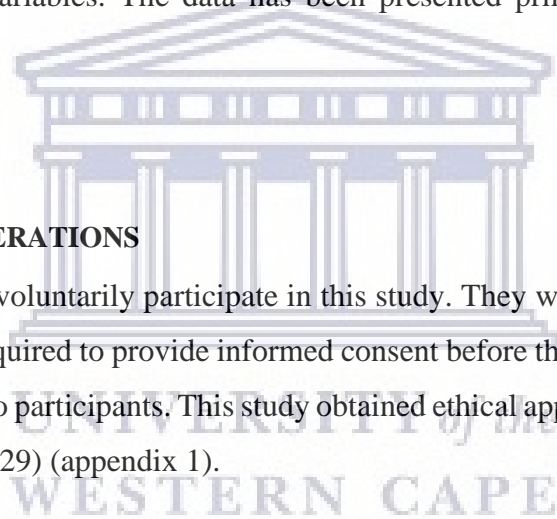
was in English. Data collected included consumer knowledge of products they take, sources of information regarding dietary supplements, their motivation for taking dietary supplements, and their perceptions of their experiences with dietary supplements. Surveys were all done by the primary investigator and two trained assistants.

## **2.6 DATA ANALYSIS**

After collecting the data used in this survey on paper forms it was input to Google Forms. This enabled the data to be captured and collated for analysis. It was then exported to a spreadsheet. The spreadsheet was analyzed using a variety of functions in Microsoft Excel 2010. Trends were observed using available variables. The data has been presented primarily using percentages, charts, and graphs.

## **2.7 ETHICAL CONSIDERATIONS**

Subjects were requested to voluntarily participate in this study. They were given full information about the study and were required to provide informed consent before their participation. Answers provided were untraceable to participants. This study obtained ethical approval from the University of Western Cape (BM 19/1/29) (appendix 1).





# CHAPTER THREE

## RESULTS

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### 3.1 DEMOGRAPHICS OF DIETARY SUPPLEMENT USERS

Out of 600 questionnaires that were distributed, 590 participants responded. This study indicated that the majority of supplement users in Gaborone within the fitness community were young people between the ages of 18 and 35, making up 79% of users. The 18 to 25-year-olds made up the largest category (35%), followed by 31-35-year-olds (27%). There was an equal 17% of respondents within the 26-30 and 36-45 years age ranges. The number of qualified respondents (both in the fitness community and supplement users) decreased with increasing age (Figure 1). A slight majority (55%) of users were male while the rest were female.

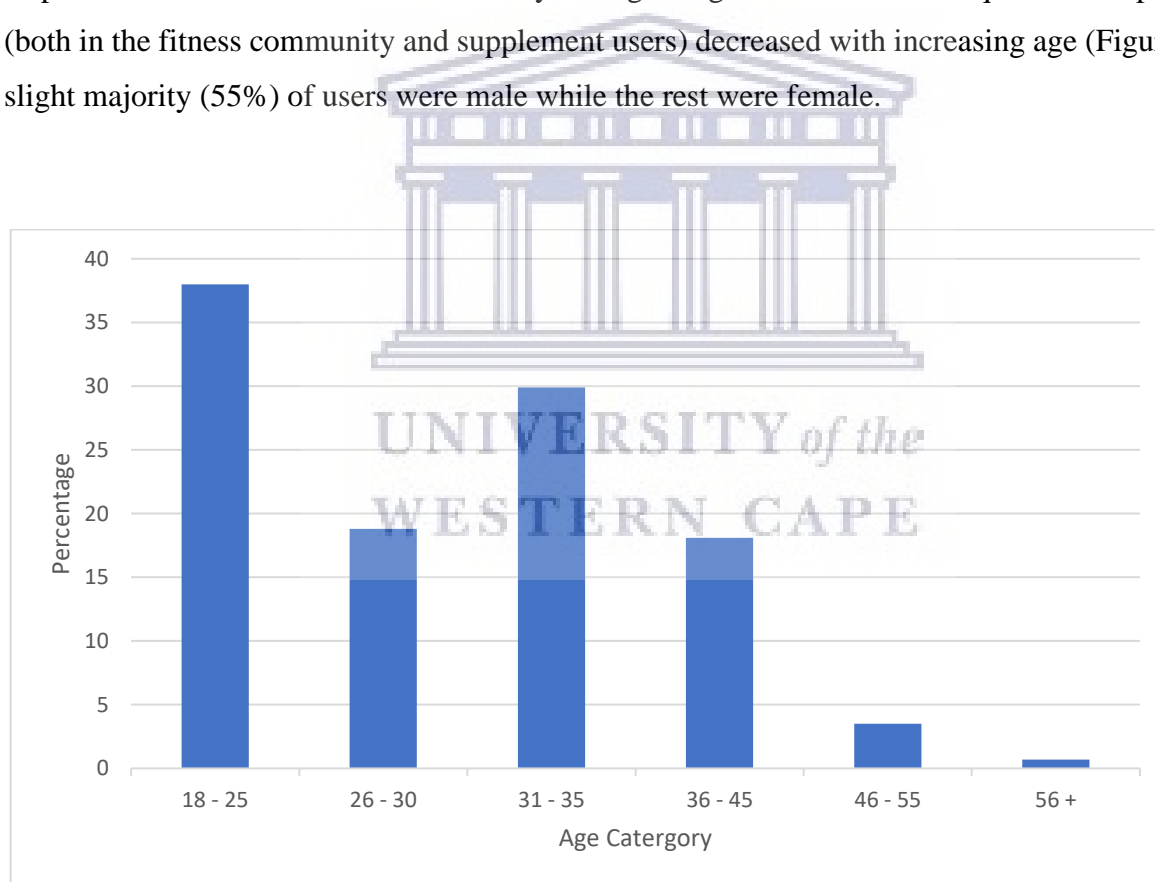


Figure 1: A Trend Showing the Percentage of Use of Dietary Supplements by Age Categories of Supplement Users

Respondents were requested to indicate the level of their own fitness, and as indicated in figure 2, the majority perceived themselves as beginners (46%), while professional athletes (14%) were in the minority of users. Others reported their level of fitness as either intermediate (36.7%) or advanced (17.8%) (figure 2).

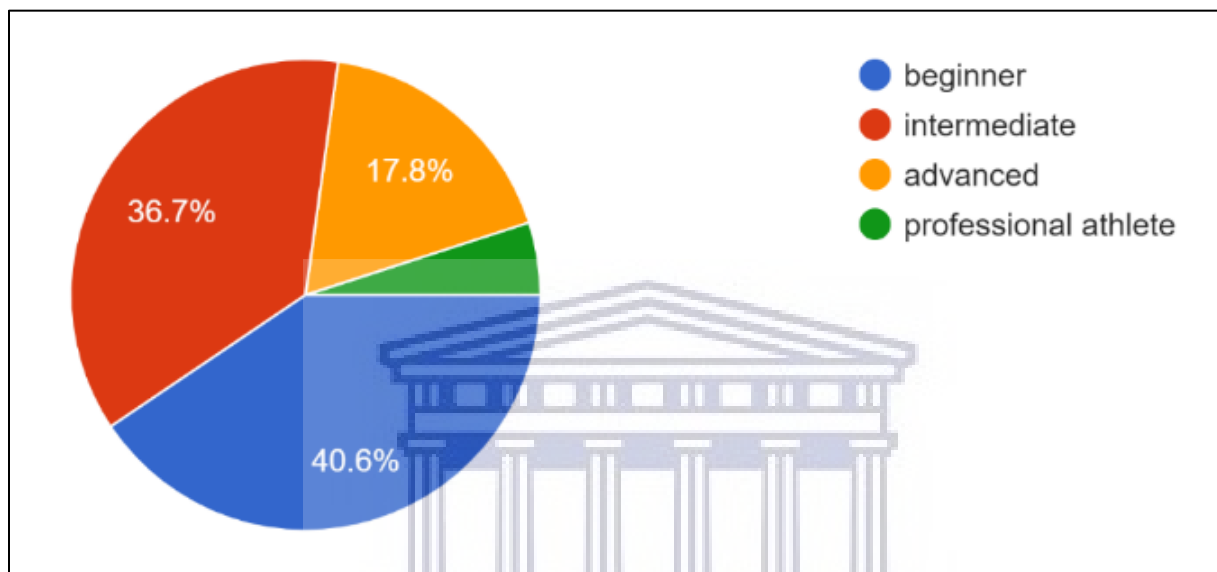


Figure 2: Respondents perception of their level of fitness

There is generally an even distribution of the frequency of exercise for users of supplements from once to more than five times a week. The majority of respondents (30%) were people whose exercise was irregular, while of those reporting regular exercising, there was generally an greater use of dietary supplements corresponding to an increasing frequency of weekly exercise (Figure 3). Amongst the regular exercisers, the majority of supplement users (20%) exercised more than 5 times a week, while the least supplement users (10%) where amongst those exercising once a week.

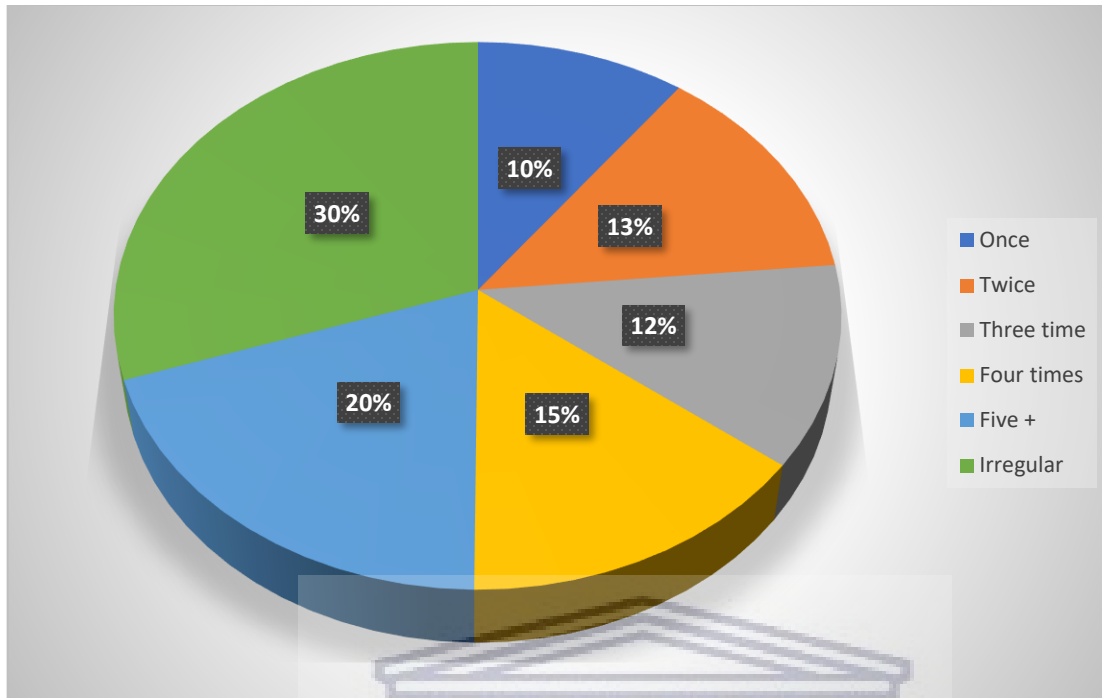


Figure 3: Frequency of exercise of the people taking supplements in Gaborone

### 3.2 CONSUMER KNOWLEDGE AND SOURCES OF KNOWLEDGE ABOUT DIETARY SUPPLEMENTS

The majority (55.2%) of participants reported knowledge of the ingredients of products they take, however many users were unaware of supplement ingredients they take and reported being either entirely unaware (18.8%) or partially unaware (26.1%) of the ingredients. With respect to the source of information regarding dietary supplements, online sources (39.5%) were the most common source followed by healthcare professionals (37.3%), with product packaging (16.4%) and coaches (16.4%) being the least common source of information. Of these four sources of information, those who feel most confident about their knowledge of these products are those who obtain information from a healthcare professional (16%), followed by online platforms (14%), then coaches (7%) and lastly, product labels (6%) as indicated by Figure 4.

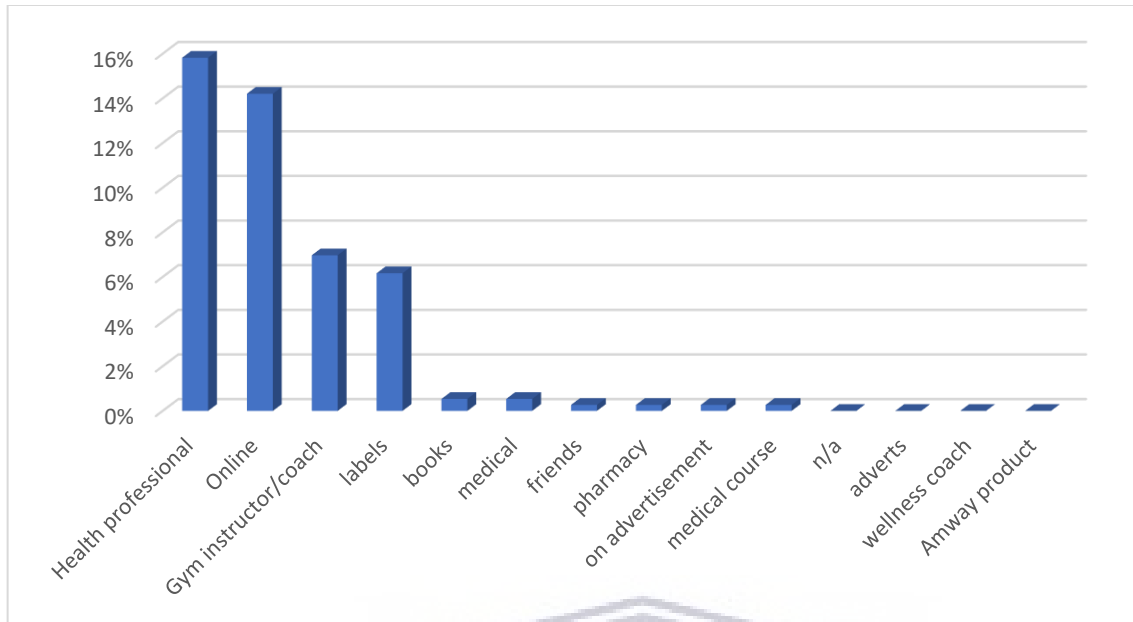


Figure 4: Percentage of participants who know ingredients of product they take by source.

### 3.3 CONSUMER EXPERIENCES OF DIETARY SUPPLEMENTS

The majority (66.1%) of participants who use dietary supplements have done so for under 1 year. Only 23.2% have used these products for 2-4 years, 8.3% have used these products for 5-10 years and less than 2.4% have used them for more than 10 years (Figure 5).

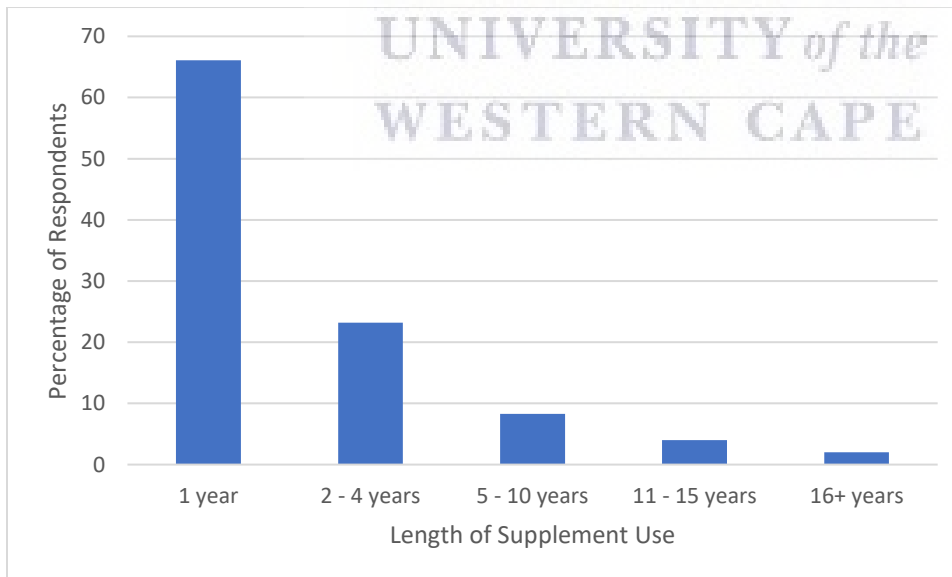


Figure 5: Length of Use of Dietary Supplements

The survey also investigated consumers own perception and experience of side effects of dietary supplements. The largest group (48.7%) of users were not aware of potential side effects before using these products. Only 42.5% of users reported that they were aware of side effects while the rest reported being unsure. Of those aware of potential side effects, 18% experienced them (Figure 6). On the other hand, 10.8% of participants reported having experienced side effects that were not declared on the label by the manufacturer, and 13.8% were unsure if they had experienced side effects. The remaining 75.5% of participants reported having not experienced side effects other than those declared on the packaging label of the products they take.

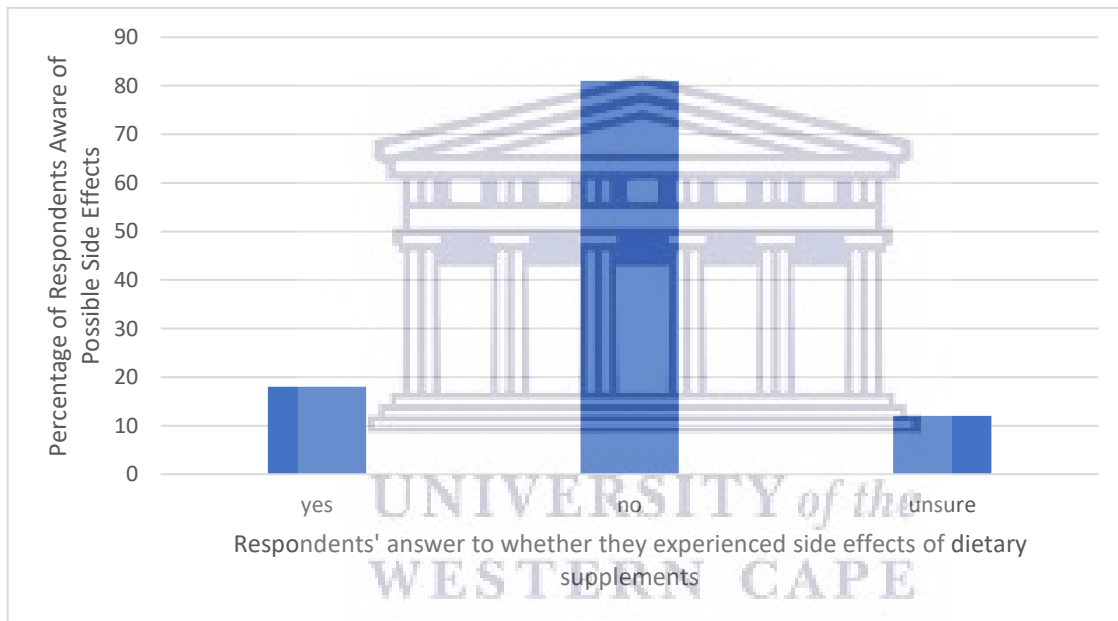


Figure 6: Respondents response to awareness and experience of side effects

About half (50.6%) of dietary supplement users felt that the products helped them achieve their fitness goals, while the rest either reported that these products do not help them (17.1%) or were not sure of the effect of the products on their fitness goals (32.3%). When asked about their medical conditions, 20% of participants reported to have at least one medical condition, 12% were not sure and the rest reported to have no medical condition.

# CHAPTER FOUR

## DISCUSSION AND CONCLUSION

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### 4.1 DISCUSSION

This research project aimed to explore the prevalence of the use and consumer knowledge of dietary supplements in the fitness community of Gaborone, Botswana. It also set out to identify consumer sources of information used in their knowledge and customer experiences of these products. Although there have been similar studies conducted in other locations there have not been any studies done in Botswana regarding nutritional supplements.

The majority of survey respondents were young and perceived their fitness level to be “beginner”. There was also a trend in the decrease in the use of these products decreases with increasing age, possibly due to a corresponding reduction in exercise and interest in ‘fitness’ with age. This finding demonstrates the changing landscape of Botswana’s health and fitness industry. This may be because young people are more likely to be concerned with their physical appearance and fitness. They are also more likely to have the time and expendable income to invest in fitness and nutrition. It also implies that the young population (69.3% of people in Botswana are under 35 years old) is a likely factor in this study (Statistics Botswana, 2018). Younger generations also have greater access to nutritional substances and gyms/fitness programs, and although supplements are used for a wide variety of purposes, weight gain and loss, muscle building, and recovery are very common uses (Varvaštian, 2015). A slight majority (55%) of users were male, a result similar to a study by Braun *et al.*, (2009) who found in their German study that there was no statistical difference in supplement usage between males and females. In the case of Gaborone, men are likely to try to build muscle mass by using protein powders and other products which promise muscle strength and growth, whereas women are more likely to have other objectives.

The majority of respondents reported having used supplements for less than a year. There could be a variety of reasons for this. First, they may have been taking supplements for a specific, short-

term reason. For example, some people may take supplements to boost their immune system with the hope that it will address their acute medical conditions. Secondly, users may have tried supplements but not had the finances to keep taking them consistently. Third, it is possible that some users did not see fitness results they expected from using the products and therefore were not interested in continuing supplement use. Finally, they may have stopped taking supplements because they experienced unexpected or undesirable effects.

Although 55.2% of consumers reported to be fully aware of the ingredients of the supplements they take, it is likely that they were overestimating their knowledge. Regardless, almost half of users reported not knowing the constituents of the supplements they consumed. The results also indicate that most users are getting their information from potentially unreliable sources, like the internet and product labels. Healthcare professionals are more likely to provide accurate information, however this is dependent on the knowledge of the healthcare professional on the subject, which could be limited. The difference between the knowledge of healthcare professionals and consumers being that healthcare professionals are more likely to know the clinical use of ingredients on the label, but are however unable to verify the actual ingredients in the products. Regardless of what the supplement label says, the nature of the actual ingredients used, the state of facilities in which these products were manufactured, the manufacturing processes or quality measures put in place when these products are manufactured are largely unknown to both consumer and healthcare professional. Dietary supplements in Botswana unlike drugs are not regulated by BoMRA. Coleman (2008) noted that it is common for supplements to contain undeclared contaminants, with clear evidence of the deliberate addition of unsafe molecules during manufacturing. Only manufacturers, who are incentivized to reduce the cost of manufacturing and increase sales and profits, know the exact ingredients of these products.

The drug methylhexaneamine has been found in supplements, including those obtained from a pharmacy, as the situation leading to the banning of the athlete Amantle Montsho by the WADA (Athletics Weekly, 2015; Ganetsang, G. (2015). This has led federations such as UK Anti-Doping and Athletics Australia to release warnings to athletes on the presence of banned substances in products available over the counter, including weight-loss aids and energy-boosters (Athletics Weekly, 2015).

It is a concern to find out that 48.7% of consumers of dietary supplements in the fitness community of Gaborone reported that they were not aware of side effects that may occur as a result of using these products. So, instead of delivering the promised health benefits, the use of sports supplements can contribute to or cause serious health problems, or even death if not adequately regulated (Jones, 2002).

Though it may be challenging, the best practice is to regulate dietary supplements fully as therapeutic medicines or food substances depending on the ingredients and claims like the Therapeutic Goods Administration of Australia. At a minimum, like the US-FDA, the BoMRA ought to set expected standards from dietary supplement manufacturers marketing products in Botswana, put pharmacovigilance activities in place to monitor their effects on people and implement reasonable penalties for manufacturers who do not comply. Based on the findings and other research work done in other parts of the world, the Botswana health authorities must put systems in place to regulate the manufacturing, labeling, and use of dietary supplements in Botswana.

## 4.2 CONCLUSION

This study focused on exploring the prevalence of use and consumer perception of dietary supplements in the fitness community of Gaborone, Botswana. A survey using a semi-structured, self-administered questionnaire was used to gather information from participants, which was then analyzed using Microsoft Excel.

The findings indicated that dietary supplements are mostly used by educated young adults, both male and female. The internet is the biggest sources of information of dietary supplements in Gaborone. About half of the survey participants were not aware of adverse side effects before beginning their use. Dietary supplements have great potential to damage the health and career progression of users if they remain unregulated. There is a definite need of regulation of these products in Gaborone, Botswana.



With more time and resources, future studies can focus on a nation-wide study assessing and analyzing the knowledge of healthcare professionals and of consumers, not only their perceptions. Detailed studies can also be done on the nature of the side effects experienced by consumers of specific products available in the Botswana market.



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## APPENDIX 1: ETHICAL APPROVAL

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WESTERN CAPE





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20 March 2019

Dr K Obikeze and Mr K Phaladi  
School of Pharmacy  
Faculty of Natural Science

**Ethics Reference Number:** BM19/1/29

**Project Title:** Prevalence of use and consumer perceptions of dietary supplements in the fitness community of Gaborone, Botswana.

**Approval Period:** 11 March 2019 – 11 March 2020

I hereby certify that the Biomedical Science Research Ethics Committee of the University of the Western Cape approved the scientific methodology and ethics of the above mentioned research project.

Any amendments, extension or other modifications to the protocol must be submitted to the Ethics Committee for approval.

**Please remember to submit a progress report in good time for annual renewal.**

*The permission to conduct the study must be submitted to BMREC for record keeping*

The Committee must be informed of any serious adverse event and/or termination of the study.

*Ms Patricia Josias  
Research Ethics Committee Officer  
University of the Western Cape*

**BMREC REGISTRATION NUMBER -130416-050**

## APPENDIX 2: QUESTIONNAIRE

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### Dietary Supplement Questionnaire

**1. Please indicate your gender:**

- Male  Female

**2. Please indicate your age category:**

- 18 to 25 years old  31 to 35 years old  46 to 56 years old  
 26 to 30 years old  36 to 45 years old  56 years old or more

**3. Please indicate your highest educational level completed:**

- None  
 Primary  
 Secondary  
 Tertiary

**4. How often do you exercise in an average week?**

- Once  Four times  irregularly  
 Twice  5 +  
 Three times

**5. What type of fitness activities/sports do you regularly participate in? (check all that apply)**

- Cardio training  Football  
 Strength training  Rugby  
 HIIT (eg: Grid)  Swimming  
 Functional fitness (eg: Crossfit)  Basketball or netball  
 Dance  Body building  
 Yoga/Pilates  Power listing/strongman  
 Track & field  Other  
 Distance running \_\_\_\_\_

**6. Do you have a known medical condition?**

- Yes  No  Maybe

**7. Please indicate your level of fitness:**



- Beginner
- Intermediate
- Advanced
- Professional athlete

**8. Do you use any dietary supplements (including vitamins)?**

- Never
- Yes
- Only in the past

**9. Please indicate the reason you decided to start using dietary supplements**

- Advertising/saw in a store
- Friends
- Recommended by fitness coach
- Recommended by a healthcare professional
- Recommended by an agent from the manufacturer
- Others .....

**10. On average, how many different types of supplements do you use in a week?**

- 1
- 2
- 3
- 4
- 5
- 6+

**11. How long have you or did you use dietary supplements for?**

- Less than 1 year
- 2 to 4 years
- 5 to 10 years
- 10 to 15 years
- 16 or more years

**12. What is your primary fitness goal?**

- Maintain
- Weight loss
- Weight/muscle gain
- Improve overall fitness
- Improve endurance
- Improve muscle tone
- Other: please indicate \_\_\_\_\_

**13. Were you aware of any side effects of using dietary supplements before you started using them?**

- Yes
- No
- I don't know

**14. Have you experienced any side effect other than what is written on the labels when using any dietary supplements?**

Yes

No

Unsure

**15. Why do you take dietary supplements?**

They help me achieve my fitness goal

My fitness instructor/coach told me to

I saw an advert

My friends are taking them

Other

\_\_\_\_\_  
\_\_\_\_\_

**16. Are sports supplements helping you achieve your fitness goal?**

Yes

No

Maybe

I do not know

**17. Where do you get information about the dietary supplements you use?**

Online

Healthcare professional

Gym instructor/Coach

Labels

Other, please specify:

\_\_\_\_\_  
\_\_\_\_\_

**18. Do you know the contents of the dietary supplements you take?**

Yes

No

I know some of them

**19. Where do you buy your dietary supplements?**

Health or fitness store

Online

Gym

Other, please specify: \_\_\_\_\_



# Informed Consent

**Title**

Prevalence of use and consumer perceptions of dietary supplements in the fitness community of Gaborone, Botswana.

**Principal Investigator**

Kagiso Phaladi

**About the Study**

The questionnaire provided to you is a tool being used to collect data for an academic study. This study aims to understand the prevalence of use, perceptions and experiences of using dietary supplements by members of the fitness community in Gaborone.

The study has been approved by the University of Western Cape Research Ethics Committee. The data collected from the questionnaire shall be coded to protect your identity. The information shall not be traceable to you. You are therefore encouraged to answer each question as honestly as possible.

Please sign below to indicate that you have read and understood the nature of this study, your concerns have been addressed, and that you are participating willingly. You may withdraw from the study at any time.

**Full Name**.....

**Signature**.....

**Date**.....

