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Umar Gambo Adamu

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Head of the Doctoral School: **Prof. Dr. András Nábrádi university professor**

THE CHANGE IN HEALTH BEHAVIOR AS A RESULT OF THE COVID-19 EPIDEMIC WITH SPECIAL REFERENCE TO SPORT CONSUMPTION

Prepared by:

Umar Gambo Adamu

Supervisor:

Dr. Ildikó Balatoni

Clinical Centre, University of Debrecen

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The aim of this dissertation is to obtain a doctoral (PhD) degree in the scientific field of „Management and Business”

Written by: Umar Gambo Adamu

Supervisor: Dr. Ildikó Balatoni

Doctoral final exam committee:

	name	academic degree
Chair:	.....	.....
Members:	.....	.....
	.....	.....
	.....	.....

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Reviewers of the Dissertation:

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Review committee:

	name, academic degree	signature
Chair:	.....	.....
Secretary:	.....	.....
Members:	.....	…….
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I undersigned (name: **Adamu Umar Gambo**, date of birth: **1987-03-10**) declare under penalty of perjury and certify with my signature that the dissertation I submitted in order to obtain doctoral (PhD) degree is entirely my own work.

Furthermore, I declare the following:

- I examined the Code of the Doctoral School of Management and Business Administration and I acknowledge the points laid down in the code as mandatory;
- I handled the technical literature sources used in my dissertation fairly and I conformed to the provisions and stipulations related to the dissertation;
- I indicated the original source of other authors' unpublished thoughts and data in the references section in a complete and correct way in consideration of the prevailing copyright protection rules;
- No dissertation which is fully or partly identical to the present dissertation was submitted to any other university or doctoral school for the purpose of obtaining a PhD degree.

Debrecen, 2025. 10. 01.

Adamu Umar Gambo

signature

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LIST OF ABBREVIATIONS

AfCov - After Covis-19

BeCov - Before Covid-19

Covid-19 - Coronavirus Disease 2019

DuCov - During Covid-19

EU - European Union

GBD - Global Burden of Disease

GDP - Gross Domestic Product

ICT - Information and Communication Technology

IPAQ - International Physical Activity Questionnaire

KSH - Központi Statisztikai Hivatal

MLB - Major League Baseball

NCDs - Non-Communicable Diseases

NFL - National Football League

NHS - National Health Services

OECD - Organization for Economic Cooperation and Develeopment

PwC - Pricewaterhouse Coopers

SARS-COV-2 - Severe Acute Respiratory Syndrome Coronavirus 2

SpEA - SportEcon Austria

TV - Television

UK - United Kingdom

UNDP - United Nations Development Programme

US - United State

USD - United State Dollar

WHO - Worl Health Organization

INTRODUCTION

The year 2020 is significant in history due to the event of the global pandemic Covid-19. The global pandemic by Covid-19 has led to more than 1.8 million deaths at the end of December 2020 (World Health Organization, 2021a). SARS-COV-2 (Corona Virus) as defined by the World Health Organization (2023a) has created major disruption to the entire world, the economy, business, ecosystem, politics, healthcare system, society and family have all been affected by the events of the Covid-19 pandemic and drastically brought new order in almost all sectors across the globe including the sports industry. As a result of the Covid-19 outbreak, the epidemic measures set in place by various countries to limit the wider spread of the virus among people, longer lockdown period, and restricted movements were seen across the world which led to temporary but longer closures, sketchy business operations, and or total collapse in activities in many sectors of the economies all over the world. The restrictions placed by governments as measures taken to curb the epidemic's widespread had negatively affected most of the gains made previously in this sector and further forced many people to alter their lifestyle. The setbacks faced on engaging in sporting activities were majorly affected by movement restriction which also led to the collapse of several community events, *e.g.* attending sports events, participating, or playing sports in the community, etc. These extended measures also forced many sports fans, employees, students, children, and elderly people to stay indoors for a longer time increasing the risk of sedentary behaviour, inactivity, screen time.

Sports consumption may vary not only across countries but also among different social groups (e.g., young people, the elderly, men, and women), and the COVID-19 pandemic has affected these groups to differing degrees, thereby influencing their habits to varying extents. Covid-19 restrictions posed significant risks to vulnerable groups, particularly individuals with chronic diseases such as asthma, diabetes, and arthritis, whose conditions require regular care and physical activity. Prolonged closure or limited access to sport facilities hindered their engagement in exercise, potentially worsening their health. The elderly, already predisposed to multiple diseases - especially cardiovascular conditions - were further affected, as reduced physical activity is known to elevate cardiovascular risks (*e.g.* Peçanha et al., 2020). Restrictions preventing routine outdoor activity, such as walking, likely contributed to their deteriorating condition. While women in developed societies (*e.g.* the UK and Europe) generally enjoy equal opportunities in sports

participation, cultural and religious norms in developing regions such as parts of Nigeria often restrict their involvement. Covid-19 restrictions further exacerbated these limitations, reducing their autonomy and opportunities for physical activity. Young people also faced unprecedented challenges. Concerns regarding reduced productivity linked to excessive use of digital devices and video games (Balatoni et al., 2020) were intensified during lockdowns, as many resorted to sedentary lifestyles. Therefore, to reduce the burden of Covid-19 restrictions as the situation became a little more permanent, organizations and educational institutions were forced to introduce work from home or online teaching to the working class and students by either working or studying from home.

Experts suggested that Covid-19 could be within our midst for longer period which they described as the new normal. This statement could further be validated as from time-to-time new variants of the Covid-19 virus are being discovered across Europe, US, and Asia. This could mean that Covid-19 virus as a “new normal” like many other epidemics could be amongst us for a very long time and people could be said to survive with it. Although many epidemic measures were lifted and people are freer to move than before, the administration of Covid-19 doses of vaccines to patients who tested positive of Covid-19 disease still continuous and advise of self- isolation is still relevant.

Despite the announcement made by the WHO Chief in press release by United Nations News in May 5 2023 declaring end of Covid-19, he stressed that the declaration does not underscore the dangers and threat the disease still pose till today because according to World Health Organization Covid-19 dashboard as recent as February 2025 there are still reported cases of deaths due to Covid-19 (World Health Organization, 2025a). This made the subject of Covid-19 very relevant to our today’s realities in 2025 almost five years later and as upper respiratory viruses Coronavirus is, they cause flu-like symptoms in higher numbers during the autumn and spring. Therefore, it is important to learn personal hygiene rules, sneezing and coughing etiquette during the epidemic period and to continue to do so during all such periods in the future. Avoiding crowded public places and regular exercise in fresh air are also recommended in the autumn-winter period.

Furthermore, the epidemic has affected different countries and economic areas of the world to varying degrees more specifically in sport sector, tourism, and hospitality. Therefore, it is vital to keep in mind the experiences learned in all cases closer to our watch. The concept of "resilience" has been brought to the fore and its importance

highlighted by the Covid-19 epidemic. The impact of wars around the world and the Covid epidemic triggered an economic crisis, which also highlighted the importance of resilience, survivability and perseverance. For all these reasons, analysis and reflection on the lessons learned are still relevant today.

More personally, it is important for me to exercise regularly, I was already going to the gym daily before the epidemic. The restrictions have also had a significant impact on my own lifestyle. I was curious to see how the epidemiological measures introduced after the outbreak of Covid-19 affected the daily lives and habits of the population and how this led to changes after the outbreak.

To the healthcare system of nations who were the lifesavers during the crisis and beyond, the workload of the healthcare workers, the high mortality rate among patients, and the serious complications have made the management of chronic diseases in health care institutions significantly more difficult. It would have therefore been particularly important that a smaller percentage of the population be affected by chronic diseases which could have been reduced/improved by a healthy lifestyle.

The first chapter contains the introductory section of the study, the topic objectives and aims, the research questions, and the hypotheses. The second chapter contains the literature review section where extensive relevant literature materials are assessed and presented. The third chapter entails the entire research process diagrammatically, the method of data collection, sampling and sample size, tools for data collection and preparation, statistical techniques of data analysis, and justification for their use or selection. The fourth chapter presents both the secondary and primary results of the study, which include all three countries. The secondary results present multifaceted aspects of the three countries, while the primary results present the survey findings for all three countries, including demographic, descriptive, and statistical analyses. The fifth chapter contains the conclusion and recommendations derived from the study, and finally, the sixth chapter presents the novel findings of the research.

The results of the dissertation and the recommendations formulated in Chapter 5, the Conclusions and recommendations section, may be suitable for consideration by decision-makers when developing policies aimed at rebuilding sports life, particularly in disadvantaged countries and among marginalized groups.

1. TOPIC AND OBJECTIVE

The global pandemic Covid-19 in 2020 had a major impact on the whole world. It caused significant disruption to the global economy and our daily lives.

As a result of the Covid-19 pandemic and the epidemiological measures introduced in connection with it, the opportunities for sports have significantly decreased and people's physical activity has decreased. The time spent sitting increased in parallel. Physical inactivity increases the risk of chronic disease, which was also associated with chronic stress during the epidemic, affecting the functioning of the immune system, increasing the chance of infection and further reducing the propensity to exercise during quarantine. Thus, the various negative effects add up.

This research analyzes how the epidemiological measures introduced after the onset of Covid-19 pandemic affected the health behavior of the population, how it developed during the epidemic period and then after the epidemic situation ended. We paid special attention to the changes in sports consumption habits. Based on the above, it was assumed that the physical activity of the population decreased significantly even in those social groups and in those geographical areas, among which the proportion of people who regularly exercised was higher. However, with the end of the epidemic, given the long period of confinement, perhaps even non-athletes began some exercise (*e.g.*, walking) to compensate for the isolation, home office work.

Due to the Covid-19 epidemic, personal contacts around the world have been digitalized, impoverished, and community events have been almost completely delayed. Consequently, shopping habits, eating habits have changed, home-office-type, homework, distance learning, restrictions, or even fear of infection have changed, the concept of "leisure time" and the way it is spent have changed, and exercise opportunities have also impoverished. Our lifestyle and, within that, our health behavior have changed significantly. However, the question also was to what extent, during and after the prolonged and recurrent epidemic periods, the elements of our lifestyle have changed compared to the pre-epidemic situation, whether the rebound effect would prevail.

The first step of the research was to explore the antecedents and relevant literature. In this regard it was necessary to review such basic concepts - and their evolution - as health,

health behaviour, and health development. It was indispensable to identify the models related to the former concepts. It was essential to know the role of physical activity in a healthy lifestyle, as well as the harmful effects of inactivity, its role as a risk factor. In addition, the characteristics of the Covid-19 epidemic and its effects on people's lifestyles, health, and thinking had to be mapped, and we could not disregard the analysis of the economic processes caused by the pandemic. After that, the study was to examine what habits and how they changed during the pandemic. It reviewed how elements of health behaviour such as *e.g*. time spent in front of the screen, socializing, physical activity, *etc*. developed during the relevant period.

We analysed whether the trends observed in the changes in all these indicators are the same in Hungary and in relation to foreign countries. Having analysed the information that could be extracted from the secondary databases, own survey involving sport consumers and general population was implemented. In addition to socio-demographic data, the questionnaire included a set of questions on sports habits, considering elements of internationally accredited questionnaires, as well as questions focusing on lifestyle changes. Based on the above, my main research objective was to examine how health behaviour and sports habits have changed as a result of the Covid-19 pandemic in countries with varying levels of economic development. The main aims and related research questions are summarised in Table 1.

Table 1. Summary of aims and research questions

	Question	Aim
1.	**Q1**: How has the Covid-19 epidemic affected physical activity in different countries?	**A1**: Examination of physical activity trends before, during, and after the Covid-19 epidemic.
2.	**Q2**: How has the Covid-19 epidemic affected sports consumption in different countries?	**A2**: Analysis of trends in sport consumption before, during, and after the Covid-19 epidemic.
3.	**Q3**: How did daily sitting time change before, during, and after the Covid-19 epidemic?	**A3**: Analysis of daily sitting time before, during, and after the Covid-19 epidemic.
4.	**Q4**: Did sports consumption among sports fans differ from the general population before, during and after the Covid-19 epidemic?	**A4**: Examination of trends in sports consumption before, during, and after the Covid-19 epidemic among sports fans compared to the general population.
5.	**Q5**: Was there a difference between the genders in sports consumption before, during, and after the Covid-19 epidemic?	**A5**: Analysis of trends in sports consumption by gender before, during, and after the Covid-19 epidemic.
6.	**Q6**: How has the Covid-19 epidemic affected screen time in different countries?	**A6**: Examining trends in screen time before, during, and after the Covid-19 epidemic.
7.	**Q7**: Is there a difference in physical activity, including leisure time activity, and sport consumption between the populations of the 3 countries?	**A7**: Comparison of the physical activity of the population, including leisure activities, and sport consumption over the 3 periods and the 3 countries.

Hypotheses

As a result of the literature review, the following hypotheses were formulated in relation to the above research aims and questions:

H1: There are changes and declines in Physical Activity and leisure-related activities during Covid-19 which increased after Covid-19 period.

H2: Changes and decline in sport consumption during Covid-19 compared to after Covid-19 and before Covid-19 periods.

H3: Variations and reduced daily sitting time at work during Covid-19 period but more sitting time at work before and after Covid-19.

H4: For sports fans, the change due to the Covid-19 epidemic would be more pronounced.

H5: There is no gender difference in sport consumption in either country.

H6: Increased daily screen time of individuals during Covid-19 in comparison with before and after Covid-19 periods.

H7: PA, leisure activities, sport consumption, and sitting time at work in the Covid-free periods, *i.e*. before Covid-19 and after Covid-19, would be greater in England as compared to Hungary and Nigeria, while *vice-versa* on screen time. Due to the prolonged Covid-19 measures witnessed in the UK during Covid-19 period, we expected both Hungary and Nigeria to have a better result than England. We also expected Hungary to have a much better results than Nigeria.

2. LITERATURE REVIEW

The outbreak of the coronavirus (Covid-19) pandemic in the year 2020 has led to a large-scale decrease in physical activity levels globally among other unexpected changes to human lifestyles, evident especially in the alteration of health behaviours.

Sport consumption and the sports industry in general have suffered significant setbacks during the period of the Covid-19 epidemic. It is evident that an unexpected decrease in sport activities was experienced during the pandemic, which negatively impacted both sports consumption and overall physical activity, affecting general health and wellbeing to a great extent.

2.1. Health definition

According to the World Health Organisation, "Health is a state of complete physical, mental, and social wellbeing and not merely the absence of disease or infirmity" (Callahan, 1973, p. 77). In a 2020 study, the National Institute of Diabetes and Digestive and Kidney Diseases stressed that the health status of an individual may change with their habits. For example, implementing healthy habits may protect one from diseases such as obesity and diabetes, and a balanced diet and regular exercise may also help in managing weight and increased energy gain in particular. Inversely, with the development of unhealthy habits and behaviours such as overeating, insufficient physical activity or an increasingly sedentary lifestyle, the chances of weight gain, obesity, and possible cardiovascular issues increase as well.

2.2. Healthy lifestyle

Some studies believe that longevity might be a result of individuals observing an overall healthy lifestyle, which may be defined as habits or behaviours that an individual adopts and continuously observes throughout their lifetime. Sustenance of a healthy lifestyle commands and promotes both a physiological and behavioural shift in the individual, for instance; partaking in increased physical activity (such as walking or exercising), a less sedentary lifestyle, reduced screen time, and a healthier diet including a decreased intake

of salt and oil, as well as eating more fruits and vegetables (Zanjani et al., 2015; Dunn et al., 2024; Fang et al., 2024; Peng et al., 2024; Liu et al., 2024).

These positive changes in behaviour and increased wellbeing may also be attributed to an avoidance of harmful or addictive components, such as the excessive consumption of alcohol, tobacco and other harmful substances (Lara et al., 2013). These changes can altogether promote the reduction of mental and physical stress on the individual, which can furthermore result in positive effects, namely increased sleep quality and restfulness. The aforementioned changes, as well as maintaining a generally healthy body mass index are all associated with increased wellbeing even at later ages and may contribute to a higher life expectancy (Zanjani et al., 2015; Dunn et al., 2024; Fang et al., 2024; Peng et al., 2024; Liu et al., 2024). Some studies are of the opinion that living a healthy lifestyle is not only influenced by the direct actions of an individual, as certain outside factors, such as the socio-economic situation, education level, family status, age, gender and social connections of a person can greatly influence their opportunities when it comes to their lifestyle (Denton et al., 2004; Ochieng, 2006; Fong et al., 2007; Paulik et al., 2010). The nudging effects experienced when consumers were given the opportunity to choose between healthy and unhealthy options proved to be more effective when consumers were given more positive reinforcement towards healthy choices (Vugts et al., 2024). In urban environments, the concern over ever-reducing (due to urban development) space and environment for consistent physical activity proves to be a unique factor for determining healthy lifestyle through physical activity (Garcia et al., 2012; Ghose & Yaya, 2018; Das Gupta et al., 2019). Inversely, in rural settings, the role of fitness support programs and lifestyle awareness emerge as the most significant measurements regarding the adoption and sustenance of healthy lifestyles (Bunn et al., 2023; Lozano-Vicario et al., 2024). In the digital era, intervention through online behaviour change support systems also arises as a significant factor for people adapting to healthy lifestyles or behaviours (Agyei et al., 2024). The availability of sports infrastructure or facilities, especially in non-urban areas, plays a vital role in the development and upkeep of healthy lifestyle behaviours (Kosztin & Balatoni, 2015).

2.3. Role of physical activity in maintaining a healthy lifestyle

The importance of physical activity (further referred to as PA) and other behaviours related to physical health are another key factor in determining a healthy lifestyle. Regular PA increases the endurance and stamina of the individual and is generally an effective method of preventing various ailments and illnesses in the human body (Adamu & Balatoni 2023). Some studies suggest that a decrease in PA may have a role in the development of multiple conditions, such as cardiovascular diseases, which may subsequently cause a decreased life expectancy particularly among people who are at an increased risk of cardiovascular disorders (Peçanha et al., 2020). On the other hand, the advantages that participating in physical activity and sports may provide to young people in particular have been extensively documented across studies. Young people are the future workers of any society, therefore protecting and encouraging their physical wellness is paramount to ensure the existence of a healthy and productive workforce in the future (Post et al., 2022). To adequately achieve this goal, parents, teachers, schools, and caregivers must begin the promotion and encouragement of sports and other forms of physical activity to young people in an all-encompassing manner, especially during their years of adolescence. Healthy behaviours and lifestyle changes cultivated during adolescence tend to persevere through the majority of an individual's lifetime (Kim et al., 2022). Therefore, it is necessary to begin the encouragement of physical activity at an early age and continuously maintain it during the later years of life, as its positive effects will stay with individuals throughout their entire lives.

The extent of the effect of physical activity on both physical and mental health and wellbeing is an ongoing topic of discussion, with the debate continuously evolving through research findings which may help people significantly in establishing a healthy lifestyle and improving their mental and physical wellbeing (Seefeldt et al., 2002). Some studies have evaluated the importance of an active lifestyle through engaging in physical activity and introduction to given diets in improving overall health and wellbeing (Mathisen et al., 2023). People who routinely engage in PA are generally found to experience increased mood and focus, possess higher self-esteem, and to be generally more optimistic compared to those who are unable to engage in regular PA (Appelqvist-Schmidlechner et al., 2023). Physical activity may also enable one to build endurance and self-confidence, and can be described as a therapeutic process, consequently impacting individual health and wellbeing in a positive manner (Williams et al., 2023). For example,

yoga as a form of physical activity is found to be an effective remedy for people with dementia in some cases, since physical fitness is proven to be able to improve cognitive functioning and mental health, as suggested by multiple studies (Karamacoska et al., 2023; Galle et al., 2023). Inversely, research found that unhealthy habits such as high substance use, unhealthy diets, and insufficient physical activity have devastating effects on the mental health of adults (Collins et al., 2023). On the other hand, engaging in frequent physical activity is correlated with appropriate diurnal cortisol levels, translating to decreased stress levels and better psychological functioning (Moyers & Hagger, 2023). Studies proved the impact of regular fitness activity as a natural remedy for conditions such as anxiety and depression, improving blood pressure and regulating and improving human health (Nguyen et al., 2023). The financial income of an individual may also influence their level of engagement in physical activity (Lakerveld et al., 2008; Lewanczyk et al., 2023). Living a healthy lifestyle during and after pregnancy was expressly recommended to obese and overweight women through weight management, via engaging in some sort of physical activity during the antenatal and post-ante-natal periods (Fair & Soltani, 2024). Healthy behaviours, which include regular physical activity, are theorised to increase life expectancy of an individual by up to 14 years compared to those who engage in less frequent or no PA (Zhang et al., 2020a; Tessier et al., 2024).

2.4. Harmful effects of inactivity

A 2009 report by the World Health Organisation declared physical inactivity as number four on a list of the 19 leading risk factors for global mortality. While the relationship between physical inactivity and non-communicable diseases has been widely established, the risks of inactivity can be even more detrimental to the wellbeing of individuals. This, in turn, may pose economic burden on health authorities, all the while the population is exposed to rising physical inactivity rates. For example, in the United Kingdom during the 2006-2007 period, this phenomenon cost the NHS a total amount of around 900 million pounds (Scarborough et al., 2011). Another negative economic consequence of underfunding the treatment of Non-Communicable Diseases (NCDs), the causes of which include physical inactivity and other unhealthy habits and behaviours, is the increase in its estimated cost of around $47 trillion USD globally, to provide care for people with NCDs according to World Economic Forum (Bloom et al., 2011; Sithey et al., 2021).

Sedentary behaviour, which is directly linked to inactivity, especially in older people, may cause multiple diseases like Alzheimer's, dementia, cardiovascular disease, diabetes, cancer, and other health deficiencies such as cognitive decline, reduced quality of life and wellbeing, depression, reduced life expectancy, poor quality of sleep, or even premature death (Fisher et al., 2016; Copeland et al., 2017; Jasper et al., 2020; Rey-Brandariz et al., 2023; Lai et al., 2024). Physical inactivity has been identified as one of the modifiable risk behaviours among individuals suffering from mental illness or disorders based on psychiatric diagnoses; and its possible consequences include higher morbidity and mortality rates, as well as reduced life expectancy (Robson & Gray, 2006; Colton & Manderscheid, 2006; Galletly et al., 2016; Fehily et al., 2018). Similarly, physical inactivity is attributed to ailments like hypertension, increased blood cholesterol, and obesity (Tiwari et al., 2022). In regards to some preventable chronic diseases such as respiratory diseases, physical inactivity can play a significant role in the development of the illness itself, whereas sufficient physical activity could help cure or prevent these illnesses altogether (Schmidt et al., 2016; Datta et al., 2018; Riley-Gibson et al., 2023). Some studies also found that physical inactivity is closely linked to obesity, cardiovascular disorders, and diabetes, consequently allowing psychological consequences of stress, such as anxiety to develop (Lines et al., 2020). According to a Canadian study, physical inactivity accounted for 9% of diagnosed cancer cases in hospitals. Additionally, the consequences of physical inactivity have further increased the cost of healthcare and overall reliance on health providers, which prove to be a serious burden to the government (Poirier et al., 2019; Adhikari et al., 2024). Furthermore, the global cost of physical inactivity, which has led to an increase in numerous preventable conditions such as stroke, dementia, depression, as well as higher mortality rates due to cardiovascular disease, may be up to billions of dollars (Santos et al., 2022). Even more worrisome is the possibility that physical inactivity and certain unhealthy habits among the adolescent population are identified as potential factors negatively influencing mental health, with its possible outcomes including heightened suicidal ideation and tendencies (Kumar et al., 2020). In the case of diabetes and hypertension, which are responsible for considerable morbidity and mortality in sub-Saharan Africa, a strong link or association is present between the aforementioned conditions and a lack of adequate physical activity (Beaglehole et al., 2008; GBD, 2015; Lutala & Muula, 2022). Moreover, it is estimated that by the year 2030, nearly 18 million people in sub-Saharan Africa could be suffering from diabetes, a development that is disturbing, especially considering the other

preexisting conditions and poverty concerns the continent is currently experiencing (Wild et al., 2004; Lutala & Muula, 2022). Physical inactivity may additionally be a cause for insulin resistance, metabolic syndrome and some mental health disorders (Lee et al., 2012; Le Roux et al., 2022). Currently, an estimated death toll of around 5.3 million globally is in some way attributable to physical inactivity and its consequences (Lee et al., 2012).

2.5. Relationship between social and economic development and lifestyle

The social and economic development of a nation can make a substantial difference in solving societal problems, including adherence to a healthy lifestyle. Also, several studies maintain that these factors are interrelated: the low socio-economic status of an individual may lead to increased sedentary lifestyle and reduced fruit and vegetable consumption (Adler & Newman, 2002; Qi et al., 2006). A Canadian survey of health promotion identified a clear link between socioeconomic class and physical activity or exercise patterns (Wister, 1996; Qi et al., 2006). Even though alcohol consumption patterns are more mixed, association was found between heavy drinking and tobacco smoking and low socio-economic status (Adler & Newman, 2002; Sorensen et al., 2004; Qi et al., 2006). Sciatica as a pain radiating from the low back to the leg is strongly associated with overweight, obesity, and inactivity; a survey study found that education is more crucial in preventing the unhealthy lifestyles that lead to sciatic pain than unemployment, even though it is generally believed that more sedentary lifestyle the unemployed tend to have plays the most important role (Anttila et al., 2024). In a qualitative interview conducted in the US, McCoy et al. (2024) identified four key factors providing a link between socio-economic status and healthy lifestyle in the population. One factor is the time, energy, and material resources that are available to commit to health, with the second one being the influence of social connections on the ability to engage in health practices. The third factor is the control over health practices, and the fourth one they identified was how lifestyle is viewed as voluntary and planned behaviour. Their results show that socio-economic status is not only interconnected with some specific health actions, but in a broader sense it also influences how individuals think about and manage their bodies. In addition, socio-economic inequalities were identified as causes of different illnesses, such as cancer and cardiovascular disease (Clark et al., 2009; Bernini et al., 2024). A study observed decline in dementia in some high-net-worth or income countries, citing some

social determinants that influence health even at a later stage in life (Roehr et al., 2018; Wolters et al., 2020; Bernini et al., 2024). Social and cultural determinants as well as people's living conditions may affect cognitive behaviour, influencing health and lifestyle changes (Galobardes et al., 2003; Hendrie et al., 2018). In a Chinese study, lower socio-economic status was found to be closely linked to physical and healthy lifestyle factors among the old and the middle-aged population (Guo et al., 2023). A study conducted on dietary intake found that higher socio-economic status and a healthier lifestyle are strongly associated with the Mediterranean diet (Papadaki et al., 2023). In a Brazilian study, the choice of either private or public healthcare depended on the socio-economic aspects of individuals, and a clear distinction was made in terms of socio-economic conditions and lifestyles across the above mentioned two sets of people (Geraldes et al., 2024). Cognitive malfunctions can heavily impact an individual's ability to cope with many life challenges, and the related failure may also affect one's income, leading to generational transmission of poverty. Low socio-economic status has been shown to be linked with worse cognitive functioning, as well as physical and mental health outcomes (Mac-Giollabhui & Hartman, 2022).

2.6. Sports infrastructure

In the 21st century, sport is regarded as a global platform where sport fans make effective use of their leisure time for maximum fun and exciting memories that improve wellbeing. More importantly to active athletes, a crucial motivator to enhance physical and mental wellbeing in professional level athletes may be to build a career and provide generational wealth for their family (Xu et al., 2024), whereas governments consider sport a means to promote numerous economic and social programs, such as improving a nation's competitive prowess in an international sporting scene, motivating healthy living among citizens, and sometimes boosting the country's economy through tourism, hospitality, employment, ticket sales, rights purchase, media, and commercialisation (Adamu & Balatoni, 2022; Kallioupi & Tsourvakas, 2024).

Building sports facilities is supported by governments to ensure constant development in a given country so as to stay competitive and to encourage people to keep fit and maintain a healthy lifestyle and habits. By so doing, the government can also reduce healthcare expenses through the decreasing use of healthcare facilities. For private owners of sport

clubs, arenas or stadiums, gyms, fitness centres and other sports facilities, it is a lifetime investment that generates substantial income (Adamu & Balatoni, 2022). Various countries such as the UK, Australia, and China introduced policies to encourage active participation in mass sport, especially at a club level; in the framework of these policies, sports facilities are prioritised (Wicker et al., 2013). Highlighting sports facilities as catalyst for increased living standards and recreational values, a study revealed the importance of demographic factors such as age, income, and education, in the strategic stage of establishing sports infrastructure in order to accommodate a variety of users and address mismatch in terms of purpose (Chen et al., 2024a). In their paper, they concluded that investing public funds in long term and sustainable projects like community sports centres, adds value to the immediate neighbourhood in terms of price in commercial housing and hospitality (Tsai, 2024). As physical activity and public health gains paramount importance in society, the continuous allocation of land resources to build sports infrastructure proves to be challenging (Wang et al., 2024). Kosztin and Balatoni (2015) concluded that sports facilities built for the purpose of generating revenue leading to economic growth may not achieve the desired attendance relying on sports activities only; therefore, these sports facilities may have to be used to house other social gatherings or events to achieve meaningful economic outcomes.

2.7. Sports consumption, sports industry, sports economy

Sports consumption can either happen through direct involvement or engagement in physical exercises or through spectatorship or other sports-related consumption. The latter is a source of pleasure, excitement, and a means of distraction from hardships experienced by many, most evident when spectators are enjoying live events in sports arenas (Balatoni et al., 2020). Sports consumption is recognized across continents as way of life and serves as a yardstick for measuring quality of life of residents; its consumption rate rises in harmony with the income level (Ying, 2012). However, it is gradually gaining acceptance in emerging countries in Africa and Asia as well. Sports clubs emerged as global business franchises which employ professional players, technical and non-technical experts from across the world from clubs to clubs, country to country, or continent to continent. Overseas leagues and domestic competitions are scheduled and played in every football season with a high demand of manpower both in terms of players and technical crews (Beech-Chadwick, 2004; Horne-Manzenreiter, 2004; Anil, 2019).

The global popularity of football in large European leagues and other leagues across the world, as well as the entertainment it generates in fans results in an exceptional income.

In Germany, football is more than mere entertainment, it is an economic powerhouse (Biscaia et al., 2013). The German football league, the Bundesliga, earned €4.01 billion (approximately 4.5 billion USD) during the 2016-2017 season; revenues in this period grew a whopping 368% from €1.09 billion in the 2003-2004 season.

The role of football and its influence on spectators has changed; it has gone much further than being an entertainment. It has transformed into a profitable global venture and an avenue for investments. Media broadcasts and modern technologies turned it into a massive event industry, where spectators can enjoy the games of their favourite clubs and teams from every part of the world in various tournaments (Mihaylov, 2012).

Sports industry, especially football, does not offer one single product, service, or entertainment. It offers a sports bundle or package which comprises the team itself, competitions, clubs, players, services, events, fitness halls, leisure, snacking, advertising, merchandising, amongst other commercial activities (Dolles-Soederman, 2005; Dolles-Soederman, 2013). The popularity professional sports are gaining makes them a major entertainment business; its earnings in the US accounted for 69 million USD in 2017, as shown by the sports outlook done by PwC (2018), forecasting it to overtake that of the Hollywood movie industry. On average, football is the leading sport when it comes to entertainment, accounting for 43% of the total earnings. Most of the revenue generated by professional sports is accrued from seasonal leagues. Other events, like the Olympics, World Cup, and European Cup are organised every four years, while some are held every two years, such as the African Nations Cup. However, despite their varying schedules, all events generate a high turnover from corporate sponsorship, attendance and other TV rights. Although football is recognised and enjoyed all around the globe, European leagues tend to generate most earnings. In terms of global sports earnings, the American National Football League (NFL) and Major League Baseball (MLB) combined accounted for 25% of the earnings, and these numbers compared to football alone are estimated to be far below. In terms of yearly events and competitions, however, the NFL and the MLB generate the highest revenue, despite their not being as popular in Europe and other regions. This would not be possible if it was not for the increased stadium capacities and the enthusiasm of the American people for these particular sports (Sanchez et al., 2019).

2.8. Emergence of the Covid-19 epidemic

The spread of the Covid-19 pandemic led to global panic, which forced global health authorities like the World Health Organization to declare the disease a global emergency. Its victims were mainly elderly, people with pre-existing health conditions; in contrast, the children population was regarded as the least affected by the virus (Wu & McGoogan, 2020; Ouldali et al., 2020). The disease struck globally, leading to a medical, economic, and social crisis that led to over 760 million confirmed cases worldwide, and 7 million deaths reported by the World Health Organisation (United Nations, 2023; Lee et al., 2024; Chen et al., 2024b). From the emerging of the virus around 2020, chaos was witnessed, and after millions of deaths globally the occurrence of a similar event in the future was perceived as very likely (Chauhan et al., 2024). The emergence of the virus also made it necessary to study and understand the dynamics of the outbreak in order to assist clinical decision making as well as policy making for the sake of controlling such dynamics in the future (Cori & Kucharski, 2024). As the casualty rate increased, the initial strategies to combat the virus were based on non-pharmaceutical measures, with people using face masks, physical distancing, travel restrictions, lockdowns, and applying sanitisers like hand wash or liquid soap (Del Riccio et al., 2024). By the end of 2020, variants of Covid-19 emerged, which led to WHO's characterising and prioritising such variants to focus on global coordination, research, and adequate response (World Health Organization, 2023a). In the subsequent 3 years, multiple variants such as alpha, beta, gamma, omicron, emerged and led to increasing uncertainty on a global scale. As this uncertainty increased, people around the world set their focus on health authorities concerned with "the development of better vaccines" (Mohapatra et al., 2022; Mohapatra et al., 2023; Sun et al., 2023). Notwithstanding all the efforts and resources used to fight the coronavirus, some are of the opinion that the virus was a mere propaganda used globally, and the restrictive measures put in place caused delays in patients being attended by doctors, which eventually led to the potential neglect of patients with other deadly illnesses (Wong et al., 2020; Mogharab et al., 2022; Lu et al., 2024b). However, the Covid-19 epidemic highlighted the need to put in place early warning systems and focus on preparedness (Kamalrathne et al., 2023).

2.9. Social impact of restrictive measures during the Covid-19 epidemic

Several studies were conducted to document the impact of the Covid-19 lockdown and its influence on health behaviour changes. During the lockdown, most people were engaged in unhealthy behaviours because of the restrictions; sports consumption, physical activity, leisure habits, sedentary behaviours, screen time behaviours, eating habits, and sleeping behaviours were significantly affected. A study on the use of various services, such as sports-related shopping and consumption habits, also found that the coronavirus pandemic and the subsequent lockdown resulted in frequent and mostly unhealthy changes in lifestyle in the general population (Constant et al. 2020).

2.9.1. Impacts on alcohol and tobacco consumption

A study written by Schmitz and Glowacz (2020) revealed that the Covid-19 pandemic and subsequent lockdowns saw half of the population change their drinking patterns, either by increasing or decreasing the amount of alcohol they usually drink. The rates of daily drinking in the community also increased during the pandemic. In many cases, this is due to individuals consuming alcohol at home with their partners, friends, or family (Czenczek-Lewandowska et al. 2021). Increased alcohol consumption was also witnessed during the pandemic in Geneva (Wozniak et al. 2021); however, a Spanish study showed that tobacco and alcohol consumption decreased during the restrictive measures (López-Bueno et al. 2020). In their study, Knell et al. (2020) found that among a sample of U.S. adults, females, those with children, and those with moderate-to-severe depression symptom severity were more likely to report increased engagement in negative health behaviours (alcohol consumption and tobacco use), potentially due to increases in available time or additional stressors resulting from competing responsibilities between family and work. Rossinot et al. (2020) found that living alone was a strong risk factor for tobacco consumption; Busse et al. (2021) stated that many students reported engagement in two risk behaviours (alcohol consumption and physical inactivity), 19% reported smoking tobacco, and 11% reported cannabis consumption. Almost half of the students reported binge drinking prior to the Covid-19 pandemic; in most students, no substantial changes in engagement in health risk behaviours during the Covid-19 pandemic compared to the pre-pandemic period were noted. While smoking and cannabis use were found to be the most stable behaviours, alcohol consumption and physical activity were the behaviours that were reported to have changed the most among the

German student population. Salman et al. (2021) in their Kuwaiti survey found increased smoking among males during the restrictive measures.

2.9.2. Impacts on eating habits

Fanelli (2021) revealed that when asked about their eating habits and food-related behaviour during the lockdown period, most study participants claimed that they had not changed their diet. However, the surveys noted changes in the purchase of food products. With people spending more time at home and dining out becoming less accessible, a major shift could be noticed in people's attitudes and behaviour concerning food and health. Indeed, there have been clear changes in the way consumers ate, shopped, and interacted with food. The study conducted by López-Bueno et al. (2020) in a large Spanish sample revealed that fruit and vegetable consumption increased during the period of restrictive measures. People ate at home and focused more on the quality of their food and their eating patterns, which had positive influences on their quality of life, particularly in women (Wang et al. 2020). Another survey carried out by Salman et al. (2021) also showed favourable changes in health behaviours among residents of Kuwait, marked by increased consumption of fruits and vegetables, and decreased consumption of sugary drinks among both males and females.

2.9.3. Impacts on sleeping habits

In their study, Czenczek-Lewandowska et al. (2021) noted a significant decrease in sleep and increase in generalized anxiety amongst adults. Wozniak et al. (2021) concluded that lifestyle changes in aspects like the amount of sleep were of paramount importance during the pandemic. Improvement in sleep quality was found in a Spanish survey during the restrictive measures (López-Bueno et al. 2020). At the same time, Knell et al. (2020) found that females and those with moderate to severe depression symptom severity reported worsened sleep quality, which may be due to increased feelings of worry and stress. The findings of Mon-López et al. (2020) revealed significant adverse effects on the training and recovery conditions of handball players, leading to physical deconditioning and worsening sleep conditions. Relevant training reductions in volume and intensity were detected, especially in women and professionals, while a decrease in

sleep quality was identified in professional handball players, especially in men. However, in our review study (Adamu & Balatoni, 2023), we found an increased sleeping time and increased sleep quality among participants of several studies conducted during the Covid-19 restrictions (Bates et al., 2020; Bingham et al., 2021; Cahon-Zagalaz et al., 2021; Jalal et al., 2021; Alarcón Meza & Hall-López, 2021).

2.9.4. Psychological impacts

Mata et al. (2021) revealed that anxiety, depression, and loneliness reached their peak shortly after the lockdown came into effect; over time, symptoms remained stable or went down slightly. Zhang et al. (2020b) concluded that during the peak phase of the Covid-19 outbreak in China, the severity of the outbreak had an indirect effect on local young adults' negative emotions. Other findings revealed that some aspects of psychological distress, including depression, anxiety, and stress, were significantly associated with changes in health behaviour, both independently and as a composite score (Stanton et al., 2020). A study revealed that Covid 19 restrictions led to minor changes in health behaviours among older adults. However, mental health was more affected, particularly in those living alone and feeling lonelier, with mobility limitations, and lower cognitive function (Garcia-Esquinas et al. 2021). Stress level, anxiety level, and depression are essential elements determining general mental health and mental wellbeing, because high levels of stress and anxiety may affect optimal brain function. In addition, depression is a disorder that requires medical attention in order to prevent people from making unhealthy or dangerous life choices and decisions. Our review study (Adamu & Balatoni, 2023) found that a high prevalence and increased levels of stress, anxiety, and proneness to depression were recorded during the Covid-19 pandemic compared to the pre-pandemic period (Coakley et al., 2021; Lin et al., 2020; Talapko et al., 2021; Xiang et al., 2020).

2.9.5. Impacts on obesity

A study suggested that excessive sitting could increase the risk of cardio-metabolic diseases in adults, adolescents, and children (Santos et al., 2012; Carson et al., 2016).

Pellegrini et al. (2020) revealed that individuals with obesity significantly gained weight one month after the beginning of the lockdown period, and it was the adverse mental burden linked to the Covid-19 pandemic that might be associated with this increase in weight. Kriaucioniene et al. (2020) found that weight gain was associated with unhealthy dietary changes, decreased physical activity, and increased alcohol consumption.

The effect of sedentary behaviour during the Covid-19 restrictions imposed on adults, children, and adolescents was documented in a number of studies, and showed an increase in sedentary lifestyle among study participants during the Covid-19 period (Dunton et al., 2020; Gallè et al., 2020; Gilbert et al., 2021; Gjaka et al., 2021; Kang et al., 2020). A study reported that half of the students maintained the same body mass index during lockdown, which was associated with physical and lifestyle factors; also, students could reduce their weight by reducing the intake of fast food and fried food during the lockdown period (Jalal et al., 2021).

2.9.6. Impacts on screen time

Due to the increased access to and affordability of cutting-edge technology, screen time is yet another concern that may have contributed to increased sitting behaviour even before the Covid-19 period. Teenagers and adults have been spending a significant amount of time using different electronic devices including mobile phones, TVs, computers, laptops. With the Covid-19 restrictions, these behaviours were expected to rise. This observation is in harmony with the findings of several studies that addressed screen time, with all the studies revealing an increased screen time among children, adolescents, and adults, as a result of the Covid-19 lockdown compared to the pre-pandemic period (Eyler et al., 2021a; Eyler et al., 2021b; Nathan et al., 2021; Luszczki et al., 2021; Censi et al., 2021).

2.9.7. Impacts on social connections

Social connections are very important to the general wellbeing of people; however, studies reported a decrease in social connections during pandemic (Shepherd et al., 2021; Syahruddin et al., 2021). Depending on one's culture, social connections can be very important to people coming from certain cultures, especially in the African context.

2.9.8. Impacts on people living with chronic illnesses

It was also of interest to know what the health outcome of people with special medical needs or chronic illnesses could be during the epidemic. Studies reported a decrease in physical activity and increase in sedentary behaviour among children with asthma, and suggested strategies to support indoor PA and ensure improved indoor air quality (Ferrante et al., 2021). Similarly, another study revealed insufficient PA among young people with type 1 diabetes during the epidemic (Shepherd et al., 2021). Also, another study found the Covid-19 epidemic to have had a negative impact on PA and mental health in people with different physical or intellectual disabilities (Tornaghi et al., 2021). Cardiovascular diseases are also associated with insufficient physical activity (e.g. Peçanha et al., 2020).

2.10. Economic impact of restrictive measures during the Covid-19 pandemic

There is no doubt that the Covid-19 epidemic has had many impacts on global economies in various sectors, which consequently affected the GDP of individual economies. A number of studies were conducted globally to measure the impact of Covid-19 on the economy. Amongst them was the study conducted by Kolahchi et al. (2021), which found that due to the closing down of manufacturing facilities, drop in travels and oil consumption, stock market crash, and drop in mining activities, tourism and airline companies were hit hard globally. Another study conducted by Aduhene-Osei-Assibey (2021) in Ghana suggested that the spread of Covid-19 negatively affected employment in agriculture, industries, and healthcare. Priya et al. (2021) concluded that Covid-19 had catastrophic implications on global energy consumption as prices fell due to lower demand.

Another important economic drawback of the Covid-19 restrictions was the huge loss of revenue suffered by operators of sports facilities during both the first and second wave of the Covid-19 pandemic. The situation was further deteriorated by the Russo-Ukrainian war, leading to increasing inflation in Europe (Delloite, 2021; Balatoni & Adamu, 2023).

2.11. Economic impact of restrictive measures during the Covid-19 epidemic in the UK

The economic consequences of the Covid-19 restrictive measures, and the complete shutdown of activities throughout the world with few exceptions, were apparent to all. In the UK, a study predicted a 13.5% loss to the UK's Gross Domestic Product or GDP, which totals the amount of goods and services produced in a given country over a period of time; and the three-month lockdown experienced in the United Kingdom and its results were in line with the estimate given by the Office for Budget Responsibilities, a 13% drop in the UK's GDP during the first three months of the lockdown (Keogh-Brown et al., 2020). The United Kingdom's economy as measured by GDP contracted by 19.8% in the second quarter of 2020, and at the end of the third quarter it was still 8.2% below the February level; suppliers of hospitality including pubs, restaurants, and hotels recorded no output according to the Office for National Statistics (2020a). During the restriction period, over 11 million jobs were suspended under the UK's Job Retention Scheme between March 2020 and September 2021; the scheme supported employers with different grants provided by the government to enable them pay up to 80% of their workers' wages to retain the furloughed employees until the lockdown continued (Francis-Devine et al., 2021; May et al., 2023). As a result of the obvious reduction of passengers in the aviation industry due to Covid-19 restrictions, a huge loss of revenue was experienced by the business operators of big UK airports, which forced them to adopt new strategies and policies to handle or minimize the severity of the situation (Colak et al., 2023). Couple of years after the start of the Covid-19 lockdown, employment demand from employers fully recovered both in the UK and the US with vacant job available to take; the employment sector, however, did not yet recover until two years from the initial month of the epidemic. This could be attributed to the change in workplace pattern and consumption, especially in the sectors that were most badly affected, for instance tourism and aviation (Pizzinelli & Shibata, 2023).

2.12. Economic impact of restrictive measures during the Covid-19 epidemic in Hungary

Hungary's position as a member state of the European Union compelled the country to define its economic position within the framework of the entire block's economy. Starting from January 2020 until March 2021, lockdown policies were made within the EU with a view to bring down the mortality rate; however, these policies came with negative economic consequences that pushed up economic losses including reduction in industrial production or construction activities (Bollino, 2023). There is no single sector in the economy that was left untouched by the outbreak and the restrictive measures taken during the Covid-19 epidemic (Shrestha et al., 2020; Varga et al., 2024). In a study conducted during the epidemic on nine exchange rates in European countries found that the more widespread the pandemic at home than in the euro area, the weaker the domestic currency; and the same stands for stricter movement restrictions and Covid-19 measures taken at home compared to the euro zone. Also, more robust expansionary fiscal policies at home result in appreciation of the domestic currency (Klose, 2023). Cross-border shopping tourism, widely known in Europe and beyond, contributes to a great extent to the economy of a country; however, due to movement restrictions implemented in response to the Covid-19 pandemic, shoppers could not cross borders to make purchases. This also caused difficulties for retail chains within Europe and across the world, and retailers were forced to adopt new ways (Tömöri & Staniscia, 2023). The role of small and medium enterprises (SMEs) is critical to the growth of an economy, and self-employed individuals were also badly affected by the outcomes of the coronavirus in Hungary. Therefore, the European Commission agreed to a Temporary Framework to support such individuals by approving a 50 million euro 'umbrella' scheme (European Commission 2021). A furlough scheme similar to that implemented in the UK was also introduced in Hungary during the Covid-19 pandemic to reduce the unemployment rate, and similar government policies were put in place to protect workplaces. Different incentives were introduced as a temporary measure to deal with the Covid-19 situation and reduce unemployment during the pandemic (Tóth et al., 2023). According to the TÁRKI Social Research Institute (2020), one of the major economic consequences of the Covid-19 restrictions was the significant loss of income suffered by individuals. In their research, the Institute found that 18% of their respondents admitted that their income had significantly decreased, and in the Southern Great Plain the proportion of those whose

income decreased was 23%, followed by Central Hungary with 22%, and Northern Hungary with 12% of the population suffering from income decrease. The Hungarian Central Statistics Office (2020) reported that the tourism sector suffered the most during the pandemic, with the construction and transportation industries also recording a huge setback. However, alongside all the negative consequences that the outbreak came with, positive aspects regarding increase in mail order and online retail businesses including food and other home deliveries were also recorded due to the fact that people were denied or scared to have physical contact with one another. In general, the overall performance of the Hungarian economy declined by 5.0% compared to the previous years' level, although an estimate of 4% growth had been expected if there had not been the pandemic; thus the GDP contracted in line with the Covid-19 situation.

2.13. Economic impact of restrictive measures during the Covid-19 epidemic in Nigeria

The mono-cultural economy of Nigeria, which relies heavily on crude oil, faced a serious challenge regarding the country's revenue source due to the global decline in crude oil prices (Al-Ghwell, 2020; Bjørnland, 2000; Oladipo-Fabayo, 2012; Awofeso-Irabor, 2020). The fall in the global oil price on the market during the Covid-19 epidemic foreshadowed a negative growth in Nigeria's GDP (Awofeso-Irabor, 2020). Moreover, the increased internal and external loans of the government further escalated the problems in economic growth. The country had been servicing debts, and every fiscal year, debt servicing proved to be a serious challenge. On top of all that, it would keep increasing as the government's loans continued to increase (Aluko-Arowolo, 2010; Awofeso-Irabor, 2020). In the past couple of years, Nigeria's debt rose by nearly three times, from 10.9 trillion Naira in the year 2015 to 28 trillion Naira in the last quarter of 2020, which is equivalent to almost 25 billion and 68 billion USD, respectively. The coronavirus epidemic brought the world economic growth to a standstill, which negatively impacted Nigeria's economy due to the shock brought about by the decline in global oil prices (Ojekunle, 2021). Although the government introduced several measures to support micro, small, and medium enterprises (MSME's) and individuals through the Central Bank via grants, soft loans, and other measures aimed at reducing the impact of the crisis. Even though the support never covered the entire population, a significant amount of 3.5 trillion Naira (equivalent to 8.5 billion USD) was provided to support the above

mentioned measures, also including other sectors, all in a bid to prevent the economy from further crisis. Economic activities were delayed, and business actors were forced to refrain from freely conducting their routine activities to prevent themselves from getting infected (Ozili, 2021). The price war between Saudi Aramco and Russia's Gazprom, the coronavirus-induced recession, the decrease in tourism, hospitality industries, and transportation all influenced the fall in the price of oil on the global market (Alozie et al., 2020).

2.14. Impact of restrictions during the Covid-19 epidemic on physical activity

While investigating the importance of physical activity (PA), researchers found that the Covid-19 pandemic did not only cause significant health impacts occurring as a result of corona virus infection, but also impacted lifestyle behaviours, manifesting in worsening mental health (Flanagan et al., 2021; Adamu & Balatoni, 2022; Laczkó et al., 2023). Authorities around the world ordered people to stay at home, with restaurants, retail outlets, and other businesses set in crowded places and usually open to the public also forced to close. Regulations varied from country to country, but between March and June 2021, most fitness clubs and other sports facilities were closed. While the fitness market had been growing strongly in the decade before the Covid-19 epidemic, the lockdown threatened the viability of many gyms. Furthermore, revenues fell significantly due to closures related to Covid-19.

Our literature review study (Adamu & Balatoni, 2023) comparing sixty articles focused on a number of physical activity dimensions. The findings of 35 studies revealed a significant decrease in physical activity levels among the participants during the Covid-19 restrictions; while another finding was that unstructured PA levels in children increased, and the responsibility of ensuring and keeping children engaged in a PA lay with the parents rather than their schools. Concurrently, it was revealed that, during the lockdown, children with younger parents were more active in sports and physical activity in general compared to children with older parents (Roe et al., 2020).

2.15. Impact of restrictions during the Covid-19 epidemic on sports economy

Prior to the Covid-19 pandemic, the professional sports industry had not been affected by economic hardships and had witnessed a sustainable growth, as reflected in the growth rate experienced in English and French football leagues (Sanchez et al., 2019). A mapping study commissioned by the European Commission to evaluate the impact of Covid-19 restrictions on the sports sector and carried out by Ecorys and sport economics non-profit SportEconAustria (SpEA) in 2020 estimated that the UK would suffer the second most significant drop (of about 8.6 billion pounds) in sport income out of all the EU countries, while sport-related job losses might reach 250,000. The study also found that a 60 billion euros loss in GDP and a job loss of over a million was expected across Europe, with Germany estimated to be the most affected, where the study estimated a loss of 23 billion euros in sport-related GDP, equalling 40% of the EU total. A report published by the New York Times, which investigated the global economic consequences of the Covid-19 restrictions on sports economy, stated that in the US alone, sporting organizations lost 13 billion dollars in the US sporting leagues, and 28.6 billion dollars in wages and earnings (Drape et al., 2020; Skinner & Smith, 2021). On the whole, the negative impacts of Covid-19 restrictions on sports economy are well established by studies and research done all over the world (Hammerschmidt et al., 2021; Gonzalez-Serrano et al., 2023; Lu et al., 2024c).

The sports industry, one of the industries most badly affected by the lockdowns and movement restrictions imposed because of the Covid-19 epidemic, is still yet to fully recover. We observed a total halt in sporting activities across the world at the initial stage of the epidemic, ranging from soccer, baseball, basketball, volleyball, tennis, and rugby to Formula 1, with resulting economic consequences. In addition, the transfer market closed, cutting down employment opportunities of the youth in the domestic and international football leagues. The front and back staff of many sport facilities were also affected, with merchandising sport gears and wears, ticketing, media, advertising, transportation, restaurants, sport-related healthy foods and drinks for athletes all having declined, causing many direct and indirect jobs to be lost and making thousands of people unemployed (Adamu & Balatoni, 2022).

2.16. Impact of restrictions during the Covid-19 epidemic on sports consumption

For the first time in history, the Covid-19 epidemic affected sports so heavily in 2020 (Adamu & Balatoni, 2022) that not even world wars were capable of. All sports activities were cancelled (Tovar 2020; Horky, 2020), and the Covid-19 epidemic brought an era that witnessed the complete shutdown of sports without any war taking place, a very unfamiliar experience in general (Horky, 2020). Also for the first time in history, the Olympic Games and the Euro 2020, which were initially planned to take place in year 2020, were postponed to 2021 due to the pandemic. Due to concerns over infections and rapid escalation in the spread of Covid-19, no sporting event was allowed to take place with fans watching live games. 'Ghost matches' were played without spectators in most of the European countries and Germany in particular, for epidemiological reasons; the purpose was to protect fans from contracting the virus and from spreading it. The weekly rituals of match days at European football clubs stopped for a very long time and the sports media outlets were left with no other option than broadcast replays (Adamu & Balatoni, 2022). These measures placed heavy financial pressure on European football clubs and the German league. To mitigate this, some larger Bundesliga clubs established funds to donate to the lower-tier clubs who faced economic hardships due to the pandemic (Horky, 2020). Under these circumstances, the leisure sports consumption patterns of the female population increased drastically compared to the pre-pandemic period, whereas those of the male population decreased drastically, and a study also highlighted gender inequalities in sports expenditure (Ada-Lameiras et al., 2024). As a result of home confinement, disabled athletes, who had been involved in athletic activities and were considered one the most vulnerable segment of society, felt a sense of marginalisation during the period of restrictive measures (Fiorilli et al., 2021). While a lot of data has been gathered on the effect of sports consumption through actual participation on people's health, little research has been conducted on the excitement experienced while consuming or watching sports, especially live sporting events. The feel-good factor provided by spectators in a live game, event, or race has been shown to be invaluable and make a huge contribution – the lack of which was obvious during the Covid-19 lockdown, especially when sporting events were held with no spectators (Grix et al., 2021). In England, during the second lockdown period, authorities allowed the elite football clubs to resume playing and hold events like the Champions League with no fans; and although the live games seemed boring due to the lack of rhythm usually provided by spectators in the stadium,

the clubs secured revenues from TV rights. Grassroots football clubs, however, were denied similar opportunities, causing them to lose almost 48% of their income from the inception of the pandemic, and creating more dissatisfaction among the grassroot football community in turn, including their fans (McInnes, 2020; Grix et al., 2021). The Covid-19 restrictions affected a number of industries and sports companies worldwide, including sporting clubs (Pena et al., 2021; Glebova et al., 2022).

3. MATERIALS AND METHODS

The research was based on both primary and secondary data sources. Following a comprehensive review of the literature, I formulated hypotheses that defined the framework of the study. Insights gained from the secondary analysis were used to develop the structured questionnaire applied in the primary data collection. The entire research process is illustrated in the Figure 1.

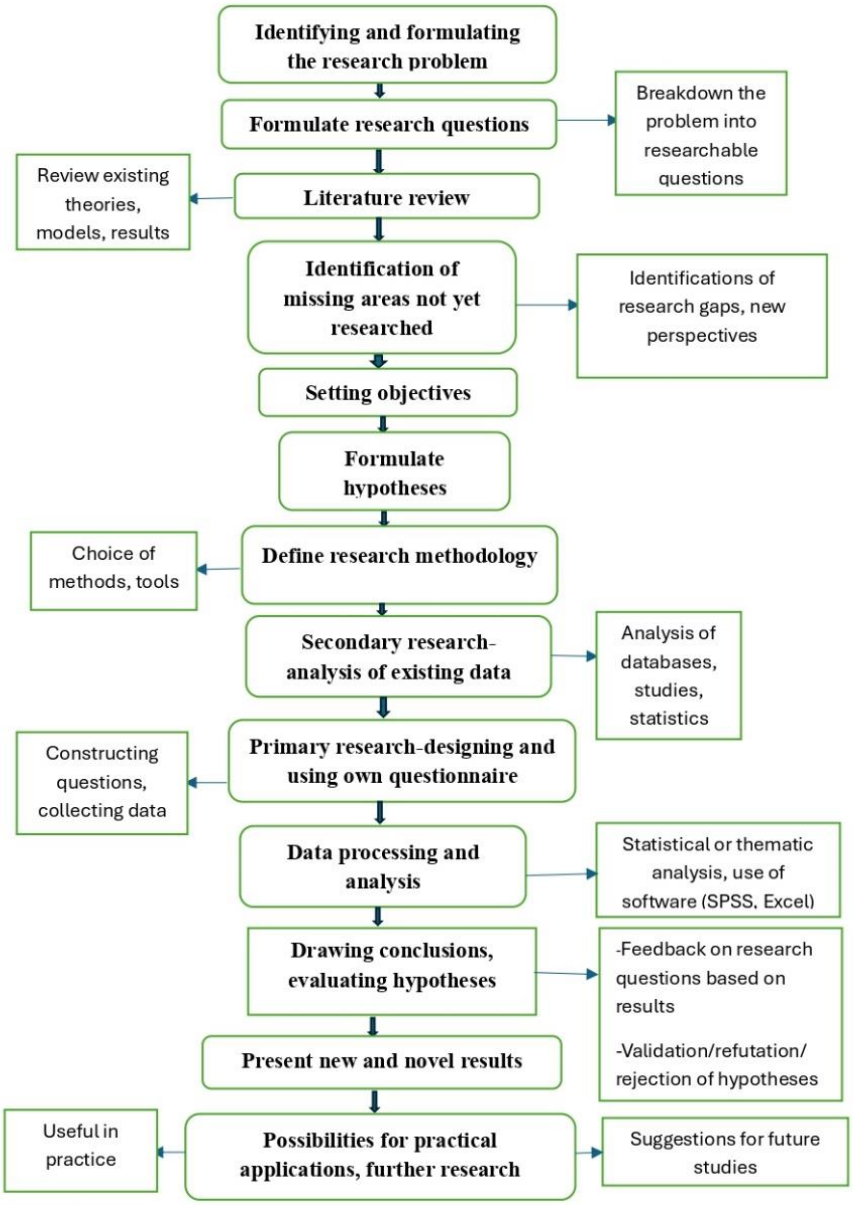

Figure 1. The research process

The secondary research

To conduct our literature review, we proceeded according to a pre-prepared protocol approved by two independent reviewers. The protocol defined the methodology of the search, the databases to be used, the selection and exclusion criteria, the methodology of quality assurance focusing on distorting factors, the aspects of data extraction and the data analysis.

The study used web of science, google scholar and science direct which are multi-disciplinary and considered widely used databases globally and conducted extensive keyword search using four keywords initially as “Covid-19”, “Physical activity”, “Health behaviour”, and “Sport Consumption”. The search was restricted to include only combined keywords such as “Consumption and Covid”, “Sports and Covid”, “Health behaviour and Covid”, “Physical activity and Covid”. These searches were conducted between 20th November 2021 to 1st December 2021.

On each of the combinations, over 1000 studies were available as per search result from web of science. This was then reduced to the first 200 related articles of each combination giving a total of 800 articles for further screening based on the most recent date of publication of the studies.

After the overlapping articles of the different searches were removed, an additional screening to include either “University”, “Students”, “Gender”, “Adolescent”, “Young”, or “Child(ren)” together with two of the original keywords (“Sport” or “Physical activity”) in the titles of the articles was carried out. This search finally combined together to came up with a total of 67 articles from across the keyword combinations and formed our basis for analysis, results, discussion, and conclusions using a comprehensive data extraction approach. These results were published as "The Effect of Covid-19 on Health Behavior and Physical Activity in Youth - A Review" (Umar, G. A., Balatoni, I., 2023).

Table 2. Databases used for secondary data collection

#	Subject	Databases
1.	The socio-economic characteristics of the countries surveyed	World Bank
2	Health indicators	WHO, World Life Expect
3.	Characteristics of physical activity of the population	WHO
4.	Economic indicators	World Bank, Statista
5.	Impact of covid-19	EU commission, Worldbank, UNDP

Primary research

During the preparation of our self-edited questionnaire, I relied on the use of the questions already used in previous studies. In addition to collecting information, the primary research aimed to test the hypotheses formulated earlier.

The questionnaire

The questionnaire used was an IPAQ modified by Chopra et al. (2020) to analyze Physical Activity such as 30 minutes of aerobic activities in a week, leisure-related activity frequency, daily sitting and screen time. Whereby, sport consumption was tested using adapted scales developed by Aiken et al. (2018). The items included daily lives sport participation, thoughts about sport consumption, difficulties in stopping sport activities, the urge to engage in the activity, the addiction to sport and the psychological aspect of sport consumption. The questionnaire initially contained a total number of 92 items from which 33 items were used for our analysis of the variables. Our independent variable which is Covid-19 was unidimensional and our dependent variables such as sport consumption were multi-dimensional followed by daily sitting time, screen time, leisure activities, *etc*.

In the questionnaire, as defined for IPAQ, physical activity refers to activities that take hard physical effort and last for at least 30 minutes. We consider sport fans those who are sport spectators and attend live sporting events in stadiums, arenas or get entertained in pubs.

The sample selection

The surveys took place between March 2023 to August 2023 in England, Hungary, and Nigeria, respectively. For the England survey, the data was collected across the cities of Manchester, Liverpool, London, and Cambridge. For the Hungarian survey, the data collection was conducted in Debrecen which is the second largest city in Hungary after Budapest while in Nigeria it was conducted in Kano state the second largest city in Nigeria after Lagos in terms of population and the largest in the northern part of Nigeria.

The questionnaires from all three surveys were physically distributed in a printed copy and the respondents were aided with writing materials for self-completion. The anonymity of the respondents was protected and participating in the survey was voluntary.

For both Hungary and Nigerian study, simple random sampling and randomly selected individuals who were willing to respond were used with no exclusion criteria application. Convenience sampling method was used for the study in England and people who were available and willing to respond participated. For Nigerian survey, one hundred and fifty (150) questionnaires were distributed to the members of the Bayero University community fitness club. Two weeks after the distribution of the questionnaires one hundred and five (105) completed questionnaires were retrieved, fifteen (15) returned invalid and thirty (30) were returned unfilled. In the Hungarian survey, one hundred and fifty questionnaires (150) were distributed among members of Unifit fitness center of the University of Debrecen. In total, one hundred and twenty-seven (127) were returned completed and twenty-three (23) were partially completed and declared invalid. In the England survey, one hundred (100) questionnaires were physically distributed among those indicated interest. A total of ninety-two (92) completed questionnaires were recovered and the remaining eight (8) questionnaires were considered missing.

Data preparation, data analysis

The completed questionnaires were coded using EvaSys software (VSL Inc., Hungary; http://www.vsl.hu) and then subjected to reliability testing to ensure its repeatability and internal consistency. To check the hypotheses, a non-parametric Wilcoxon signed rank test for matched or paired data was conducted to analyze our p-values ($p < 0.05$ was considered significant), and mean ranks, as well as descriptive analysis using statistical package for social science SPSS software version 23 (SPSS Inc., Chicago, IL, USA). Due to the nature of our data being ordinal data or ranked data because of using likert scales in the questionnaire, a non-parametric test was best fit, and Wilcoxon signed rank test was eventually performed. This test is suitable for making comparisons between two events to find differences and the extent of the differences through the mean ranking. The test is also flexible in accommodating differences in data sample or number of responses because Hungary, England, and Nigeria all recorded different number of responses. The test was able to avoid bias by taking the least of the response to make its comparisons.

4. STUDY RESULTS AND DISCUSSION

4.1. GENERAL RESULT

This chapter presents the results based on the comparative analysis of the three countries under study – Hungary, England, and Nigeria – using data available from various databases. The comparison is carried out along multiple dimensions, including socio-economic, economic, and sport economy-related factors, as well as indicators related to the health status of the population. Efforts were made to present the data in the most illustrative manner possible, using tables and graphs. The aim is to identify structural similarities and differences between the countries that may provide a framework for interpreting the findings of the primary research.

4.1.1. Socio-economic characteristics of the countries surveyed

This chapter presents the socio-demographic and economic situation of the three countries - Hungary, Nigeria, and the United Kingdom - covered by the study. Basically, in terms of economic development, the United Kingdom is a developed, high-income country with a strong economy, while Hungary is a moderately developed, middle-income country, an EU member state with an export-oriented economy. Nigeria, on the other hand, is a developing country with lower incomes, an economy based mainly on raw material exports, and significant social inequalities.

Figure 2 shows the population of Hungary, United Kingdom, and Nigeria in 2025. These stood at 9,632,287 people for Hungary while 69,551,331 people for the United Kingdom, and at 237,527,782 people for Nigeria, respectively (www.populationpyramid.net). Considering the population trends of these three countries of over seven decades, the result identified fast population growth in Nigeria and steady growth in United Kingdom, whereby in Hungary a consistent decline since the 1980s (Figure 3).

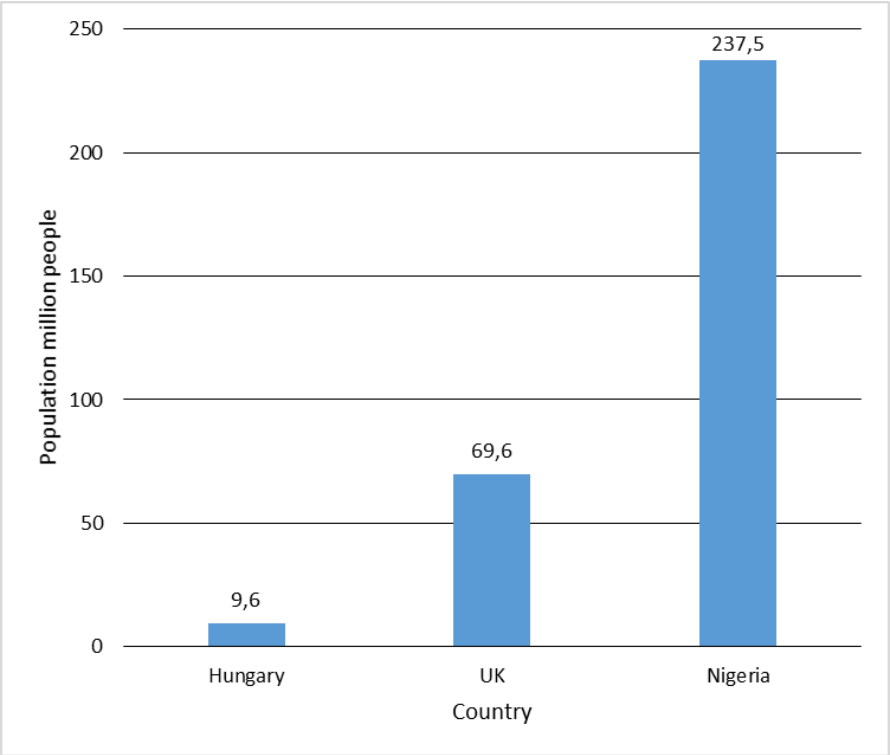

Figure 2. Population of Hungary, UK, and Nigeria in 2025.
Source: Population Pyramids of the World from 1950 to 2100

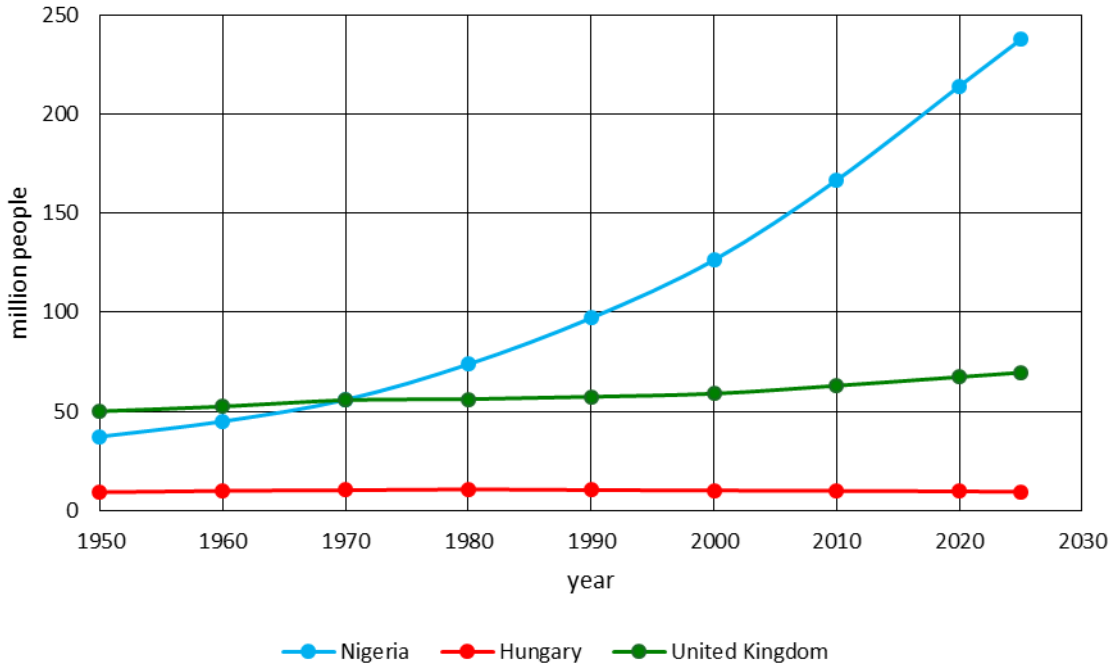

Figure 3. Population change between 1950 and 2025 in Hungary, Nigeria, and the United Kingdom.
Source: Population Pyramids of the World from 1950 to 2100

Figure 4 shows the age structure of the population of the three countries in 2025. The results show that people with age range between 25 to 64 was the highest in Hungary. Furthermore, it identifies a low birth rate in Hungary as the percentage of 0-14-year-olds is the lowest among the countries investigated. Nigeria is among the top six most populous nations in the world and looking at the age structure of its population one can deduce a diverse or balanced age groupings. Unlike in Hungary and the United Kingdom, children and babies have a significant percentage in the population

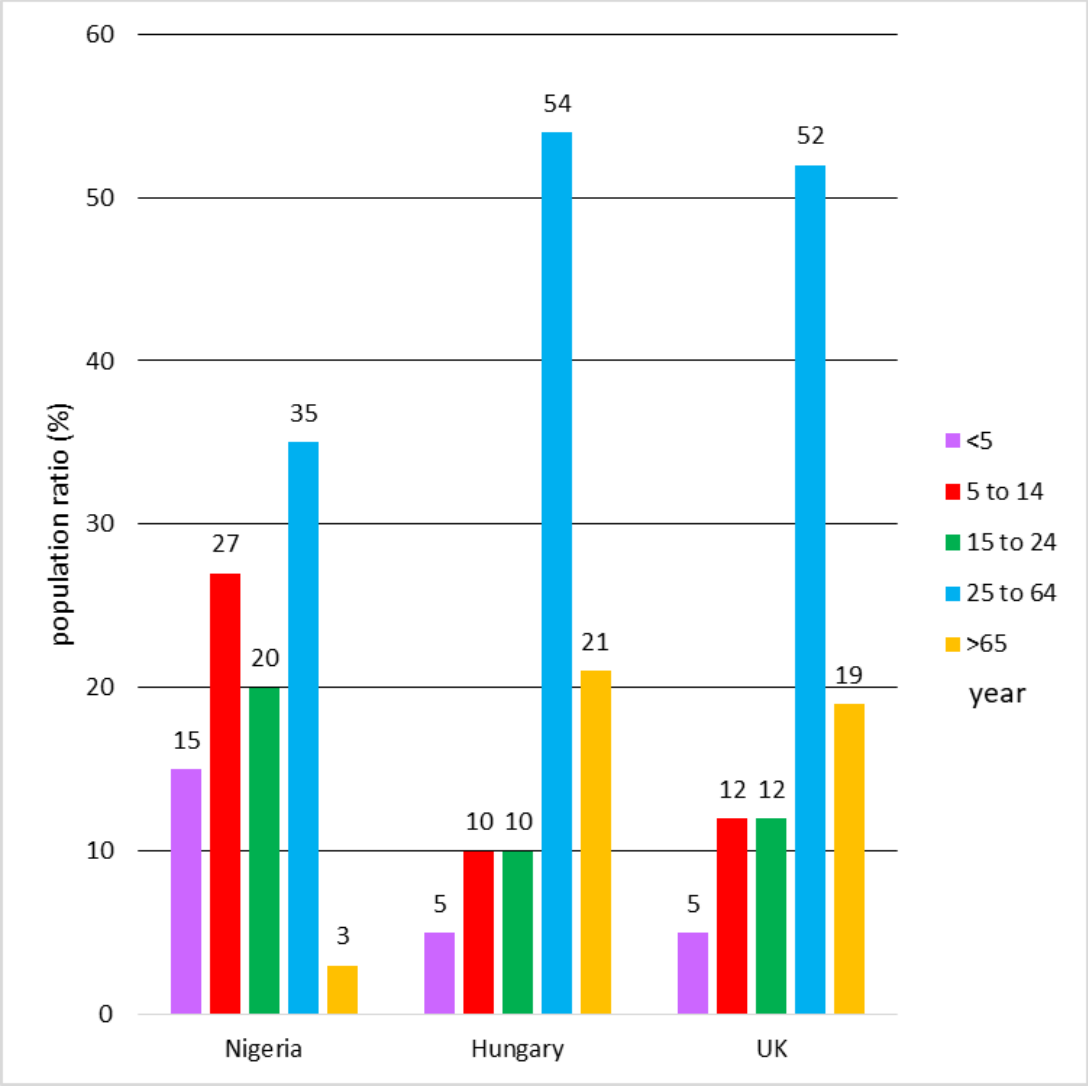

Figure 4. Population distribution by age group in Hungary, Nigeria, and the United Kingdom, 2023.
Source: Our World in Data

Comparing the population pyramids of the different countries highlights various demographic trends (Figure 5).

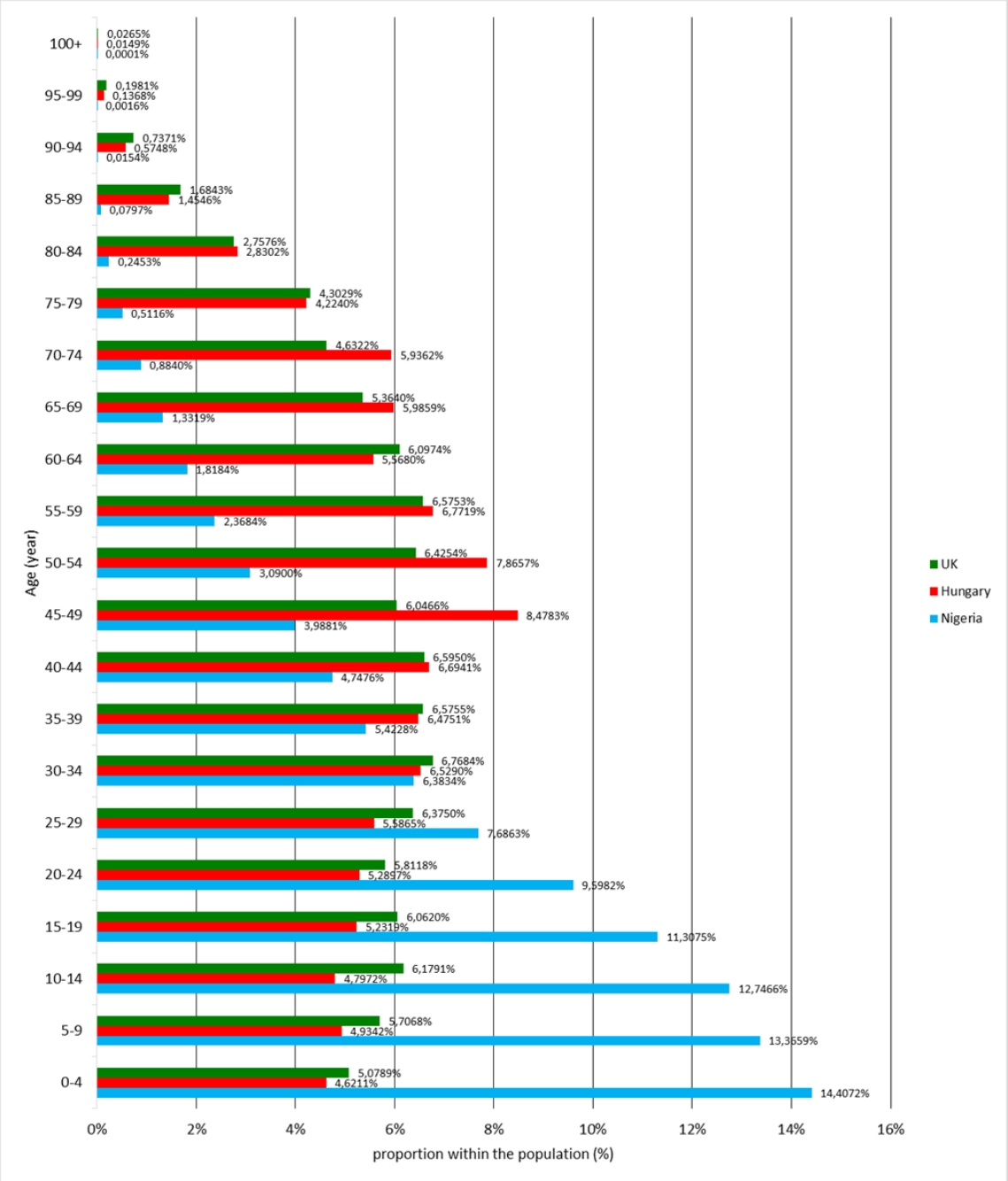

Figure 5. Population pyramid for Hungary, Nigeria, and the United Kingdom, 2025.
Source: Population Pyramids of the World from 1950 to 2100

Overall, the three countries represent different demographic trajectories. Nigeria is in the early stages of demographic transition and is a rapidly growing, young society. Hungary has an aging society with a declining population, while the United Kingdom has a relatively stable but also aging population structure, where migration dynamics play a key role in maintaining demographic balance.

4.1.2. Health indicators

Environmental and social factors, different standards of living, dietary habits, and healthcare infrastructure significantly influence which are the most common diseases, with significant differences observed between the three countries.

Table 3 highlights some common chronic diesases found in the three countries as provided by the updated World Health Organization data in varying years. In the case of some diseases shown in the table, some countries show no data as per the report. The table contains percentage of the prevalence and at some point, number of cases from the general population.

Table 3: Prevalence of some chronic diseases in Hungary, England, and Nigeria

Diseases	**Hungary** (%) (no. of cases)	**UK** (%) (no. of cases)	**Nigeria** (%) (no. of cases)	**Source***
Hepatitis B (HBV)	-	-	6.6	2025b
Hepatitis C (HCV)	0.2	0.2	0.6	2025b
HIV+ aged 15-49	no data	no data	1.4	2023b
Diabetes 18+	11.2	8.8	10.9	2024a
Hypertension	50.9	38.1	35.1	2021b
Malaria cases	-	-	24,098,323	2024b
Tuberculosis cases	570	5,200	499,000	2024c

**Source: (WHO, 2021b; WHO, 2023b; WHO, 2024a; WHO, 2024b; WHO, 2024c; WHO, 2025b).*

To compare the data for the three countries, we may understand the prevalence of hypertension and diabetics which are non-communicable diseases (NCD). The hypertension prevalence in Hungary is the highest among the three countries. This highlights the role that physical activity can play in reducing the prevalence rate of these chronic diseases especially diabetics and hypertension as it is recognized as non-medicinal way to fight many NCDs.

In summary, the frequency and nature of diseases reflect the economic development and the level of development of the healthcare system in each country. In Nigeria, infectious diseases are the main health challenge, which could be partially prevented by basic public health improvements. In Hungary and the United Kingdom, chronic non-communicable diseases dominate, but while care and prevention are more advanced in the United

Kingdom, in Hungary, risks arising from lifestyle and social factors are associated with more serious health outcomes.

Obesity is now a global public health problem, but its prevalence and severity vary considerably between developed and developing countries. Figure 6 presents data on adult obesity prevalence across the three countries, Hungary, England, and Nigeria. As per WHO data in 2022 Hungary has 31.7% UK 26.8% and Nigeria 12.4% prevalence among the general population. These rates as per as health is concerned are too large to ignore and yet again underscore the importance of embracing physical activity and healthy eating.

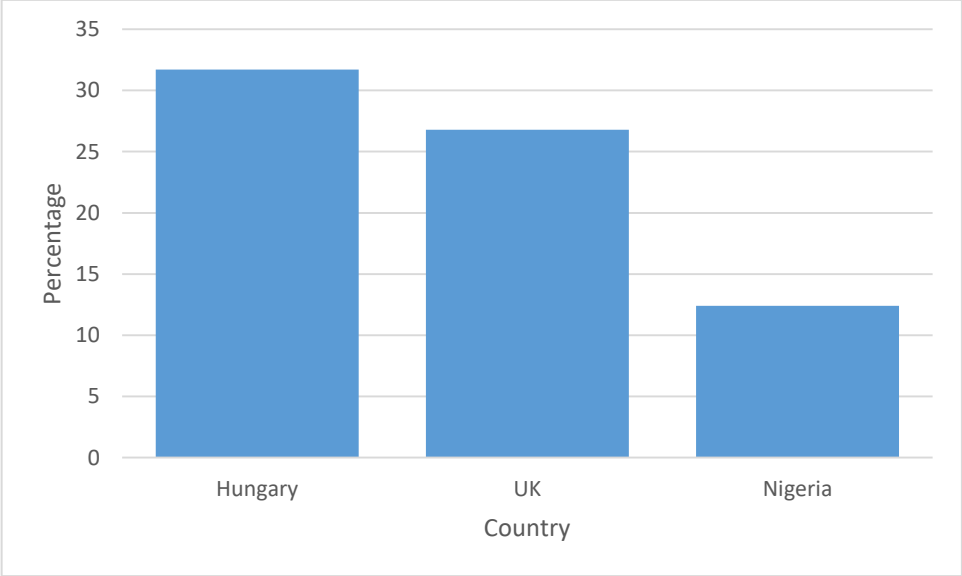

Figure 6. Obesity prevalence in Hungary, England, and Nigeria (2022)

Source: World Health Organization (2022a)

The prevalence and health significance of obesity in the three countries are closely linked to urbanization, economic development, and cultural and lifestyle differences. While in Nigeria obesity mainly affects urban, higher social status groups, in Hungary and the United Kingdom it is already a massive, structural public health problem. Of the two European countries, the situation is more serious in Hungary, partly due to unhealthy diets, lack of exercise, and low health awareness. Obesity is a significant risk factor for chronic non-communicable diseases in all three countries, and its treatment requires a complex, multi-sectoral approach (Scarborough et al., 2011).

In most cases, chronic diseases are also the leading causes of death. The treatment of these diseases is costly, and many people become unable to work as a result, which increases the number of days lost from work and reduces the GDP of the country concerned. Many chronic diseases could be prevented, and physical activity is one of the means of doing so.

The major mortality causes in Hungary is shown in Table 4 where the first 5 diseases out of 50 leading causes of deaths are displayed as per the year 2020. The death figures represents both female and male gender and the statistics is provided in percentage.

Table 4. **Top 5 leading cause of death in Hungary**

Leading mortality causes	Number of deaths	% in total deaths
Coronary heart disease	36,766	32.00
Stroke	11,915	10.37
Lung cancers	8,377	7.29
Lung diseases	6,436	5.60
Hypertension	7,262	6.32
Others	43,640	38.42

Source: World Life Expectancy (2020).

Table 5 represents the first five leading causes of death in 2020 from the list of 50 leading causes of death in United Kingdom for the two genders combined. Each number of deaths has its corresponding percentage in the total death in that year.

Table 5. **Top 5 leading cause of death in the UK**

Leading causes of death	Number of deaths	% in total deaths
Coronary heart disease	71,728	14.01
Alzheimers & Dementia	98,135	19.17
Lung cancers	35,715	6.98
Influenza and Pneumonia	40,540	7.92
Stroke	37,626	7.35
Others	225,889	44.57

Source: World Life Expectancy (2020).

Table 6 presents the first 5 lists of leading cause of death in Nigeria in 2020 among the 50 diseases listed as per the health profile of the country published. As published, coronary heart disease is number one in the list.

Table 6. **Top 5 leading cause of death in Nigeria**

Leading causes of death	Number of deaths	% in total deaths
Coronary heart disease	61, 374	4.14
Tuberculosis	127,335	8.60
Influenza and Pneumonia	207,281	14.00
Stroke	57,744	3.90
Diarrheal diseases	144,724	9.77
Others	857,815	59.59

Source: World Life Expectancy (2020).

The mortality patterns in the three countries clearly reflect the phases of the epidemiological transition (Omran, 1971). In Nigeria, most deaths are caused by infectious diseases and related complications, which is an indicator of poor health care and public health infrastructure. In Hungary, the leading causes of death are cardiovascular and cancerous diseases, which are linked to unhealthy lifestyles and social inequalities. In the United Kingdom, similar non-communicable diseases dominate, but mortality rates are improving due to a more advanced healthcare system and effective prevention. In addition, neurodegenerative diseases (*e.g.* Alzheimer's disease) are becoming an increasingly significant cause of death due to the aging population.

4.1.3. Characteristics of physical inactivity of the populations

Inactivity – or lack of physical activity – plays a fundamental role in the development of non-communicable chronic diseases including cardiovascular disease, diabetes, certain cancers, and depression (Lee et al., 2012).

Figure 7 shows the prevalance of physical inactivity in Hungary in 2022 for adolescents and adult population for both genders. For adolescents aged 11-17 74% of males and 86% of females are physically inactive meaning that only 26% of male and 14% of female adolescents aged 11-17 were found active. In this context inactivity is understood that they do not meet the required physical activity or exercise level set by WHO. Similarly with adults aged 18 years and above 33% among males and 43% among females are considered physically inactive. This is the approximately the same for adults of 70 years and above where 48% among males 59% among females are physically inactive.

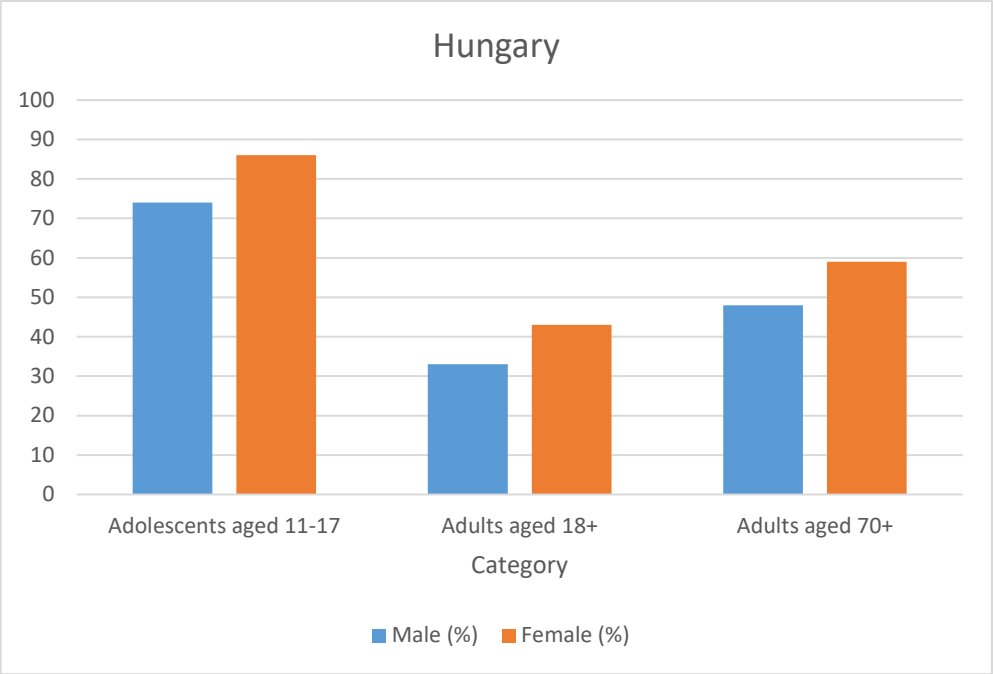

Figure 7. Characteristics of physical inactivity in Hungary (2022)

Source: World Health Organization (2022b).

Figure 8 reveals similar trends in the UK, namely, that 75% and 85% of the adolescent males and females, respectively, were not physically active according to the recommended level. Likewise, for adults above 18 years 32% of males and 40% of females were inactive physically while adults aged 70 years and above 47% among males and 56% among females were physically inactive as per recommended levels.

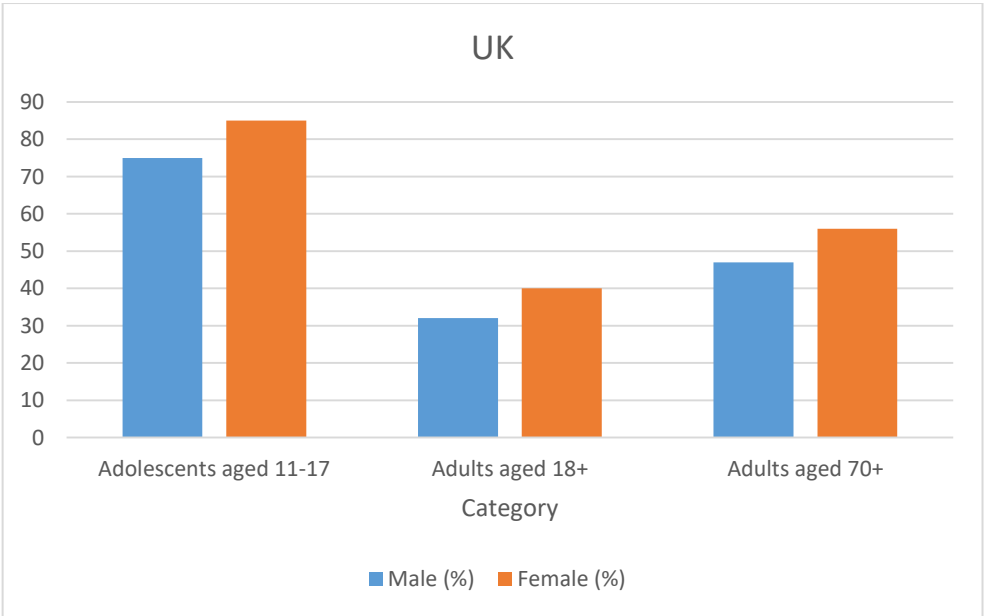

Figure 8. Characteristics of physical inactivity in the UK (2022)

Source: World Health Organization (2022c).

Although no data for adolescents' category was available for Nigeria, Figure 9 shows similar trends of physically inactive people for both males and females for adults aged 18 years and more - 25% for males and 30% for females - and for adults aged 70 above - 37% among males and 43% among females.

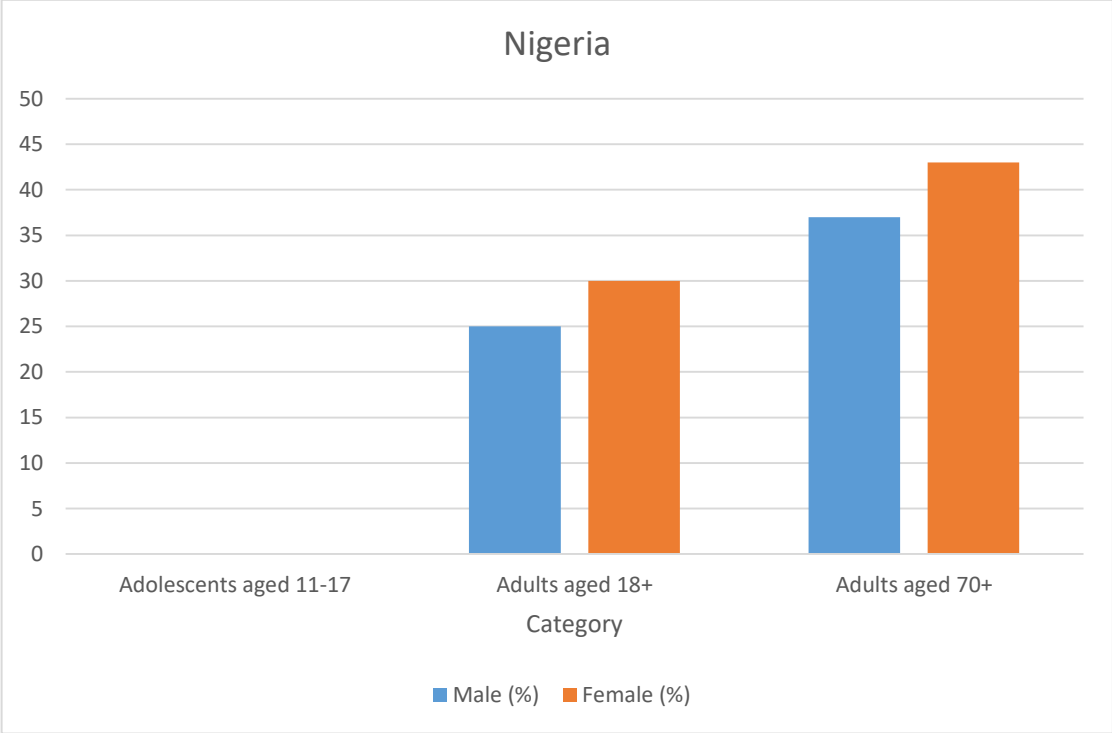

Figure 9. Characteristics of physical inactivity in Nigeria (2022)

Source: World Health Organization (2022b).

Although we have no data for Nigeria on adolescent's category of physically inactive people, results for both Hungary and UK show a large percent of physically inactive adolescent people which should be a great concern as goverments work hard to inculcate physical activity culture at a very young age of our lives. It is also interesting to note that for all three countries and all age groups females are less physically active than males.

Overall, in Nigeria, most of the population is still naturally physically active, but urbanization and the spread of Western lifestyles threaten this favorable situation. In Hungary, inactivity is a serious problem that begins in childhood and is closely linked to a high burden of chronic disease. Inactivity is also significant in the United Kingdom, but health policy responses are more developed, and prevention efforts are present at the national level.

4.1.4. Economic indicators

Gross Domestic Product (GDP) per capita is one of the most used indicators of economic well-being, allowing for comparisons between countries in terms of their standard of living and economic development.

The GDP for the three countries for the year 2023 is shown in Table 7. It also presents the GDP per capita and the rate of unemployment for the same 2023 for the three countries as obtained from World Bank data. In addition, Figure 10 and 11 give the trends for GDP per capita and unemployment rates, respectively, for the past decades.

Table 7. Gross Domestic Products (GDP) value for the countries

Country	GDP (millions)	GDP per capita	Unemployment
Hungary	$212, 388.91	$ 22,141.9	4.1%
UK	$ 3,380,854.52	$49,463.9	4.0%
Nigeria	$ 363,846.33	$ 1,596.6	3.1%*

Source: World Bank (2023b)

** The apparently low percent is likely to be due to a change in the methodology used. In 2023 employment was redefined in Nigeria by the National Bureau of Statistics to include individuals working at least one hour per week, i.e. those in the informal sector, which comprises over 90% of the workforce.*

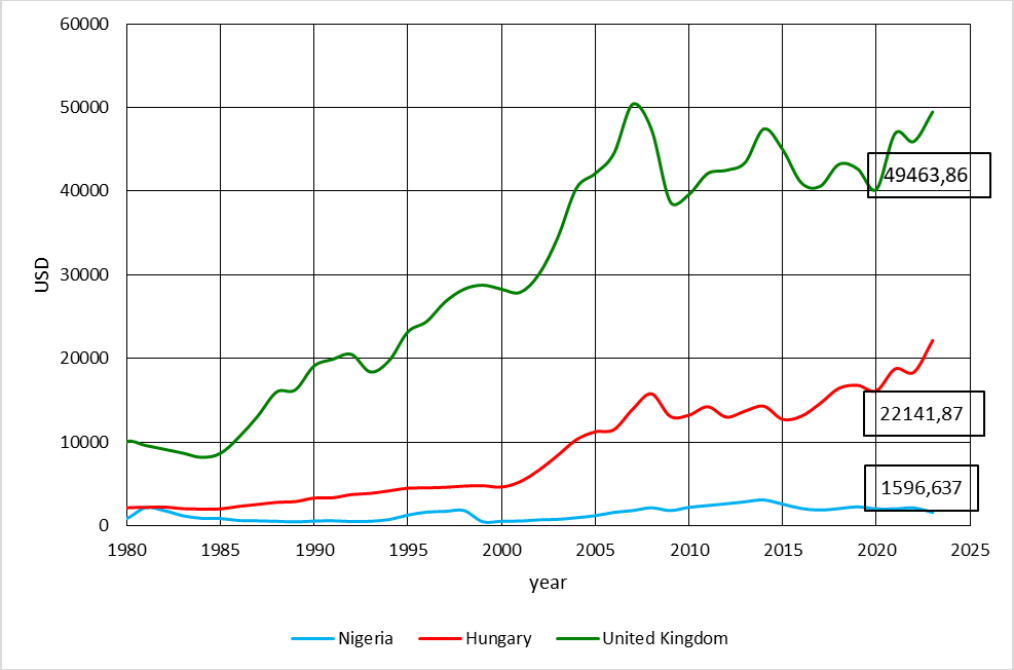

Figure 10. GDP/capita between 1980 and 2023 in Hungary, Nigeria, and the United Kingdom.

Source: World Bank (2023d).

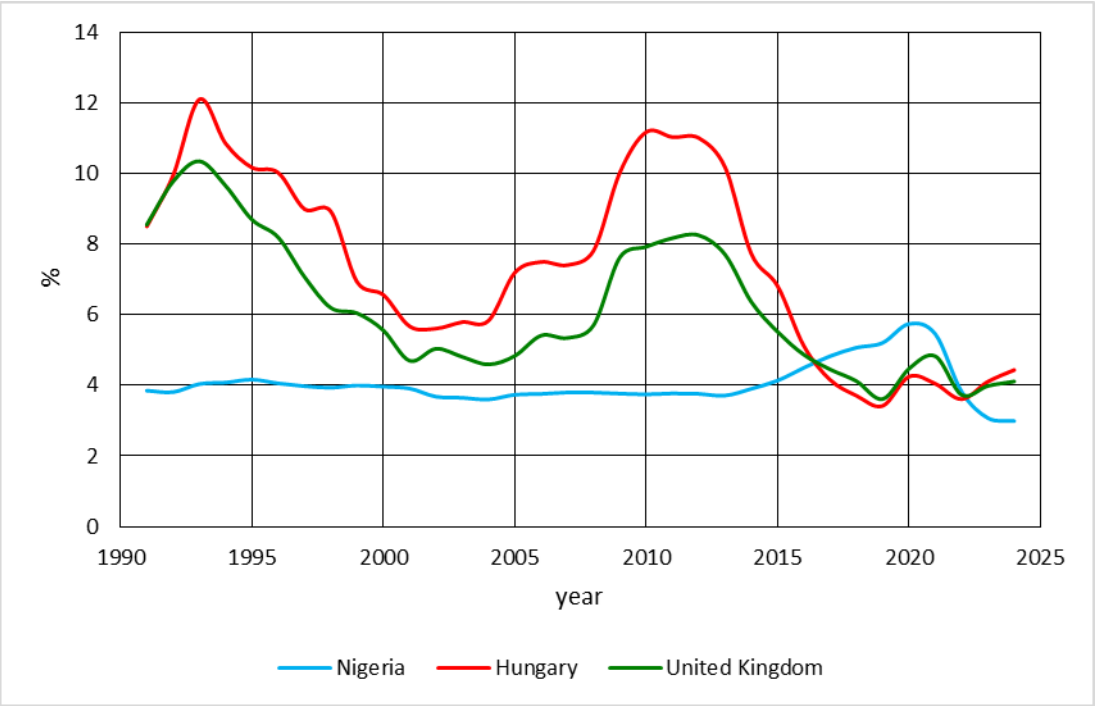

Figure 11. Unemployment rates between 1991 and 2024 in Hungary, Nigeria*, and the United Kingdom.

Source: World Bank (2024).
** The apparently low percent is likely to be due to a change in the methodology used by the Nigerian National Bureau of Statistics. See above for Table 7.*

A comparison of the GDP per capita indicators of the three countries clearly reflects global economic inequalities. Nigeria is still in the early stages of economic development, where low GDP per capita is accompanied by significant social and health challenges. Hungary, as a moderately developed country, is in transition from the periphery to the center, while lagging significantly behind Western European economies. The United Kingdom represents one of the developed centers of the global economy, with a high GDP per capita and a complex economic structure.

Table 8 shows the composition of GDP by sector contribution for the three countries. The agriculture contains crops cultivation, fishing, forestry, livestock production and hunting. Whereby the industry includes construction, mining, electricity, gas, water and therefore manufacturing comprises the output of production boundaries. Finally, the services include wholesale and retail trade, hotels and restaurants, transportation, Government, financial, professional and personal services, education, health care, real estate etc.

Table 8. Flourishing sectors by GDP contribution in Hungary, UK, and Nigeria in 2023

Sector	Hungary (%)*	UK (%)	Nigeria (%)*
Agriculture	4.7	0.6	22.7
Industry	24.3	17.5	32.6
Manufacturing	17.1	8.3	15.4
Services	57.6	72.5	42.8

Source: World Bank (2023c).

** The percentage of these four sectors' contribution can exceed 100% because usually the GDP deflator equals more than 100% whenever nominal GDP is greater than real GDP. The nominal GDP is the total goods and services produced in each period where the real GDP is an adjusted nominal GDP due to inflation.*

Comparing these countries, the result show which sector contributes more to the country's GDP. The UK is dominated by service industry where services in this century became the modern sector for wealth creation, and this also means that the UK economy is predominantly service based. Followed by the Hungarian economy with elements of services and industry. The Nigerian economy has shown rather a diverse sector contribution ranging from services, industry, agriculture and manufacturing. With the above, Nigeria could be said to be food-independent through agricultural outputs.

The sports economy refers to all economic activities related to sports, including the organization of sporting events, the construction and maintenance of infrastructure, the sports equipment and clothing industry, as well as sports tourism, media, and sponsorship revenues. The sports economies of the three countries examined show significant differences, which are influenced by the popularity of sports, economic development, and the existence of infrastructure.

Table 9 shows the economic output and economic contribution of the sports economy in numbers and in percentage for England and the UK in general in 2021 demonstrating a remarkable success ahead of many other sectors such as construction, foods, and telecom. The sport-related output was mainly comprised of sales and revenue generated from ticket sales, stadiums, media rights, betting, merchandizing, and equipment.

Table 9. Characteristics of the sport economy in England/UK

Characteristics	England	UK
Sport related output in the economy (direct) sales, revenue generated	£87.0 billion	£99.6 billion
% of total sport related output in the economy (direct)	2.5%	2.5%
Contribution of sport related to the GDP (direct)	£46.7 billion	£53.6 billion
% of total contribution of sport related to GDP (direct)	2.7%	2.6%
Sport related employment (direct)	749,000 jobs	878,000 jobs
Sport related % of total employment (direct)	3.5%	3.5%

Source: UK Department for Culture, Media & Sport (2024).

Revenue from sport equipment market in Hungary has reached US$300.0 million in 2024 ranging from sport equipment such as outdoor, winter, exercise, racket sport, fishing, team sports, water sport, *etc*. (Statista 2025c). However, Table 10 additionally shows how other sporting units or categories such as basketball, handball, soccer, etc. contributed to the Hungarian economy through ticket sales, merchandizing, and media valued at US$28.33 million.

Table 10. Characteristics of the sport economy related to sport clubs in Hungary in 2022

Category	Revenue
Media	$6.86 million
Merchandise	$12.36 million
Ticket sales	$9.08 million

Source: Statista (2024a).

In 2024 the sport industry revenue by segment is projected in Nigeria to be US$1.57m. Whereby additional contribution from advertising, in-app purchase, and paid app in 2022 are presented in Table11. Although there is a projection for growth until 2027, but the potential of the market is not fully harnessed, especially considering the country's population and history in sport successes, especially soccer. Table 11 outline some of the categories in sport market in Nigeria that are projected to contribute to the country's GDP in 2022.

Table 11. Characteristics of the sport economy in Nigeria in 2022

Category	Revenue
Sport advertising	$190,000
In-app purchases of sport-related	$479,700
Paid Apps of sport related	$564, 600

Source: Statista (2024b).

It is difficult to make comparisons between these three countries on their respective sports economy as there is scarcity of sport database that captures all the sport Gross Value Added (GVA) possibly due to peculiarity of the sports markets in these three countries. Nevertheless, it is clear that the sports economy in the three countries has very different structures and sizes. Nigeria's sports economy is still developing, but the development of sports infrastructure and the promotion of sports tourism are still in their infancy (Umar – Balatoni, 2022). Hungary's sports economy is moderately developed, with football, handball and Olympic sports playing an important role. Sports tourism and modern sports infrastructure are also showing an upward trend (Tóth – Mátrai, 2023). The UK's sports economy is one of the most developed in the world, particularly in football, but the country is a leading player in almost every sport, and sports tourism, sponsorship and media contracts are also significant economic factors (SIRC, 2020).

4.1.5. Impact of Covid-19 on countries' economy

The Covid-19 pandemic has presented all three countries with serious economic challenges. The UK economy was among the economies in the world that were severely affected by the Covid-19 lockdown. Despite drop in GDP of up to 26% within the first 2 months of the lockdown in 2020 in April, the labour market did not experience huge catastrophe of unemployment thanks to Government furlough program supporting the employers to keep employee’s jobs of over 8 million people. The Hungarian economy’s GDP also dropped but experienced manageable deficit in Government spending and inflation rate of about 3.4% around September 2020. Although the main revenue source for the Nigerian Government is from crude oil sales it only contributes 9% to its GDP.

During the Covid-19 lockdown the price of crude oil crashed to $29 per barrel as against the $57 per barrel which while pegged the country's budget and translated to a 48% decline in oil revenue it had little influence on the overall GDP. The inflation in Nigeria rose to 14% against the projected 9% before the pandemic. As import dependent Nigeria is, the supply chain disruptions significantly affected consumer goods supply and impacted the inflation, the interest rate cut from 9% to 5% on some of the Government intervention programmes (Table 12).

Table 12. Impact of Covid-19 on UK, Hungary, and Nigeria's economy

Country	**GDP (decline)***	**Labor Market (furlough/ unemployment)**	**Monetary policy** (interest rate cut)	**Govt spending tackling Covid-19**	**Budget deficit**	**Govt debt to GDP**
UK	26%	Over 8 million furloughed	0.75% to 0.1%	£311 billion	15% of GDP	97% of GDP
Hungary	13.6%	4.4% unemployment	-	-	Over 8%	78% of GDP
Nigeria	1.8%	55% youth unemployment	9% to 5%	Over $1.5billion	-	-

*Source: (European Commission, 2020; World Bank, 2020; UNDP Nigeria, 2020; Brien et al 2022). * In the first 2 months of the lockdown.*

The Covid-19 pandemic has severely affected the economies of all three countries, but the extent of the impact and the economic responses have varied. Nigeria's crude production did not stop, and as shown in Table 8, Nigeria's economy spans across agriculture, industry, manufacturing, and services unlike both those in the UK and Hungary where the GDP composition was dominated by the service sector. These and other factors might have contributed to Nigeria having smaller GDP contraction compared to other two countries during the pandemic. Hungary's economy responded relatively quickly to the crisis, with economic stimulus measures and social support helping to mitigate the impact, particularly in the industrial and service sectors. The UK economy faced serious difficulties due to the decline in tourism and services, but government support and growth in the digital sector helped the recovery.

The impact of the Covid-19 pandemic on the sports industry has been felt worldwide, with serious consequences not only for the economic situation of individual countries but also for sporting life. The sports industries in the three countries examined responded to the crisis in different ways and to varying degrees.

Sport is a significant sector as it contributes massively to the entire UK economy. During the Covid-19 the sport economy of the UK was badly affected which in turn affected the sport share contribution to the entire UK economy. Table 13 identifies the specific sports sectors that experienced a decline in their contribution to the sport economy during the 2020 lockdown. The data indicate that over £5 billion in economic output was lost in the early months of the Covid-19 pandemic, a period marked by the complete suspension of sporting activities. This contraction significantly affected both the sport-related GDP and the broader national GDP of the United Kingdom.

Table 13. Impact of Covid-19 on England/UK Sport economy during Covid-19 lockdown

Sport Economic Activities	**Sport GDP reduction during lockdown (%)**	**Sport GDP reduction during lockdown in monetary value** (million)
Sport clubs & Leisure centers	80	£1,061
Accommodation- sport tourism	100	£581
Sport construction	65	£180
Sport betting	100	£770
Sport education	25	£248
Sport manufacturing	35	£263
Others	-	£2,365

Source: (Kokolakakis, Lera-Lopez & Ramchandani 2021).

The EU 27 as a block has a vibrant sport economy more specifically in countries like Spain, Germany, France and Italy. Table 14 presented sport related economic parameters and how Covid-19 led to some sport economic losses.

Table 14. Impact of Covid-19 on EU 27 Sport economy during Covid-19 lockdown

Sport Economic Activities	**Loss (%)**	**Loss in figures**
Direct sport-related GDP	15	€47million
Direct sport-related jobs	16	845,000
Retail & sporting services	-	€79million & 1.2million jobs

Source: (Katsarova & European Parliamentary Research Services 2021).

Sport in Nigeria is not viewed profitable-wise but usually as an entertainment or leisure (Akarah 2014). Therefore, there is inadequate private investment nor adequate Government investment in the sector to make it more profit oriented. This is why the type of employment generated in this sector for active sport participants is mainly for optimism that in the future something positive might come up and for the clubs and the fitness places, their output of financial contribution to the economy could be seen very inadequate. Another impacted area could be sport merchandizing. However, as the country is currently described as low-income, very little portion of the population can afford to purchase high quality brands of sport gears and wears, thus the loss from this sector during the Covid-19 period was also unidentified. The advertising revenue generated by the sport sector was also not significant enough to cause any serious changes during the Covid-19 period as shown in Table 15.

Table 15. Impact of Covid-19 on Nigeria Sport economy during Covid-19 lockdown.

Impacted Areas	**Negative impact level to the sport economy**
Unemployment	No statistics but low negative impact
Merchandizing	No statistics but low negative impact
Advertising	No statistics but low negative impact

Source: (Akarah, 2014; Timi, 2021; Adamu & Balatoni 2022).

The Covid-19 pandemic has had a serious impact on the sports industry in all three countries, and the industry has responded to the challenges in different ways. While Nigeria's sports market has suffered a severe downturn during the pandemic, as the suspension of local sporting events and the economic difficulties faced by sports, this did not lead to significant losses in revenue due to the relatively minor contribution of the sector to the overall economy (Adamu - Balatoni, 2022). Hungary's sports sector has gradually restarted, and the suspension of competitions have had a serious financial impact (Balatoni - Adamu, 2023). The UK sports industry sought solutions through digital broadcasting and sponsorship support, but closed-door matches and the cancellation of major sporting events severely affected revenues. The effects of the pandemic were particularly noticeable in the sports economy and mental health, as athletes and fans alike faced serious challenges in adapting to the spread of the virus.

The Covid-19 pandemic has placed a heavy burden on the healthcare systems of all three countries, with consequences varying depending on each country's healthcare infrastructure and socio-economic situation.

United Kingdom is among the top 5 countries with obese adults. Prevalence of smoking, substance abuse and alcohol consumption increased during the Covid-19 lockdown period. Social distancing and closure of other community space necessitated loss of connections or support networks thereby increasing stress and anxiety among people with mental health issues. This also led to an increase in mental health cases during this period. The closure of sports and leisure facilities was translated into experiencing a declined physical activity level among the populace. The life expectancy improvement is a measure of good health in a population, when the UK entered the pandemic the life expectancy was already ranked poorly in relation to its peer countries and continue to stagnate afterwards (Table 16).

Table 16. Impact of Covid-19 on health in UK

Drivers of poor health	**Before Covid-19** (rate)	**During Covid-19** (rate)
Obesity	ranked 4th highest in Europe	direct risk factor for respiratory disease
Smoking	among leading causes of preventable death in UK	direct risk factor for respiratory disease
Substance abuse	vulnerable situation	vulnerable situation
Alcohol consumption	status quo	influenced by restrictions
Physical activity	status quo	influenced by restrictions
Stress & anxiety	existing conditions	deteriorated
Report of mental health cases	existing conditions	deteriorated
Life expectancy	ranked 24th in OECD	stagnated
Healthcare inequalities	disadvantaged to certain group	more disadvantageous

Source: (OECD, 2019; ONS, 2020b; WHO, 2022c; British Medical Association 2024).

The life expectancy of Hungarians which is one of the yardsticks of health improvement declined for almost a year during the Covid-19 lockdown compared to stable growth experienced before Covid-19 period. Health complaints among adolescents increased (Table 17) while health satisfaction declined among boys and girls of 11-15 years of age.

Behavioural risk factors such as excessive alcohol consumption and obesity and tobacco smoking has been an existing problem for Hungary as they were already above the EU threshold and marked to be 50% of all deaths in Hungary among adolescents and adults in 2020. With Covid-19, the situation was not any better. The sport and leisure facilities were dominant spaces for people to exercise but Covid-19 lockdown forced people to change their physical activity habit by exercising in an open air or self-equipped with exercise machines at homes which led to the closure of many fitness and gym centers (Balatoni - Adamu, 2023).

Table 17. Impact of Covid-19 on health in Hungary

Health parameters	Before Covid-19	During Covid-19
Life expectancy	76.5 years	75.7 years
Health complaints	33.1%	50.3%
Health satisfaction	31.5%	19.7%
Alcohol consumption	13% higher than EU average	greater than EU average
Obesity (2019)	24% (EU average 16%)	greater than EU average
Physical activity	2% of all death due to low PA	-

Source: (OECD/European Observatory on Health Systems and Policies, 2021; WHO, 2023c; Losonczi, M. 2024).

The healthcare system in Nigeria was facing a huge challenge of underfunding even before the emergence of Covid-19 and it is safe to say that the Covid-19 situation added unbearable consequences to the already over-stretched system. Table 18 highlights some of the main essential healthcare services in Nigeria that were severely affected due to the Covid-19. Services critical to the survival of most of the population were disrupted and the consequent mortality rates grew. The physical activity due to Covid-19 closure of sport facilities highlighted the inequality level on infrastructure development in Nigeria. People with better socioeconomic status often reside in a spacious environment that gave them opportunity to engage in physical activity during the lockdown, however, most of the population have no such privileges and resorted to exercising on empty public roads and highways endangering the further spread of the virus or violating the Covid-19 protocols. The sports and leisure facilities are not so popular places country-wide in conducting physical activities as are open spaces, therefore, their closure affected few out of many.

Table 18. Impact of Covid-19 on health in Nigeria

Essential Health System	Status during Covid-19	Percentage of disruption
Routine immunization	disrupted	-
Family planning	disrupted	-
Antenatal & neonatal services	disrupted	down by 6%
Tuberculosis treatment	disrupted	down by 72%
HIV/AIDs	disrupted	-
Malaria treatment	disrupted	mosquito net distribution down by 75%
Child mortality	increased	18%
Maternal mortality	increased	9%
Physical activity	based on space availability	-

Source: (Ahmed et al. 2020; Okeke et al 2022; Lawanson et al. 2020).

Nigeria's health system was unprepared to deal with the pandemic, resulting in severe hospital overcrowding and low testing capacity (Uguru et al., 2023). Hungary faced serious challenges due to the shutdown of healthcare services and screening programs, while the Covid-19 mortality rate rose due to the population's high prevalence of chronic diseases (Elek et al., 2022). The UK's healthcare system, although strong, was also overwhelmed, and the reduction in non-urgent treatment and preventive services could have long-term effects, particularly on mental health (BMA, 2022). Overall, the countries felt the impact of the pandemic to varying degrees due to their different health infrastructures and social situations, but all faced serious challenges in managing Covid-19 and developing public health responses.

4.2. OWN SURVEY RESULTS

The following section presents the results of my own questionnaire-based research, conducted in three countries: Hungary, England, and Nigeria. The detailed presentation and analysis of the data collected provide an opportunity to answer the central research questions of the thesis and to examine the proposed hypotheses. Particular attention is given to the relationships that support or refute the assumptions formulated during the research, with an emphasis on identifying similarities and differences observed among the three countries and across the three time periods: before, during, and after the Covid-19 pandemic.

Table 19 presents the results of the reliability analysis conducted to assess the internal consistency of the entire questionnaire, comprising a total of 84 cleaned items. According to established standards, a Cronbach's alpha value of 0.70 or higher is considered acceptable for internal consistency. The reliability analysis yielded Cronbach's alpha values of 0.938, 0.894, and 0.875 for the surveys conducted in England, Hungary, and Nigeria, respectively. These results indicate a high level of internal consistency across all three samples. Notably, the same version of the questionnaire was administered in each country, further supporting the robustness of the instrument across different cultural contexts.

Table 19. Reliability test results for the entire questionnaire.

Country	Cronbach's Alpha	No of Items
Nigeria	0.938	84
Hungary	0.894	84
England	0.875	84

Source: Collected Data (2023).

Table 20 presents respondents' self-assessed income levels, rated on a 5-point scale where 1 corresponds to the lowest 20% income bracket and 5 to the highest 20% within their respective countries. The results indicate that a substantial proportion of participants perceived themselves to be in the lower income categories. Specifically, 35.9% of respondents in England and 34.7% in Hungary rated themselves in the lowest two categories, while in Nigeria, a slightly higher proportion (30.5%) did so.

Although this suggests a relatively smaller concentration of lower-income respondents in Nigeria, the overall trend across all three countries reflects a predominance of respondents from the lower-middle income brackets.

Table 20. Perceived income level of the respondents

Country	Scales	Frequency	Percent (%)
Nigeria	1	9	8.6
	2	23	21.9
	3	61	58.1
	4	8	7.6
	5	4	3.8
Hungary	1	27	21.3
	2	17	13.4
	3	56	44.1
	4	18	14.2
	5	9	7.1
England	1	10	10.9
	2	23	25.0
	3	44	47.8
	4	13	14.1
	5	2	2.2

Source: Collected Data (2023).

Table 21 displays the gender distribution of respondents across the three countries. The data reveal a relatively balanced representation of male and female participants in both the England and Hungary samples. In contrast, the Nigerian sample exhibited a slight male predominance, indicating a modest gender imbalance in that context. Overall, the surveys achieved an approximately equitable gender distribution, with minor variations across countries.

Table 21. Gender of the respondents

Country	Gender	Frequency	Percent (%)
Nigeria	Female	42	40.0
	Male	63	60.0
Hungary	Female	64	50.4
	Male	63	49.6
England	Female	44	47.8
	Male	48	52.2

Source: Collected Data (2023).

Table 22 presents the age distribution of respondents across the three countries. The results indicate that individuals under 30 years were more likely to participate in the survey in the Hungary and England samples. Nigeria followed with a slightly lower proportion of younger respondents.

Overall, the age distributions across the three countries are relatively comparable, suggesting that the target populations were similar in terms of age-related representation among those who completed the questionnaire.

Table 22. Age of the respondents

Country	Scales	Frequency	Percent (%)
Nigeria	Under 18	17	16.2
	18-20	9	8.6
	21-30	23	21.9
	31-50	47	44.8
	51-60	4	3.8
	61-70	4	3.8
	Above 80	1	1.0
Hungary	Under 18	1	0.8
	18-20	43	33.9
	21-30	75	59.1
	31-50	7	5.5
	51-60	1	0.8
England	Under 18	3	3.3
	18-20	13	14.1
	21-30	47	51.1
	31-50	21	22.8
	51-60	8	8.7

Source: Collected Data (2023).

Table 23 presents the classification of respondents based on their primary occupation or status across the three countries. The Hungarian sample was predominantly composed of students, who represented the largest respondent group. In the England-based survey, employees constituted the highest proportion, followed by students. Similarly, in the Nigerian survey, students accounted for most responses, with employees comprising the second largest group. These findings highlight a notable concentration of student and employee participation across all three countries, suggesting that these two groups were the most actively engaged in the survey.

Table 23. Classification of the respondents

Country	Respondents	Frequency	Percent (%)
Hungary	Students	110	86.6
	University staff	2	1.6
	Employer	1	0.8
	Employee	11	8.7
	Entrepreneurs	2	1.6
	Others	1	0.8
	Total	**127**	**100**
England	Students	23	25.0
	University staff	-	-
	Employer	6	6.5
	Employee	52	56.5
	Entrepreneurs	4	4.3
	Others	7	7.6
	Total	**92**	**100**
Nigeria	Students	46	43.8
	University staff	5	4.8
	Employer	5	4.8
	Employee	22	21.0
	Entrepreneurs	13	12.4
	Others	14	13.3
	Total	**105**	**100**

Source: Collected Data (2023).

Table 24 presents respondents' perceptions of weight gain in the post-Covid-19 period across the three countries. When asked whether they had gained weight in the current post-pandemic context, most of the respondents in England, Hungary, and Nigeria indicated that they had. This may reflect broader lifestyle changes and reduced physical activity associated after Covid-19.

Table 24. Anthropometric question on whether the respondents gained weight currently.

Country	Answer	Frequency	Percent (%)
Nigeria	No, my weight is stable	27	25.7
	No, I think I lost weight	21	20.0
	Yes, I think I gained some weight	47	44.8
	I don't know	10	9.5
Hungary	No, my weight is stable	41	32.3
	No, I think I lost weight	23	18.1
	Yes, I think I gained some weight	51	40.2
	I don't know	12	9.4
England	No, my weight is stable	25	27.2
	No, I think I lost weight	25	27.2
	Yes, I think I gained some weight	38	41.3
	I don't know	4	4.3

Source: Collected Data (2023).

Table 25 compares the proportion of respondents in each country who reported engaging in at least one fitness activity. The results show that 64.1% of respondents in England, 79.5% in Hungary, and 62.9% in Nigeria participated in some form of fitness activity. This supports the appropriateness of the target population for the survey, as a large proportion of respondents were actively involved in fitness-related behaviors.

Table 25. Fitness Activity participation by respondents

Country	Answer	Frequency	Percent (%)
Nigeria	Yes	66	62.9
	No	39	37.1
Hungary	Yes	101	79.5
	No	26	20.5
England	Yes	59	64.1
	No	33	35.9

Source: Collected Data (2023).

Table 26 presents respondents' self-identification as sport fans or spectators across the three countries. The findings indicate that 58.7% of participants in England, 62.2% in Hungary, and 73.3% in Nigeria declared that they consider themselves sport fans or spectators, thus a substantial proportion of respondents across all three countries demonstrated an active interest in sports consumption.

Table 26. Being a sport fan or spectator

Country	Scales	Frequency	Percent (%)
Nigeria	Yes	77	73.3
	No	28	26.7
	Total	105	100.0
Hungary	Yes	79	62.2
	No	48	37.8
	Total	127	100.0
England	Yes	54	58.7
	No	38	41.3
	Total	92	100.0

Source: Collected Data (2023).

4.2.1. Analysis by Country

4.2.1.1. Hungarian survey results

Table 27 presents the characteristics and changes in physical activity (PA) and leisure-related behaviors across three periods – before Covid-19 (BeCov), during Covid-19 (DuCov), and after Covid-19 (AfCov) – based on the Hungarian survey data. During the BeCov period, 39.4% of respondents reported not routinely engaging in moderate or vigorous-intensity aerobic physical activity. However, a notable proportion – 23.6% and 28.3% – indicated regular participation, engaging 1-2 times and 3-4 times per week, respectively. In addition to structured physical activity, many respondents reported engaging in leisure-related activities such as gardening, walking, and grocery shopping, which also contributed to overall physical activity during this period.

In the DuCov period, a similar trend was observed. About 37.8% of respondents reported not engaging in physical activity routinely, while 32.3% and 21.3% reported engaging 1-2 times and 3-4 times per week, respectively. Although there was a slight decline in the proportion of respondents participating 3-4 times per week compared to the BeCov period, the change was minimal. A comparable pattern was noted for leisure-related activities, which also saw a marginal decrease during the DuCov period.

In the AfCov period, a marked increase was observed in physical activity levels. The proportion of respondents engaging in moderate or vigorous physical activity 3-4 times per week nearly doubled compared to the DuCov period. A similar upward trend was evident for leisure-related activities, indicating a positive shift in health-related behaviors following the easing of Covid-19 restrictions.

Table 27. Descriptive frequency count results for Hungarian survey BeCov, DuCov, & AfCov period (routine scales variables).

Items	Not routinely*	1-2 times a week*	3-4 times a week*	5-6 times a week*	Almost daily*
BeCov					
30 min. moderate or vigorous intensity PA.	50 (39.4)	30 (23.6)	36 (28.3)	4 (3.1)	7 (5.5)
Leisure-related activities	16 (12.6)	56 (44.1)	37 (29.1)	4 (3.1)	14 (11.0)
DuCov					
30 min. moderate or vigorous intensity PA.	48 (37.8)	41 (32.3)	27 (21.3)	3 (2.4)	8 (6.3)
leisure-related activities	33 (26.0)	49 (38.6)	31 (24.4)	6 (4.7)	8 (6.3)
AfCov					
30 min. moderate or vigorous intensity PA.	19 (15.0)	31 (24.4)	52 (40.9)	11 (8.7)	14 (11.0)
Leisure-related activities	9 (7.1)	40 (31.5)	56 (44.1)	10 (7.9)	12 (9.4)

Source: Collected Data (2023).
*Data are given as number of respondents and frequency (%)

Table 28 presents continued frequency count results from the Hungarian survey, focusing on respondents' attitudes toward sport consumption across the three periods. Responses were measured on a Likert scale, where combined percentages for "*Strongly Disagree*" and "*Disagree*" reflected *Disapproval*, while "*Agree*" and "*Strongly Agree*" represented *Approval*. *Neutral* responses accounted for the remainder. In the BeCov period, the data suggest that sport consumption received less attention, with a substantial proportion of respondents selecting neutral responses, indicating not much of engagement. This trend worsened during the DuCov period, where disapproval toward sport consumption increased, reflecting the negative impact of lockdowns and restrictive measures on individuals' engagement with sports. However, in the AfCov period, an improvement was observed. There was a noticeable increase in the proportion of respondents expressing agreement with statements related to sport consumption, suggesting a renewed interest. This positive change may be attributed to the lifting of restrictions, improved access to sporting events and facilities, and greater freedom of movement.

Table 28. Descriptive frequency count results for Hungarian survey BeCov, DuCov, & AfCov period on Likert scales variables.

Items	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Approve	Dis-approve
BeCov							
Life centers around the consumption of sport.	14(11.0)	26(20.5)	49(38.6)	29(22.8)	9(7.1)	29.9%	31.5%
Thinking about sport all the time.	13(10.2)	35(27.6)	43(33.9)	24(18.9)	12(9.4)	28.3%	37.8%
Difficult to stop watching, reading, or talking about sport.	20(15.7)	43(33.9)	45(35.4)	11(8.7)	8(6.3)	15%	49.6%
Urge to consume sport is strong.	14(11.0)	39(30.7)	43(33.9)	25(19.7)	6(4.7)	24.4%	41.7%
Consuming sport is something I cannot live without.	15(11.8)	34(26.8)	45(35.4)	19(15.0)	14(11.0)	26%	38.6%
Completely taken with sport consumption	13(10.2)	29(22.8)	52(40.9)	26(20.5)	7(5.5)	26%	33%
DuCov							
Life centers around the consumption of sport.	22(17.3)	34(26.8)	45(35.4)	19(15.0)	7(5.5)	20.5%	44.1%
Thinking about sport all the time.	18(14.2)	37(29.1)	42(33.1)	20(15.7)	10(7.9)	23.6%	43.3%
Difficult to stop watching, reading, or talking about sport.	16(12.6)	48(37.8)	40(31.5)	14(11.0)	9(7.1)	18.1%	50.4%
Urge to consume sport is strong.	19(15.0)	37(29.1)	42(33.1)	22(17.3)	7(5.5)	22.8%	44.1%
Consuming sport is something I cannot live without.	17(13.4)	37(29.1)	38(29.9)	26(20.5)	9(7.1)	27.6%	42.5%
Completely taken with sport consumption	15(11.8)	42(33.1)	43(33.9)	20(15.7)	7(5.5)	21.2%	44.9%
AfCov							
Life centers around the consumption of sport.	11(8.7)	20(15.7)	54(42.5)	30(23.6)	12(9.4)	33%	24.4%
Thinking about sport all the time.	11(8.7)	29(22.8)	47(37.0)	30(23.6)	10(7.9)	31.5%	31.5%
Difficult to stop watching, reading, or talking about sport.	11(8.7)	33(26.0)	51(40.2)	23(18.1)	9(7.1)	25.2%	34.7%
Urge to consume sport is strong.	8(6.3)	25(19.7)	47(37.0)	33(26.0)	14(11.0)	37%	26%
Consuming sport is something I cannot live without.	9(7.1)	20(15.7)	52(40.9)	32(25.2)	14(11.0)	36.2%	22.8%
Completely taken with sport consumption	7(5.5)	22(17.3)	53(41.7)	32(25.2)	13(10.2)	35.4%	22.8%

Source: Collected Data (2023). Data are given as number of respondents and frequency (%).

Supplementary Table 1 presents the responses of Hungarian participants to various behavioral and lifestyle items across the BeCov, DuCov, and AfCov periods. During the BeCov period, 20.5% of respondents reported sitting for 2-4 hours daily at work, 30.7% for 4-6 hours, 27.6% for 6-8 hours, and 12.6% for more than 8 hours. When compared to DuCov, a slight increase in overall daily sitting time was observed. Interestingly, the proportion of respondents reporting 4-6 hours of sitting was lower in DuCov than in AfCov, while those sitting for 6-8 hours were more numerous in DuCov than in AfCov. Notably, only participants in the AfCov period reported sitting for more than 8 hours (11.8%), while none did so during DuCov. Supplementary Table 1 also shows that a higher percentage of respondents reported taking 3-4 breaks per day in BeCov (34.6%) and AfCov (47.2%) compared to DuCov (28.3%). With respect to screen time, the percentage of participants who reported spending more than five hours per day in front of screens was highest during the DuCov period, surpassing the figures for both BeCov and AfCov. Adequate sleep duration – defined by the American Academy of Sleep Medicine and the Sleep Research Society as 7-9 hours per night (Watson et al., 2015) – was also assessed, with results indicating that more participants in the DuCov period reported sleeping for more than 8 hours daily compared to the other two periods. Regarding sleep quality, most respondents across all three periods rated their sleep as good, though the proportions were higher in BeCov and AfCov than in DuCov. Participants were also asked about stress and anxiety levels during the three periods. The percentage of respondents indicating mild anxiety was higher in BeCov (40.2%) and AfCov (34.6%) compared to DuCov, where elevated levels of psychological distress were reported, namely, 33.1% felt ‘much’ stress/anxiety, 11.8% ‘very much,’ and 14.2% ‘extremely’. Smoking behavior was minimal among Hungarian respondents, with a significant majority identifying as non-smokers throughout all three periods. Similarly, alcohol consumption was generally low, most respondents were either non-drinkers or reported only occasional alcohol use (Supplementary Table 1).

The Hungarian study, the results in Table 29 has revealed significant differences among the periods; BeCov, DuCov, & AfCov epidemic, respectively. This means that there were significant differences in 30 minutes of moderate or vigorous intensity exercise engagement by the respondents in comparison to the periods DuCov & AfCov as well as BeCov & AfCov, respectively. It also indicated that the respondents participated more in these routine activities AfCov period than DuCov period and similarly participated more AfCov than BeCov period as the mean ranking shows.

Likewise, on leisure-related activities, significant differences were observed between all the periods, BeCov & DuCov, DuCov & AfCov, and BeCov & AfCov, respectively. The mean ranking further shows that the Hungarian respondents engaged less in leisure-related activities DuCov compared to BeCov period, also engaged in more leisure activities AfCov compared to DuCov period, and more AfCov period compared to BeCov period.

Correspondingly, the respondents' lives center around sport consumption, the results have shown significant differences in comparisons BeCov & DuCov period and DuCov & AfCov period and went ahead to identify that their lives centered around sport consumption less DuCov period than BeCov period, also centered more AfCov period than DuCov period and centered more AfCov period compared to BeCov period.

On thinking about sport all the time, a significant difference was sought DuCov & AfCov period comparison and indicated that the respondents think more about sport consumption AfCov compared to DuCov period. Furthermore, on the difficulty in stopping to watch, read, or talk about sport by the respondents DuCov & AfCov period, BeCov & AfCov period comparisons sought significant differences, respectively and ranking went further to show that it was more difficult to stop watching, reading or talking about sport AfCov period than DuCov period and more difficult to stop AfCov period than BeCov.

The respondent's urge to consume sport DuCov & AfCov period, BeCov & AfCov comparisons were significantly different and showed that the urge was stronger AfCov compared to DuCov and stronger AfCov period than BeCov period. The Hungarian respondents indicated that they cannot live without sport consumption and the responses showed differences in the comparison of periods between DuCov & AfCov, BeCov & AfCov and imply that they cannot live without sport consumption AfCov period than DuCov period and similarly cannot do so AfCov than BeCov period.

While a significant difference was also detected in the responses received on whether the respondents were completely taken with sport consumption DuCov & AfCov period, BeCov & AfCov period comparisons. The result means that they were completely taken with sport consumption more AfCov period than DuCov and more AfCov than BeCov.

Finally, on the daily screen time the respondents spent watching television, using mobile phones screen times, social media networks screens, and videogames. The comparison has shown significant differences among the periods BeCov & DuCov as well as DuCov & AfCov portraying that they do such activities more DuCov than BeCov and more DuCov than AfCov period.

Table 29. Wilcoxon signed rank test of significance (p-value) results on individual country comparisons on situations BeCov, DuCov, and AfCov Hungarian survey.

Hungary	**BD** (pvalue)	**B** (rank)	**D** (rank)	**Ties**	**DA** (pvalue)	**D** (rank)	**A** (rank)	**Ties**	**BA** (pvalue)	**B** (rank)	**A** (rank)	**Ties**
30 min. moderate or vigorous intensity aerobic PA.	0.614	35	29	63	<0.001*	13	58	56	<0.001*	14	56	57
leisure-related activities (grocery shopping, walking in park, gardening)?	0.015*	45	26	56	< 0.001*	15	59	53	0.018*	24	43	60
life centers around the consumption of sport.	0.002*	50	24	53	< 0.001*	19	47	61	0.159	29	41	57
Thinking about sport all the time.	0.073	42	28	57	0.020*	25	42	60	0.258	28	36	63
Difficult to stop watching, reading, or talking about sport.	0.548	25	33	69	0.007*	20	41	66	0.001*	17	42	68
Urge to consume sport is strong.	0.514	33	31	63	< 0.001*	19	50	58	< 0.001*	19	49	59
Consuming sport is something I cannot live without.	0.462	31	25	71	< 0.001*	18	44	65	0.006*	22	42	63
Completely taken with sport consumption	0.064	41	25	61	< 0.001*	8	51	68	0.001*	18	44	65
Daily sitting time at work?	0.077	43	32	52	0.294	28	31	68	0.471	38	30	59
Break from sitting	0.861	31	21	75	0.376	27	42	58	0.263	22	34	71
Screen time spent daily watching TV, social media, mobile phones, and video games?	<0.001*	11	44	72	< 0.001*	51	13	63	0.538	34	28	65
Number of respondents:				**127**				**127**				**127**

BD: Before Covid-19 period versus During Covid-19 period.
DA: During Covid-19 period versus After Covid-19 period.
BA: Before Covid-19 period versus After Covid-19 period.
B: Before Covid-19 period.
D: During Covid-19 period.
A: After Covid-19 period.
Ties: Interaction point. *Source: Collected Data 2023.*

4.2.1.2. England-based survey results

Engaging in physical activity three to four times per week is generally considered appropriate for the average, non-athlete population. As shown in Table 30, a substantial proportion of respondents in England who reported participating in aerobic PA at this frequency before Covid-19 (BeCov) period exhibited a slight decline during Covid-19 (DuCov). However, this figure rose significantly after Covid-19 (AfCov) period, reaching 40.2%, compared to 27.2% during the DuCov period. A similar trend was observed in the context of leisure-related physical activities.

Table 30. Descriptive frequency count results for England-based survey BeCov, DuCov, & AfCov period (routine scales variables).

Items	Not routinely	1-2 times a week	3-4 times a week	5-6 times a week	Almost daily
BeCov					
30 min. moderate or vigorous intensity PA.	19(20.7)	26(28.3)	31(33.7)	8(8.7)	8(8.7)
Leisure-related activities	8(8.7)	31(33.7)	33(35.9)	5(5.4)	15(16.3)
DuCov					
30 min. moderate or vigorous intensity PA.	19(20.7)	19(20.7)	25(27.2)	5(5.4)	24(26.1)
Leisure-related activities	11(12.0)	41(44.6)	20(21.7)	3(3.3)	17(18.5)
AfCov					
30 min. moderate or vigorous intensity PA.	14(15.2)	26(28.3)	37(40.2)	5(5.4)	10(10.9)
Leisure-related activities	7(7.6)	31(33.7)	29(31.5)	8(8.7)	17(18.5)

Source: Collected Data (2023). Data are given as number of respondents and frequency (%).

Table 31 presents the frequency count results for the routine-related Likert scale items from the England-based survey. Across the BeCov, DuCov, and AfCov periods, responses largely indicated disapproval, except for one item in the AfCov period, where respondents expressed a positive preference toward sport consumption. The consistently high levels of disapproval across all three periods suggest that sport consumption was not firmly established in the daily routines of most respondents prior to Covid-19. During the DuCov period, this trend persisted, likely due to the well-documented restrictions and limitations on physical activity. While one might expect an improvement in the AfCov period as restrictions eased, the data show no substantial shift in attitudes toward increased sport consumption. This highlights a persistent lack of engagement with sport among respondents in England, in contrast to trends observed in other countries, such as Hungary, where sport consumption showed notable recovery in the AfCov period.

Table 31. Descriptive frequency count results for England-based survey BeCov, DuCov, & AfCov period (Likert scales variables).

Items	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Approve	Dis-approve
BeCov							
Life centers around the consumption of sport.	14(15.2)	22(23.9)	29(31.5)	18(19.6)	9(9.8)	29.4%	39.1%
Thinking about sport all the time.	15(16.3)	31(33.7)	24(26.1)	15(16.3)	7(7.6)	23.9%	50%
Difficult to stop watching, reading, or talking about sport.	21(22.8)	28(30.4)	26(28.3)	10(10.9)	7(7.6)	18.5%	53.2%
Urge to consume sport is strong.	19(20.7)	31(33.7)	19(20.7)	15(16.3)	8(8.7)	25%	54.4%
Consuming sport is something I cannot live without.	19(20.7)	21(22.8)	21(22.8)	22(23.9)	9(9.8)	33.7%	43.5%
Completely taken with sport consumption	22(23.9)	27(29.3)	22(23.9)	14(15.2)	7(7.6)	22.8%	53.2%
DuCov							
Life centers around the consumption of sport.	18(19.6)	24(26.1)	27(29.3)	12(13.0)	11(12.0)	25%	45.7%
Thinking about sport all the time.	23(25.0)	23(25.0)	24(26.1)	12(13.0)	10(10.9)	23.9%	50%
Difficult to stop watching, reading, or talking about sport.	21(22.8)	26(28.3)	30(32.6)	6(6.5)	9(9.8)	16.3%	51.1%
Urge to consume sport is strong.	22(23.9)	26(28.3)	17(18.5)	15(16.3)	12(13.0)	29.3%	52.2%
Consuming sport is something I cannot live without.	23(25.0)	22(23.9)	17(18.5)	17(18.5)	13(14.1)	32.6%	48.9%
Completely taken with sport consumption	23(25.0)	24(26.1)	22(23.9)	10(10.9)	13(14.1)	25.%	51.1%
AfCov							
Life centers around the consumption of sport.	19(20.7)	22(23.9)	24(26.1)	18(19.6)	9(9.8)	29.4%	44.6%
Thinking about sport all the time.	17(18.5)	27(29.3)	21(22.8)	15(16.3)	12(13.0)	29.3%	47.8%
Difficult to stop watching, reading, or talking about sport.	18(19.6)	28(30.4)	22(23.9)	14(15.2)	10(10.9)	26.1%	50%
Urge to consume sport is strong.	16(17.4)	27(29.3)	20(21.7)	20(21.7)	9(9.8)	46.7%	26%
Consuming sport is something I cannot live without.	17(18.5)	26(28.3)	25(27.2)	14(15.2)	10(10.9)	26.1%	46.8%
Completely taken with sport consumption	19(20.7)	30(32.6)	21(22.8)	14(15.2)	8(8.7)	23.9%	53.3%

Source: Collected Data (2023). Data are given as number of respondents and frequency (%).

Prolonged sedentary behavior, particularly extended sitting during work hours, poses significant health risks. Supplementary Table 2 presents data from the England-based survey on several behavioral health indicators, including workplace sitting duration. Prior to the Covid-19 pandemic (BeCov), the highest proportions of respondents reported sitting for less than 2 hours or between 4–6 hours per day. However, during the Covid-19 lockdown period (DuCov), both the percentage of individuals reporting increased sitting time and total work hours rose, with 35.9% indicating 6–8 hours of daily sitting. In the post-Covid period (AfCov), this figure decreased slightly among participants in the same sitting category.

Taking regular breaks from prolonged sitting is widely recommended to reduce the risk of developing sedentary lifestyle-related health conditions. According to Supplementary Table 2, across all three periods, respondents reported taking breaks from sitting at least once or twice during working hours. However, the frequency of such breaks was slightly lower during the DuCov period compared to BeCov and AfCov. The data also reveal a marked increase in daily screen time during the DuCov period, with 47.8% of respondents reporting more than five hours of screen use, compared to 26.1% in BeCov and 18.5% in AfCov. Sleep patterns showed a modest improvement during DuCov, with a higher percentage of participants reporting more than eight hours of sleep compared to the other two periods. Furthermore, most respondents reported good sleep quality across all three timeframes, with slightly better outcomes during the DuCov period. Regarding mental health, the results suggest relatively low levels of stress and anxiety throughout the three periods, with the lowest levels observed during DuCov. Smoking behavior also remained consistently low, with most respondents identifying as non-smokers in all periods. Only a small proportion reported smoking between 1-3, 4-6, 7-9, or more than 10 cigarettes per day. Alcohol consumption trends showed that traditional weekend drinking habits remained relatively stable between BeCov and AfCov. However, daily alcohol consumption increased during the DuCov period, indicating a potential behavioral shift in response to lockdown conditions, as detailed in Supplementary Table 2.

The tests have shown differences in the England survey in comparison of the 3 periods among the variables as presented in Table 32. The results showed difference on moderate or vigorous intensity aerobics activities of the respondents BeCov compared to DuCov period. It also went further to identify the differences between the two periods in which the respondents engaged more or less in vigorous-intensity exercise, and the result showed that the respondents in England participated more in this activity DuCov than BeCov period as evidenced by the mean rankings. Similarly, for daily screen time watching TV, social media, and video games engaged by the respondents in the England survey indicated significant differences among the periods when comparing BeCov & DuCov period with the result further showing more engagement in the activity DuCov period than BeCov.

Table 32. Wilcoxon signed rank test of significance (p-value) results on individual country comparisons on situations BeCov, DuCov, and AfCov England-based survey.

England	**BD** (pvalue)	**B** (rank)	**D** (rank)	**Ties**	**DA** (pvalue)	**D** (rank)	**A** (rank)	**Ties**	**BA** (pvalue)	**B** (rank)	**A** (rank)	**Ties**
30 min. moderate or vigorous intensity aerobic PA.	0.003*	13	30	49	0.081	29	22	41	0.345	19	27	46
leisure-related activities (grocery shopping, walking in park, gardening)?	0.427	33	21	38	0.074	18	30	44	0.383	20	27	45
life centers around the consumption of sport.	0.225	25	19	48	0.1814	21	20	51	0.481	27	20	45
Thinking about sport all the time.	0.833	20	18	54	0.073	14	23	55	0.249	17	20	55
Difficult to stop watching, reading, or talking about sport.	0.872	22	18	52	0.131	13	22	57	0.188	15	23	54
Urge to consume sport is strong.	0.486	16	20	56	0.977	13	21	58	0.457	11	25	56
Consuming sport is something I cannot live without.	0.466	18	19	55	0.977	20	20	52	0.457	19	19	54
Completely taken with sport consumption	0.239	13	21	58	0.690	20	17	55	0.451	11	18	63
Daily sitting time at work?	0.538	23	25	44	0.214	18	28	46	0.072	15	25	52
Break from sitting	0.712	22	22	48	0.943	22	22	48	0.705	26	25072	41
Screen time spent daily watching TV, social media, mobile phones, and video games?	< 0.001*	7	38	47	< 0.001*	39	5	48	0.564	21	21	50
Number of respondents:				**92**				**92**				**92**

BD: Before Covid-19 period versus During Covid-19 period.
DA: During Covid-19 period versus After Covid-19 period.
BA: Before Covid-19 period versus After Covid-19 period.
B: Before Covid-19 period.
D: During Covid-19 period.
A: After Covid-19 period.
Ties: Interaction point. *Source: Collected Data 2023*

4.2.1.3. Nigerian survey results

Physical activity is recommended almost everyday to keep one's physical fitness in check. Although that has not been achieved by the Nigerian respondents as shown in Table 33, however, 33.3% and 21.9% admitted being engaged in PA 1-2 times and 3-4 times in a week before Covid-19 (BeCov) period, respectively. Although the proportion of individuals engaging in physical activity 1-2 times per week remained essentially constant during Covid-19 (DuCov) compared to BeCov, a slight decline was observed in the percentage of those participating 3-4 times per week. In contrast, after Covid-19 (AfCov) showed an increase in participation among those exercising 1-2 times per week, rising to 39%. A similar trend was observed in leisure-related activities, participation at a frequency of 1-2 times per week was highest during BeCov at 40%, followed by a slight decrease to 37.1% during DuCov, and a further decline to 33.3% in the AfCov period.

Table 33. Descriptive frequency count results for Nigerian survey BeCov, DuCov, & AfCov period (routine scales variables).

Items	Not routinely	1-2 times a week	3-4 times a week	5-6 times a week	Almost daily
BeCov					
30 min. moderate or vigorous intensity PA.	33(31.4)	35(33.3)	23(21.9)	-(-)	14(13.3)
Leisure-related activities	32(30.5)	42(40.0)	15(14.3)	-(-)	16(15.2)
DuCov					
30 min. moderate or vigorous intensity PA.	37(35.2)	35(33.3)	16(15.2)	5(4.8)	12(11.4)
Leisure-related activities	39(37.1)	39(37.1)	15(14.3)	3(2.9)	9(8.6)
AfCov					
30 min. moderate or vigorous intensity PA.	30(28.6)	41(39.0)	15(14.3)	2(1.9)	17(16.2)
Leisure-related activities	29(27.6)	35(33.3)	19(18.1)	2(1.9)	20(19.0)

Source: Collected Data (2023). Data are given as number of respondents and frequency (%).

Table 34 presents the response ratings for individual items from the Nigerian survey across the BeCov, DuCov, and AfCov periods. Overall, the Likert scale items were predominantly met with disapproval by respondents, with a portion indicating neutral positions. Similar to findings from the England-based survey, the data suggest that sport consumption received generally poor ratings in Nigeria, indicating limited engagement prior to the Covid-19 pandemic. This already low level of engagement appeared to decline further during the DuCov period. Although disapproval remained more prevalent than approval in the AfCov period, the gap between the two narrowed, suggesting a modest improvement in respondents' attitudes toward sport consumption following the pandemic.

Table 34. Descriptive frequency count results for Nigerian survey BeCov, DuCov, & AfCov period (Likert scales variables).

Items	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Approve	Dis-approve
BeCov							
Life centers around the consumption of sport.	12(11.4)	29(27.6)	36(34.3)	18(17.1)	10(9.5)	26.6%	39%
Thinking about sport all the time.	21(20.0)	29(27.6)	21(20.0)	26(24.8)	8(7.6)	32.4%	47.6%
Difficult to stop watching, reading, or talking about sport.	20(19.0)	38(36.2)	18(17.1)	18(17.1)	11(10.5)	27.6%	55.2%
Urge to consume sport is strong.	14(13.3)	34(32.4)	26(24.8)	21(20.0)	10(9.5)	29.5%	45.7%
Consuming sport is something I cannot live without.	14(13.3)	37(35.2)	22(21.0)	16(15.2)	16(15.2)	30.4%	48.5%
Completely taken with sport consumption	15(14.3)	42(40.0)	19(18.1)	20(19.0)	9(8.6)	27.6%	54.3%
DuCov							
Life centers around the consumption of sport.	11(10.5)	40(38.1)	28(26.7)	16(15.2)	10(9.5)	24.7%	48.6%
Thinking about sport all the time.	17(16.2)	42(40.0)	16(15.2)	24(22.9)	6(5.7)	28.6%	56.2%
Difficult to stop watching, reading, or talking about sport.	13(12.4)	33(31.4)	23(21.9)	28(26.7)	8(7.6)	16.3%	34.3%
Urge to consume sport is strong.	11(10.5)	33(31.4)	29(27.6)	22(21.0)	10(9.5)	30.5%	41.9%
Consuming sport is something I cannot live without.	12(11.4)	37(35.2)	29(27.6)	20(19.0)	7(6.7)	25.7%	46.6%
Completely taken with sport consumption	12(11.4)	43(41.0)	26(24.8)	14(13.3)	10(9.5)	22.8%	52.4%
AfCov							
Life centers around the consumption of sport.	13(12.4)	28(26.7)	36(34.3)	20(19.0)	8(7.6)	26.6%	39.1%
Thinking about sport all the time.	11(10.5)	25(23.8)	36(34.3)	21(20.0)	12(11.4)	31.4%	34.3%
Difficult to stop watching, reading, or talking about sport.	7(6.7)	35(33.3)	37(35.2)	18(17.2)	8(7.6)	24.8%	40%
Urge to consume sport is strong.	12(11.4)	28(26.7)	35(33.3)	22(21.0)	8(7.6)	28.6%	38.1%
Consuming sport is something I cannot live without.	12(11.4)	29(27.6)	32(30.5)	15(14.3)	17(16.2)	30.5%	39%
Completely taken with sport consumption	11(10.5)	35(33.3)	26(24.8)	222(1.0)	11(10.5)	31.5%	43.8%

Source: Collected Data (2023). Data are given as number of respondents and frequency (%).

Supplementary Table 3 presents findings related to additional behavioral variables from the Nigerian survey across the BeCov, DuCov, and AfCov periods. In terms of workplace sedentary behavior, the proportion of respondents reporting 4-6 hours of daily sitting time showed a slight increase during the DuCov period compared to BeCov, with a further marginal rise observed in the AfCov period. The survey results also show that 42.9% of respondents in the BeCov period reported taking sitting breaks 1-2 times during working hours. This figure dropped slightly to 36.2% during DuCov and rose again to 40% in the AfCov period. Screen time – defined as time spent watching television, using social media, playing video games, or using mobile phones – was notably higher during DuCov, with 41% of respondents reporting more than five hours of daily screen exposure. This represents a significant increase compared to 21.9% in the BeCov period and 21% in the AfCov period. Regarding sleep duration, which is ideally recommended at 7-9 hours per day, the DuCov period showed improved sleep patterns among respondents. When combining the percentages of those who reported 6-8 hours and more than 8 hours of daily sleep, DuCov results were more favorable than those from BeCov and AfCov. In terms of sleep quality, 42.9% of respondents during DuCov rated their sleep as excellent, compared to 19% in BeCov and 25.7% in AfCov. Stress and anxiety levels were relatively low throughout all three periods, with 51.4% of respondents during DuCov reporting minimal stress or anxiety, compared to 44.8% in BeCov and 38.1% in AfCov. Smoking habits remained consistently low across all three periods. Most respondents reported not smoking, namely, 91.4% during BeCov and 87.6% during DuCov.

The Nigerian survey results in Table 35 have shown significant differences in leisure activities DuCov & AfCov period comparison indicating that the respondents engaged in leisure activities more AfCov than DuCov period. Similarly, on thinking about sport all the time DuCov & AfCov period comparison showed that they think about sport more AfCov than DuCov period. It showed that the respondents think more about sport AfCov period than BeCov period. When the respondents were asked if consuming sport was something they could not live without, significant difference was found when comparing DuCov & AfCov period and further identified that they could not live without sport consumption AfCov than DuCov period.

While the respondents' daily sitting time at work was significant for periods comparisons BeCov & DuCov, DuCov & AfCov, respectively, and explained that their daily sitting at work decreased DuCov period compared to BeCov period and simultaneously more sitting time at work AfCov period than DuCov period. Screen time was assumed to vary between periods, it was found significantly different BeCov & DuCov period comparisons, DuCov & AfCov period and further explained by the mean ranking that the screen time increased DuCov period compared to BeCov period and similarly increased more DuCov than AfCov period.

Table 35. Wilcoxon signed rank test of significance (p-value) results on individual country comparisons on situations BeCov, DuCov, and AfCov Nigerian survey.

Nigeria	BD (pvalue)	B (rank)	D (rank)	Ties	DA (pvalue)	D (rank)	A (rank)	Ties	BA (pvalue)	B (rank)	A (rank)	Ties
30 min. moderate or vigorous intensity aerobic PA.	0.813	27	25	53	0.333	25	31	49	0.487	27	32	46
leisure-related activities (grocery shopping, walking in park, gardening)?	0.166	31	24	50	0.003*	16	38	51	0.121	22	32	51
life centers around the consumption of sport.	0.385	31	27	47	0.470	29	33	43	0.902	31	30	44
Thinking about sport all the time.	0.353	35	25	45	0.001*	13	38	54	0.027*	23	38	44
Difficult to stop watching, reading, or talking about sport.	0.067	23	35	47	0.870	23	24	58	0.095	22	33	50
Urge to consume sport is strong.	0.554	20	26	59	0.929	26	22	57	0.459	25	38	42
Consuming sport is something I cannot live without.	0.471	26	22	57	0.036*	15	24	66	0.192	22	31	52
Completely taken with sport consumption	0.814	27	32	46	0.067	13	26	66	0.072	21	33	51
Daily sitting time at work?	< 0.001*	49	17	39	< 0.001*	19	47	39	0.782	23	25	57
Break from sitting	0.782	24	21	60	0.687	22	30	53	0.373	15	20	70
Screen time spent daily watching TV, social media, mobile phones, and video games?	< 0.001*	11	40	54	< 0.001*	39	10	56	0.495	23	17	65
Number of respondents:		**105**				**105**				**105**		

BD: Before Covid-19 period versus During Covid-19 period.
DA: During Covid-19 period versus After Covid-19 period.
BA: Before Covid-19 period versus After Covid-19 period.
B: Before Covid-19 period.
D: During Covid-19 period.
A: After Covid-19 period.
Ties: Interaction point. *Source: Collected Data 2023*

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4.2.2. Similarities and differences between the 3 countries

Considering the results from the three independent surveys we found striking similarities between respondents' daily screen time. The results of the three surveys all showed significantly increased daily screen time during Covid-19 (DuCov) period than in other periods. While this was expected since people were restricted from movement, their daily screen time was expected to rise especially when considering the targeted population's age that took part in the surveys and with growing digitization and easy access to technology. Where this development of increased daily screen time could have provided relief for the people, especially during the lockdown period, it was a great concern for their active well-being for fear of a sedentary lifestyle.

The differences observed from the results between the three countries, in England, the respondents were able to achieve moderate or vigorous intensity exercise DuCov than BeCov period whereas the other two countries did not record any significant result. Additionally, on the daily sitting time at work, while England and Hungary did not show any change, the Nigerian survey differed, however. Their daily sitting time at work was higher in both BeCov and AfCov periods when compared to DuCov period. This might be connected to the familiarity with the traditional working culture of physical presence in various work environments compared to both England and Hungary where the new concept of home office became prevalent during the pandemic period.

In Table 36 we compared the three countries to get the reactions from the respondents of the paired countries. The results showed a significant difference in moderate or vigorous intensity aerobic PA from England & Hungary suggesting that the respondents in England engaged more in moderate or vigorous intensity exercise than their Hungarian counterparts BeCov period. Similarly, significant results on leisure-related activities between England and Hungary as well as between England and Nigeria showed that again the respondents in England engaged more than Hungarians and the Nigerians on these activities BeCov period. For the daily sitting time at work, the comparison between England and Hungary and between England and Nigerian respondents showed significant differences indicating that the Hungarians' and the Nigerians' sitting time at work BeCov period was more than that of the respondents in England.

The result in Table 36 also shows comparisons DuCov period among the countries. Significant difference in moderate or vigorous intensity aerobic PA between England & Hungary and between England and Nigeria were found, presenting that the England respondents were participating in aerobic activities DuCov period more than the Hungarians and the Nigerians. Additionally, the same pattern with leisure-related activities were found between the countries, namely, the respondents in England were more physically engaged DuCov period than those in Hungary and Nigeria on their leisure activities. Furthermore, Hungarians had significant more daily sitting time at work DuCov period than the Nigerians.

Similarly, on the AfCov period we found significant changes between Hungary and Nigeria compared together as well as England and Nigeria on moderate or vigorous intensity aerobic PA and the ranking proceeded to explain that both Hungary and England are more engaged than Nigeria AfCov period or in the current situation. Also, between England and Nigeria on leisure-related activities a significant difference was found, namely the English respondents are more engaged in leisure-related activities than the Nigerians AfCov period. The respondents from England and Hungary were asked if their lives center around sport consumption and significant difference was found which indicated that the Hungarians believe that their lives revolve around sport consumption AfCov period more than the respondents in England. Also, when asked if consuming sport is something they cannot live without, the responses provided significant differences between the two countries and again the Hungarians cannot do without engaging in this activity more than the respondents in England AfCov. Furthermore, on completely taken with sport consumption sought that the Hungarians are more taken with sport consumption AfCov period than the England and the Nigerian respondents. Finally, on daily screen time, a significant difference was observed between Hungary and Nigeria, the Hungarians had more screen time on television, mobile phones, social media, and video games AfCov period than the Nigerians.

Table 36. Countries comparisons on situations BeCov, DuCov, and AfCov period.

Constructs	Periods	EH (p)	E (rank)	H (rank)	Ties	HN (p)	H (rank)	N (rank)	Ties	EN (p)	E (rank)	N (rank)	Ties
30 min. moderate or vigorous intensity aerobic PA.	**B**	0.007*	51	24	17	0.446	43	39	23	0.174	47	26	19
	D	<0.001*	53	18	21	0.350	35	39	31	<0.001*	50	20	22
	A	0.565	30	35	27	0.018*	52	25	28	0.049*	42	25	25
leisure-related activities (grocery shopping, walking in park, gardening)?	**B**	0.047*	40	28	24	0.162	53	27	25	0.002*	51	21	20
	D	0.004*	48	22	22	0.138	46	30	29	<0.001*	53	18	21
	A	0.565	37	32	22	0.078	56	26	23	0.007*	44	24	24
life centers around the consumption of sport.	**B**	0.858	30	36	26	0.483	46	38	21	1.000	35	35	22
	D	0.282	29	30	33	0.571	37	42	26	0.987	34	33	25
	A	0.043*	30	43	19	0.151	44	34	27	0.863	31	40	21
Thinking about sport all the time.	**B**	0.341	25	38	29	0.257	46	34	25	0.611	34	40	18
	D	0.480	28	36	28	0.295	41	34	30	0.807	34	35	23
	A	0.515	34	44	14	0.843	37	41	27	0.156	28	37	27
Difficult to stop watching, reading, or talking about sport.	**B**	0.906	33	44	15	0.488	42	43	20	0.808	39	36	17
	D	0.599	30	35	27	0.136	35	47	23	0.062	31	45	16
	A	0.433	29	42	21	0.906	39	38	28	0.306	26	42	24
Urge to consume sport is strong.	**B**	0.413	31	37	24	0.889	40	40	25	0.418	37	41	14
	D	0.737	33	38	21	0.258	36	43	26	0.348	32	41	19
	A	0.055	29	45	18	0.076	47	34	24	0.861	30	37	25
Consuming sport is something I cannot live without.	**B**	0.951	34	32	26	0.933	42	39	24	0.962	34	33	25
	D	0.968	36	40	16	0.705	40	35	30	0.851	33	37	22
	A	0.010*	24	48	20	0.149	43	32	30	0.369	34	41	17
Completely taken with sport consumption	**B**	0.105	30	44	18	0.138	47	32	26	0.521	30	41	21
	D	0.870	31	43	18	0.824	37	39	29	0.949	30	34	28
	A	0.001*	20	52	20	0.039*	46	32	27	0.194	26	42	24

Daily sitting time at work?	**B**	0.009*	25	44	23	0.907	47	37	21	0.003*	23	45	24
	D	0.361	31	36	25	0.013*	49	27	29	0.188	40	29	23
	A	0.267	31	40	21	0.567	41	40	24	0.179	32	43	17
Break from sitting	**B**	0.178	37	31	24	0.513	32	36	37	0.156	39	31	22
	D	0.118	42	33	17	0.310	36	35	34	0.213	45	35	12
	A	0.311	35	32	25	0.334	38	39	28	0.561	34	30	28
Screen time spent daily watching TV, social media, mobile phones, and video games?	**B**	0.561	29	33	30	0.108	41	30	34	0.073	40	26	26
	D	0.930	28	25	39	0.202	36	28	41	0.116	33	26	33
	A	0.441	29	33	30	0.030*	43	29	33	0.088	40	25	27
Number of respondents:					**92**				**105**				**92**

EH: England compared to Hungary**, HN:** Hungary compared to Nigeria, **EN:** England compared to Nigeria.
B: Before Covid-19 period
D: During Covid-19 period
A: After Covid-19 period
E: England
H: Hungary
N: Nigeria
Ties: Interaction point. *Source: Collected Data 2023.*

4.2.3. Similarities and differences between sport fans and the general population

While we analyzed the data collected from the general population, we decided to also analyze the segment of the data collected from sport fans only to understand how deeply the sport fans were affected by the imposed Covid-19 closure of sports and other activities. The aim was to check the similarities and dissimilarities of the two sample populations. The England sport fans' results showed that after Covid-19 (AfCov) period, the fans' urge to consume sport was strong compared to during Covid-19 (DuCov) period. Whereas in the general England-based study population, the result did not show any significant difference in this construct. This was to say that the sport fans may have enjoyed the freedom of reopening sport activities after the pandemic lockdown and their desire to consume sport is more than DuCov period. The England sport fans' daily sitting time at work increased AfCov compared to the other two periods while in the general population, no significant changes or differences were seen. This may be attributed to the normalization of working hours and physical presence at workplaces after the pandemic. There were similarities found in daily screen time for both sport fans and the general population. They all recorded an increase in screen time activities DuCov period compared to other periods. In contrast, when comparing the results from the Nigerian sport fans with the general Nigerian population, we identified many similarities in daily sitting time at work, daily screen time, leisure-related activities.

4.2.4. Gender comparison of the 3 countries' survey results

In Table 37 the aim was to compare the two sexes from all the countries to obtain an insight into their physical activity and sport consumption during Covid-19 (DuCov) and after Covid-19 (AfCov) periods. In the England survey, the moderate to vigorous intensity exercise showed significant difference among the female respondents comparing the two periods *i.e*. DuCov and AfCov. The result went ahead to describe that the female respondents of the England study participated more in exercise DuCov period than AfCov. However, their male counterparts in the England survey did not show any significant differences in this activity DuCov period *vs*. AfCov.

On daily sitting time at work, the male respondents showed significant differences DuCov period than AfCov. It further suggested that the male participants engaged in daily sitting at work more AfCov period than DuCov period. In contrast, the female respondents in the England-based survey did not indicate any significant difference between the two periods.

Similarly, on daily screen time on TV, video games, phones, and social media, the male respondents' results showed significant differences among the two periods *i.e.* between DuCov and AfCov. The participants engaged or spent more time with their mobile gadgets DuCov lockdown than AfCov period.

In the Hungarian survey, the results of the female respondents on difficulties to stop watching, reading, or talking about sport, urge to consume sport, consuming sport as something they cannot live without all indicated significant differences DuCov compared with AfCov period. The results explained further that the female respondents of the Hungarian survey had these feelings, attitudes, and urges more AfCov period than DuCov. Interestingly, none of these behaviors were observed from their male counterpart.

For the Nigerian gender analysis, leisure-related activities, thinking about sport, sport consumption inevitabilities, and completely taken with sport consumption, were all male-dominated as significant differences were found in all these activities and thoughts. The results were extended to describe that these changes were witnessed more AfCov compared to DuCov period. Whereby, the female respondents' results in the Nigerian survey simply did not record any significant differences in these aspects.

Table 37. Gender comparisons DuCov, and AfCov England, Hungarian, and Nigerian surveys.

Constructs	England		Hungary		Nigeria	
	M	F	M	F	M	F
30 min. moderate or vigorous intensity PA.	0.792	0.042*	< 0.001*	0.001*	0.779	0.226
Leisure-related activities (grocery shopping, walking in park, gardening)?	0.270	0.139	< 0.001*	0.009*	0.016*	0.067
life centers around the consumption of sport.	0.450	0.672	0.035*	0.002*	0.445	0.862
Thinking about sport all the time.	0.118	0.403	0.100	0.101	0.004*	0.061
Difficult to stop watching, reading, or talking about sport.	0.110	0.623	0.079	0.039*	0.972	0.837
Urge to consume sport is strong.	0.064	0.702	0.094	< 0.001*	0.753	0.500
Consuming sport is something I cannot live without.	0.518	0.458	0.210	< 0.001*	0.050*	0.453
Completely taken with sport consumption	1.000	0.572	0.002*	< 0.001*	0.018*	0.691
Daily sitting time at work?	0.002*	0.189	0.920	0.130	0.015*	0.004*
Break from sitting	0.906	0.985	0.465	0.538	0.892	0.620
Screen time spent daily watching TV, social media, mobile phones, and video games?	0.003*	< 0.001*	< 0.001*	0.016*	0.001*	0.007*

M: male; **F:** female; * - significant difference

Source: Collected Data (2023).

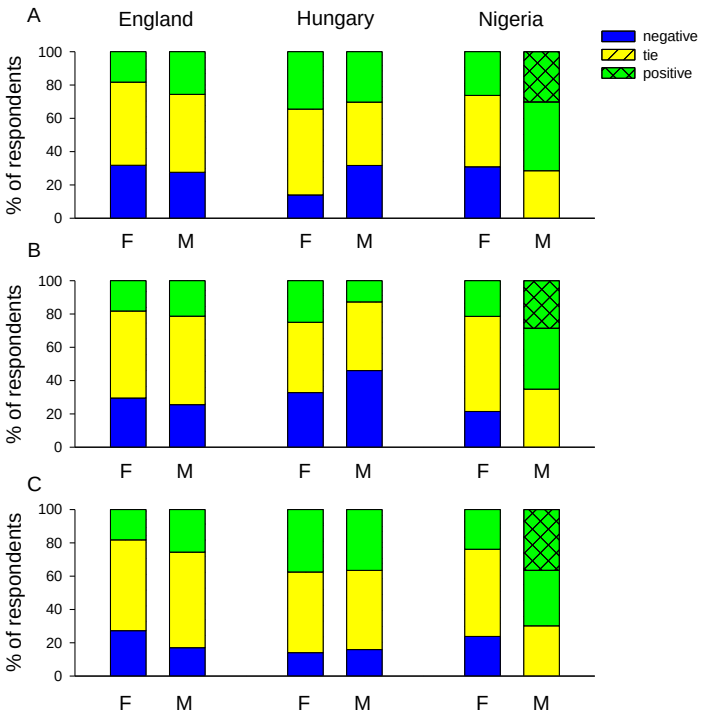

Figure 12. How Sport Physical Activity has changed in the three countries in the three periods (BeCov, DuCov, and AfCov) among sexes

(A) Before Covid-19 (BeCov) compared to after Covid-19 (AfCov), (B) BeCov compared to during Covid-19 (DuCov), and (C) DuCov compared to AfCov for females (F) and males (M), respectively. "Negative" refers to the consumption being greater in the former period than in the latter, while "positive" refers to the opposite trend, i.e., consumption being greater in the latter period than in the former. "Tie" signifies no difference between the two periods.

For females, significant differences were only found in the Hungarian survey, where sports consumption was greater after Covid-19 than either before ($p<0.017$) or during ($p<0.002$) the pandemic. Interestingly, sports consumption did not prove to be significantly different between BeCov and DuCov ($p>0.3$), most likely due to the large proportion of inactive individuals in the BeCov period. For males, again only the Hungarian survey showed significant differences. However, in this case, BeCov and AfCov did not prove to be significantly different ($p>0.6$), while DuCov consumption was significantly less than either BeCov ($p<0.001$) or AfCov ($p<0.035$).

4.2.5. Discussions

This study examined the engagement in physical activity in three selected countries: England, Hungary, and Nigeria. These countries represent three different economic statuses in relation to the Covid-19 epidemic and consequent restrictions. We compared periods before Covid-19 (BeCov), during Covid-19 (DuCov), and after Covid-19 (AfCov) both within and in between the countries. We also considered how sport fans perceive these periods and looked for differences between the responses of male and female respondents.

The respondents from all three surveys, namely England, Hungary, and Nigeria, had or shared similar gender and age distributions (Table 21 and Table 22 respectively) and both England and Hungarian participants sought benefits in physical activity engagement to keep themselves fit and healthy even in times of crisis as shown in (Table 25).

We hypothesized significant changes or decline in vigorous intensity Physical Activity (**H1**) DuCov while an increase AfCov period. The study in England identified the differences between DuCov & BeCov period and supported our hypothesis indicating a decline DuCov compared to BeCov and this is in line with a number of studies (Castañeda-Babarro et al., 2020; Hermassi et al., 2021; Elven et al., 2022; Wang et al., 2023; Macedonia et al., 2024). However, our findings did not show an increase in Physical Activity AfCov period as most British people pledged, however this deviates from those of other similar studies that showed an increase in physical activity AfCov compared to DuCov (Hurter et al., 2022; Wang et al., 2023). While the Hungarian survey did not show any significant differences between DuCov & BeCov period, an increased Physical Activity AfCov period was found due to more access to fitness centers (Balatoni & Adamu, 2023). While we expected these variations to occur, it further explains how damaging the Covid-19 period was to the physical well-being of people as a significant number of the respondents admitted to gaining weight (Table 24). Interestingly the Nigerian survey however did not show any significant changes in physical activity between these three periods.

Our findings for leisure-related activities in the Hungarian survey supported our hypotheses (**H1**) and signified changes among the periods BeCov, DuCov, and AfCov with the expected decline in leisure-related activities DuCov compared to the other periods. Similarly, the Nigerian survey demonstrated an increase in leisure activities AfCov period in comparison to DuCov. These findings are in agreement with other related

studies on leisure-related activities such as housekeeping and leisure-related travels which were found to be decreased DuCov and increased AfCov (Gurgel et al., 2024; Seiffer et al., 2024; Ecke et al., 2025; Wang & De Vos 2025).

We adapted the six constructs from Aiken et al. (2018) to evaluate sport consumption as thinking about sport all the time, life centers around sport consumption, difficulty to stop watching, reading, or talking about sport, urge to consume sport, cannot live without sport, and completely taken with sport consumption. In Hungary, we predicted (**H2**) less sport consumption DuCov as compared to AfCov and BeCov periods based on the six constructs. The results supported all six on either of the one or two periods' combinations. Similarly, the Nigerian survey on sport consumption showed that it was smaller DuCov than BeCov and AfCov. However, these constructs were developed long before the event of Covid-19 and there is no evidence of a study conducted to seek changes in sport consumption BeCov period, DuCov period, and AfCov, therefore our study is the first to adapt it in this context.

We also predicted (**H3**) a decrease in sitting time at work DuCov and an increase afterward and anticipated that it was more than BeCov. The Nigerian study proved our hypothesis as it has shown a significant decrease in sitting time as the Covid-19 period and lockdown set in. This could be due to the fact that most organizations, offices, and other places of work were all closed from daily operations to comply with Government directives on sit-at-home orders. However, this finding part ways with the study of Dillon et al. (2021) on occupational sitting by home-based office workers DuCov as high percentage of agreement of self-reported sedentary behaviour at group level was sought. Surprisingly, surveys in England and Hungary, however, did not prove any significant differences in sitting time during the three periods.

Our hypothesis on increased screen time (**H6**) DuCov compared to BeCov and AfCov periods was also validated as surveys from all three countries supported our prediction. Due to prolonged sitting at home, people were left with limited options but to spend more time in front of screens of televisions, mobile phones, social media, and videogames to reduce the burden of staying isolated. The increased sitting time and screen time contributed to a more sedentary lifestyle DuCov period compared to BeCov and AfCov, being significant from all categories such as sex, sport fans, and the combination of all countries. These results are in line with studies conducted previously (Romero-Blanco et al., 2020; Nathan et al., 2021; Bielec & Omelan, 2022).

We attempted to check the sports fans' addiction to sport consumption DuCov period and hypothesized (**H4**) a decline in these activities as compared to the other two periods. It appears that the sport fans in Nigeria think more about sport consumption AfCov than DuCov and, similarly, the urge of the fans in England to consume sport was stronger AfCov period than DuCov. However, Hungarian sport fans showed more sensitivity to the situation as all constructs of sport consumption such as life centers around sport consumption, thinking about sport, difficulty to stop watching/reading/or talking/ about sport, urge to consume sport, I cannot live without sport, and completely taken with sport consumption all received maximum attention and results have shown significant differences supporting our hypotheses (**H4**).

When we compared the countries (Table 36) to identify which has more (or less) PA engagements, leisure activities, sport consumption, daily sitting time at work, and screen time BeCov, DuCov, and AfCov period, our hypothesis (**H7**) was supported because we found that for the vigorous intensity aerobic PA the respondents in England engaged more than those in Hungary BeCov period. This could be expected as the report made by the UK Department of Business and Trade (2023) recognized the importance of grassroots sport and Physical Activity and the huge contribution it gives to the UK's economy and investments made to encourage this sector. The same was found for leisure-related activities before Covid-19 comparing England with both Hungary and Nigeria. The daily sitting time at work BeCov also supported our hypothesis (**H7**) with England being the highest. This could be attributed to the productivity level of the UK economy and the labor demands compared to both Hungary and Nigeria.

Another result comparing Hungary and Nigeria (Table 36) revealed that the Hungarians had more sitting time at work DuCov than the Nigerians. This was expected because European countries were among the first to adopt a work-from-home approach to their employees to reduce the burden of inefficiency or total blackout of economic activities by various organizations. However, Nigerian companies up until AfCov were not fully familiar with the work-from-home concept, therefore their sitting time at work could be low due to increased business closures at their workplaces DuCov. We also thought that the enthusiasm of the British people towards sport consumption would validate our expectations, however, the findings on sport consumption as both Nigerians and Hungarians believe that they are completely taken with sport consumption more than the people in England.

Consistent with our preliminary expectation (**H6**), time spent in front of a screen - which includes watching TV, texting on a mobile phone, playing a video game, and communicating with friends via social media - differed significantly between DuCov and AfCov in all three countries, regardless of gender, namely the former was significantly more than the latter (Table 37). However, for England women, vigorous exercise under DuCov significantly exceeded that of AfCov. A similar finding cannot be drawn for England men and Nigerian women and men. On the other hand, when comparing the three periods, there was no change in overall sports consumption in either the England-based or Nigerian study for either men or women (**H5**). In contrast, significant differences in overall sport consumption were observed in the Hungarian sample (Figure12). These observations are likely to be due to country-specific differences, with England having significant levels of home sport and access to sport facilities, while in Hungary only community sport was prevalent, which was closed during the pandemic, and in Nigeria almost exclusively outdoor sports were available.

5. CONCLUSIONS AND RECOMMENDATIONS

This study can be seen as cross-continental and multi-country in nature. It also provided us with a comprehensive and detailed understanding of the phenomenon by analyzing three occasions or periods in three different countries. It would also fill the existing literature gap as it would be the first of its kind to be conducted in Nigeria (see the review by Adamu & Balatoni, 2023) and serves as a study model for Africa. While some related studies were conducted but those did not examine the situation beyond Covid-19 period. Although a related study by McCarthy, Potts, and Fisher (2021) examined PA beyond Covid-19, our methodological approach was distinct. Our study provided insight into the current situation beyond the Covid-19 period to contribute to new findings. We are among the first to adapt these scales of sport consumption used in the surveys to understand the predicament of sport consumers during Covid-19 (DuCov) lockdown due to complete blackout of sports activities.

To conclude, there was a decline in Physical Activity DuCov period compared to before Covid-19 (BeCov) in England. In Hungary, no significant difference in PA in the BeCov period compared to DuCov but an increase in PA was found after Covid-19 (AfCov). No significant changes in PA were detected in the Nigerian survey when comparing all three periods. There was also a decline in leisure-related activities DuCov in Hungary compared to the other periods but there was an increase AfCov in the Nigerian survey compared to DuCov.

From the above, it can be concluded that **our first hypothesis (H1)** was only confirmed for England, only partially confirmed for Hungary and had to be rejected for Nigeria and this led to the formulation of new and novel results #3.

Table 38. Evaluation of Hypothesis 1

#	Hypothesis	Verification
H1	There are changes and declines in Physical Activity and leisure-related activities during Covid-19 which increased after Covid-19 period.	It was only confirmed for England.

It is also concluded that sport consumption was found to be reduced during the DuCov period in our Hungarian survey. Similarly, in the Nigerian study, a reduction in sport consumption was observed during DuCov compared to both BeCov and AfCov periods. This led me to conclude that **our second hypothesis (H2)** was confirmed for Hungary and Nigeria, and had to be rejected for England, where there was no change and this led to the formulation of new and novel results #2.

Table 39. Evaluation of Hypothesis 2

#	Hypothesis	Verification
H2	Changes and decline in sport consumption during Covid-19 compared to after Covid-19 and before Covid-19 periods.	It was only confirmed for Hungary and Nigeria.

In the DuCov period, all countries showed a decreasing tendency in sitting time at work and a significant increase in screen time.

Daily sitting time at work was highest in England during the BeCov period. A comparison between Hungary and Nigeria showed that Hungarian participants had more sitting time at work during DuCov than their Nigerian counterparts.

Screen time - which includes watching TV, texting on mobile phones, playing video games and communicating with friends via social media - differed significantly between the DuCov and AfCov periods in all three countries, regardless of gender; specifically, screen time was significantly higher during DuCov than during AfCov.

In view of the trends observed, I consider the **third hypothesis (H3)** and the **sixth hypothesis (H6)** to be confirmed and this led to the formulation of new and novel results #6.

Table 40. Evaluation of Hypotheses 3 and 6

#	Hypothesis	Verification
H3	Variations and reduced daily sitting time at work during Covid-19 period but more sitting time at work before and after Covid-19.	It was confirmed.
H6	Increased daily screen time of individuals during Covid-19 in comparison with before and after Covid-19 periods.	It was confirmed.

Nigerian sports fans reported that they thought more about sports consumption during the AfCov period than during the DuCov period. Similarly, among sports fans in England, the urge to consume sport was stronger in the AfCov period than in the DuCov period. Hungarian sports fans showed greater sensitivity, with all constructs of sports consumption showing significant differences.

It can be concluded that **our fourth hypothesis (H4)** can be considered confirmed and this led to the formulation of new and novel results #5.

Table 41. Evaluation of Hypothesis 4

#	Hypothesis	Verification
H4	For sports fans, the change due to the Covid-19 epidemic would be more pronounced.	It was confirmed.

Sport consumption in the Nigerian and England populations did not change over the study periods. No gender differences were observed. In Hungary, sport consumption decreased significantly during the DuCov period. No significant gender differences were found. A decrease and then an increase were observed for both genders.

Thus our **fifth hypothesis (H5)** can be considered confirmed and this led to the formulation of new and novel results #7.

Table 42. Evaluation of Hypothesis 5

#	Hypothesis	Verification
H5	There is no gender difference in sport consumption in either country.	It was confirmed.

In terms of PA engagements and leisure-related activities, sport consumption the respondents in England engaged more than their Hungarian and Nigerian counterparts BeCov. Respondents in England were also concluded to have more sitting time at work Becov than both Hungary and Nigeria, but Hungary had more than Nigeria DuCov.

Given the results obtained, **I consider** the **seventh hypothesis (H7)** to be confirmed and this led to the formulation of new and novel results #1.

Table 43. Evaluation of Hypothesis 7

#	Hypothesis	Verification
H7	PA, leisure activities, sport consumption, and sitting time at work in the Covid-free periods, *i.e*. before Covid-19 and after Covid-19, would be greater in England as compared to Hungary and Nigeria, while *vice-versa* on screen time. Due to the prolonged Covid-19 measures witnessed in the UK during Covid-19 period, we expected both Hungary and Nigeria to have a better result than England. We also expected Hungary to have a much better results than Nigeria.	It was confirmed.

Based on the foregoing, it can be summairized that there is a need to increase the infrastructure for sports facilities in residential areas in Hungary and Nigeria. In England and Hungary, healthy lifestyle education should be communicated more strongly than at present through government campaigns, starting with children. Corporate social responsibility needs to be further strengthened in all three countries, but it is particularly important to extend it to the area of support for recreational sport. In Nigeria, healthy lifestyle campaign programs should be designed, and policies be made to ensure that all citizens regardless of economic status and education are aware of the basic physical health information needed to keep themselves healthy. Additionally, sport consumption related output and contribution to the UK economy as per our findings runs in billions of pounds and hundreds of thousands of employment it generated, comparing England with both Hungary and Nigeria in this aspect, a clear gap shows because the latter are not near comparable to England in this milestone success that would continue to flourish for decades to come due to the growing popularity of sport and huge investment made. Therefore, it is rather rational to both Hungary and Nigeria to make huge investment commitments in sport by attracting foreign direct investment and making favorable investment policies in their sport industry to ensure its profitability in terms of contribution to GDP, revenue generation, creation of employment, and enhancement of sport tourism. By so doing, the two countries especially Nigeria with its teeming young population and problem of unemployment and underemployment would help in diversifying its economy and provide additional employment opportunities to its citizens.

Although our study has made a breakthrough, there are clear limitations. There was a possibility of inaccurate recollection of events by the respondents because the data of the study was collected at one time for the three periods. There is also a limitation that the

data in Hungary and Nigeria were collected in one city which even though the number of respondents is relatively moderate, they might not be seen as representative for the whole countries and due to sampling technique also adopted in England study, issue of non-representative sampling was obvious. Our study did not consider individual economic cost of reduced sport consumption Ducov period from the sport consumers and sport producer's perspectives did not consider the cultural differences such as behaviours and characteristics of individual country in data interpretations. To sum it up, policies towards social and economic emergency response should be put in place to ensure dealing with any epidemic crisis in the future that may cause situations like that of Covid-19. Due to the nature of our study, we had to target sport consumers such as sport fans and those that are engaging in an organized PA. Therefore, our Hungarian and Nigerian study targeted a fitness center and a fitness club to obtain their feedback or responses. In line with this, we thought their response may not necessarily give a clear picture of the larger community especially if we want to understand wether random people who may not be attending to any organized PA are engaging in physical activity or not due to its importance to human health.

Future studies could use more psychology-inclined constructs to objectively and precisely widen the understanding. Also, since our study focused on finding differences in PA engagements between the three periods, a future study may opt to check how adequate PA engagement was carried out by the participants especially with our findings of weight gain across all countries. The future study should also pay attention to understanding how low sport consumption due to Covid-19 crisis affected individuals' economic status and small businesses that their survival depends on how sport is consumed. It also should expand the study especially in the Hungarian and Nigerian population to target wider and random people to get a clear picture of the phenomenon.

6. NEW AND NOVEL RESULTS OF THE THESIS

The Covid-19 pandemic has had a significant impact on sports consumption and physical activity. This study provides comprehensive analysis from multiple perspectives and reveals the following new and significant findings that contribute to understanding the long-term effects of the pandemic and provide deeper insights into lifestyle changes.

1. Cross-continental and multi-country comparison

The study examined the health behaviors and sports consumption of the populations of three countries with different levels of economic development - Hungary, the United Kingdom, and Nigeria - simultaneously, in three different periods (before Covid - BeCov, during Covid - DuCov, and after Covid - AfCov). No such triple comparison has been made before. The research is particularly groundbreaking in the case of Nigeria, as this type of study has not been conducted there before. The study thus contributes to reducing the literature gap in this area on the African continent and may provide a basis for further research.

2. International comparison of sports consumption in three periods

The research analyzed sports consumption not only during the pandemic, but also in the periods before and after it, revealing differences between local and global trends. Our results show that sports consumption decreased significantly in Hungary and Nigeria during the Covid-19 epidemic, while there was no significant change in England. This offers a new perspective on understanding the resilience of sports consumption and the adaptability of different economic environments.

3. Assessment of changes in physical activity in three different periods

The research highlighted that physical activity decreased in England during Covid-19 period and did not return to previous levels, while in Hungary the pandemic did not cause

a significant decline. In fact, an increase was observed after Covid-19. In Nigeria, physical activity remained stable in all three periods, confirming the resilience of local communities and sports infrastructure.

4. Examining the subjective experience of sports consumption

The study analyzed not only objective sports activities but also the subjective significance of sports consumption ("my life revolves around sports"). In Hungary, the subjective importance of sports declined during and then strengthened again after the Covid-19 pandemic. No change was detected in England and Nigeria, which points to cultural differences and different sports consumption habits.

5. Differences between sports fans and the general population

The study separately analyzed the sports consumption habits of sports fans compared to the general population. The results showed that in England and Nigeria, the desire for sports among sports fans increased significantly after the pandemic, while in Hungary, there was a significant increase in all dimensions of sports consumption. This approach provided a new perspective on understanding the emotional and social background of sports consumption.

6. Daily sitting time and screen time by country and period

One of the key indicators of physical inactivity, daily sitting time, showed different patterns across countries, namely, it decreased in Nigeria during the Covid-19 epidemic, but there was no significant change in Hungary and England. At the same time, screen time increased significantly in all countries during Covid-19, then declined in the post-pandemic period. Time series analysis of these indicators provided a unique international comparison.

7. No gender differences in sports consumption

According to the results of the study, there were no significant differences between men and women in sports consumption in any of the countries surveyed during the three periods. This differs from the findings of several previous studies, which found that women's sports consumption declined more significantly during the pandemic. Our results suggest that the gender distribution of sports consumption remained stable in the countries surveyed during the periods examined.

8. Inclusion of Nigeria as an under-researched region

The research is groundbreaking in Nigeria, as no quantitative study of this kind has been conducted on the effects of Covid-19, especially not in an international comparison. Based on our findings, physical activity in Nigeria has remained stable, with a moderate decline in sports consumption, which contrasts with the more dynamic changes observed in Hungary and England.

SUMMARY

The main objective of the study was to examine how health behaviour changed including sport consumption during Covid-19 (DuCov) in relation to the period before Covid-19 (BeCov) and after Covid-19 (AfCov) in Hungary and other foreign countries (England and Nigeria) with more focus on the future. We then moved to formulate our research questions and specific aims and then formulated our seven hypotheses.

An extensive literature review was conducted. We used secondary databases to search-for topics such as physical activity, sport, health, economic outlook and development of Hungary, England and Nigeria, their sports industries, how the emergence of Covid-19 affected their economies and GDP and how the Covid-19 epidemic restrictive measures put in place affected their various socio-economic wellbeing. We therefore went further to reviewing empirical papers on physical activity, sport consumption, health behaviors such as sleep patterns, eating habits, alcohol consumption, tobacco smoking, daily sitting time, screen time and other related areas studied during Covid-19 period. We reviewed 67 articles on these topics and a significant number of studies on physical activity during the Covid-19 epidemic revealed a decrease in such activity due to Covid-19 restrictions (Adamu & Balatoni, 2023). Similarly, on issues that have to do with screen time and daily sitting, changes in eating habits, sedentary behaviours, alcohol and tobacco consumption, most of the studies identified changes in those activities during the Covid-19 epidemic compared to non-Covid-19 periods (Adamu & Balatoni, 2023). The conclusion drawn from the secondary sources was that the outbreak of Covid-19 epidemic and its subsequent restrictive measures put in place in Hungary, England, and Nigeria primarily altered their economic outlook as their Gross Domestic Product (GDP) which is the measurement for economic performance was negatively affected during the period. Likewise, the sports industries of these three countries and other related industry such as tourism and hospitality all experienced shocks during the period.

In preparation for our primary research questionnaire, we adapted existing validated scales from (Aiken et al. 2018; Chopra et al. 2020) and came up with our survey questionnaire which was the same for all three countries. The data collected were coded using Evasys software and we used SPSS software version 23 to perform our descriptive analysis test our hypotheses using non-parametric Wilcoxon signed ranked test.

In the fourth chapter we presented the results. Our findings in the secondary area revealed some aspects like demographics of the countries involved such as general population which is key to national planning. Nigeria's population is higher than those of England/UK and Hungary and we also identified the age structure of the population highlighting both Hungary and UK as having significant percentage of elderly people 65 years above while Nigeria has a diverse age structure. The section also highlighted prevalence of some chronic diseases which are common in all the three countries such as diabetes and hypertension as well as obesity rates. For both Hungary and UK, the characteristics of inactive people are adolescents with the highest percentage and in Nigeria it was–adults aged 70 and above as per the result. Checking the economic indicators, UK had the highest GDP and GDP per capita followed by Hungary and then Nigeria. But it is important to note that the GDP per capita of Nigeria is so low considering its huge population and this place the living standards of many Nigerians at a lower level. The sport sector is as important as many other sectors as it generates income~~s~~. In the UK, sport sectors make a significant contribution to the nation's revenue and employment generation but same is not yet the case in Hungary and Nigeria, although both have great potential.

The second part of the findings from our own survey revealed findings from many categories starting with demographic findings such as gender, age, employment status, etc. Moving further to the rest of the results and findings on our descriptive analysis, the results revealed significant differences across periods and countries especially on other scaled variables.

The last part of the result presentation was categorized based on individual country, Hungary, England and Nigeria on period comparison BeCov, DuCov and AfCov, as well as by gender and by sport fans. It can be summarized that in Hungary on period comparison physical activity and sport consumption suffered a decline during DuCov compared to BeCov but things got better AfCov compared to DuCov whereby other activities such as daily screen time increased DuCov compared to BeCov periods. While sport consumption in the England-based survey did not show any significant differences among the periods, physical activity showed slight improvement DuCov compared to BeCov and respondent's screen time increased DuCov compared to BeCov and AfCov. Sport consumption saw significant increases AfCov compared to both DuCov and BeCov

in survey conducted in Nigeria with increased screen time DuCov as similar to Hungary and England.

Comparing the three countries with each other in the three periods (BeCov, DuCov, AfCov), we found that 30 minutes aerobic PA was higher in England than in Hungary during BeCov, leisure activities more in England than in Hungary and Nigeria BeCov and lastly daily sitting time more in Hungary and Nigeria than in England BeCov. Likewise, 30 minutes of aerobic was higher in England than in Hungary and Nigeria as well as daily sitting where Hungarians had more than the Nigerians during DuCov. During AfCov, 30 minutes aerobic activity saw Hungary and England more than Nigeria, leisure activities more in England than Nigeria, life center around sport consumption more in Hungary than in England, sport consumption as something respondents could not live without was more often reported in Hungary than in England, and being completely taken with sport consumption more in Hungary than both England and Nigeria and screen time was higher in Hungary than in Nigeria.

The sport fans of the Hungarian and the Nigerian surveys indicated their desire to consume sports more BeCov and AfCov than DuCov explaining how the restrictions and other Covid-19 measures impacted on their sporting life. This result was similar to that of sport fans in England as their urge to consume sport was recorded more AfCov compared to DuCov.

Gender analysis was also conducted between male and female and compared between DuCov and AfCov periods for all three countries

Similarities and differences were examined after which it was found that Hypotheses 1 and 2 were only partially confirmed, not in relation to all three countries, while Hypotheses 3 to 7 were confirmed. Conclusions were drawn, recommendations were made, and suggestions for future studies were also provided.

Our new findings contribute to a better understanding of the health-related behaviours and pandemic responses of populations in countries with different socio-economic characteristics, specifically in relation to sports consumption.

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Supplementary Table 1. Descriptive frequency count results for Hungarian survey BeCov, DuCov & AfCov period (other scales).

Item	P	<2 hours	2-4 hrs.	4-6 hrs.	6-8 hrs.	>8 hrs.
How much was your daily sitting time at work	**B**	11(8.7)	26(20.5)	39(30.7)	35(27.6)	16(12.6)
	D	11(8.7)	29(22.8)	42(33.1)	45(35.4)	-(-)
	A	14(11.0)	23(18.1)	45(35.4)	30(23.6)	15(11.8)
		0	**1-2**	**3-4**	**5-6**	**>6**
Break from sitting such as standing, stretching, walking	**B**	8(6.3)	57(44.9)	44(34.6)	8(6.3)	10(7.9)
	D	15(11.8)	53(41.7)	36(28.3)	10(7.9)	13(10.2)
	A	9(7.1)	41(32.3)	60(47.2)	8(6.3)	9(7.1)
		< 1hr.	**1-2 hrs.**	**2-4 hrs.**	**>5 hrs.**	
Screen time watching TV, social media, videogames, and mobile phones	**B**	11(8.7)	29(22.8)	53(41.7)	34(26.8)	
	D	7(5.5)	20(15.7)	39(30.7)	61(48.0)	
	A	9(7.1)	32(25.2)	58(45.7)	28(22.0)	
		<6 hrs.	**6-8 hrs.**	**>8 hours**		
Hours of daily sleeping	**B**	10(7.9)	78(61.4)	39(30.7)		
	D	6(4.7)	60(47.2)	61(48.0)		
	A	9(7.1)	77(60.6)	41(32.3)		
		Excellent	**Very good**	**Good**	**Bad**	**Very bad**
Sleep quality	**B**	7(5.5)	31(24.4)	78(61.4)	8(6.3)	3(2.4)
	D	5(10.2)	34(27.6)	64(50.4)	14(11.0)	9(7.1)
	A	5(3.9)	33(26.0)	76(59.8)	11(8.7)	2(1.6)
		Not at all	**A little**	**Much**	**Very much**	**Extremely**
Stress & Anxiety	**B**	17(13.4)	51(40.2)	41(32.3)	8(6.3)	10(7.9)
	D	13(10.2)	39(30.7)	42(33.1)	15(11.8)	18(14.2)
	A	15(11.8)	44(34.6)	47(37.0)	10(7.9)	11(8.7)
		No	**Yes, 1-3 igars/ day**	**Yes, 4-6 cigars/day**	**Yes, 7-9 cigars/day**	**Yes, >10 cigars/ day**
Smoking	**B**	91(71.7)	12(9.4)	20(15.7)	-(-)	4(3.1)
	D	100(78.7)	6(4.7)	14(11.0)	3(2.4)	4(3.1)
	A	95(74.8)	14(11.0)	12(9.4)	1(0.8)	5(3.9)
		No	**Yes, on special occasion**	**Yes, on weekends**	**Yes, more than once in a week**	**Yes, almost daily**
Alcohol drinking	**B**	49(38.6)	40(31.5)	31(24.4)	7(5.5)	-(-)
	D	61(48.0)	34(26.8)	22(17.3)	7(5.5)	3(2.4)
	A	44(34.6)	50(39.4)	25(19.7)	6(4.7)	2(1.6)

Source: Collected Data (2023).

*Data are given as frequency (%)

P: Period; **B:** Before Covid-19 period; **D:** During Covid-19 period; **A:** After Covid-19 period

Supplementary Table 2. Descriptive frequency count results for England survey BeCov, DuCov & AfCov period (other scales).

Item	P	<2 hours	2-4 hrs.	4-6 hrs.	6-8 hrs	>8 hrs.
How much was your daily sitting time at work	**B**	28(30.4)	8(8.7)	28(30.4)	20(21.7)	8(8.7)
	D	20(21.7)	16(17.4)	23(25.0)	33(35.9)	-(-)
	A	19(20.7)	12(13.0)	24(26.1)	30(32.6)	7(7.6)
		0	**1-2**	**3-4**	**5-6**	**>6**
Break from sitting such as standing, stretching, walking	**B**	11(12.0)	32(34.8)	20(21.7)	11(12.0)	18(19.6)
	D	13(14.1)	29(31.5)	23(25.0)	9(9.8)	18(19.6)
	A	9(9.8)	36(39.1)	20(21.7)	12(13.0)	15(16.3)
		< 1hr.	**1-2**	**2-4**	**<5 hrs.**	
Screen time watching TV, social media, videogames, and mobile phones	**B**	4(4.3)	29(31.5)	35(38.0)	24(26.1)	
	D	1(1.1)	18(19.6)	29(31.5)	44(47.8)	
	A	1(1.1)	33(35.9)	41(44.6)	17(18.5)	
		<6 hrs.	**6-8 hrs.**	**>8 hours**		
Hours of daily sleeping	**B**	8(8.7)	51(55.4)	33(35.9)		
	D	9(9.8)	43(46.7)	40(43.0)		
	A	8(8.7)	52(56.5)	32(34.8)		
		Excellent	**Very Good**	**Good**	**Bad**	**Very bad**
Sleep quality	**B**	7(7.6)	20(21.7)	48(52.2)	11(12.0)	6(6.5)
	D	12(13.0)	17(18.5)	51(55.4)	8(8.7)	4(4.3)
	A	7(7.6)	17(18.5)	48(52.2)	19(20.7)	1(1.1)
		Not at all	**A little**	**Much**	**Very much**	**Extremely**
Stress & Anxiety	**B**	13(14.1)	45(48.9)	25(27.2)	6(6.5)	3(3.3)
	D	19(20.7)	35(38.0)	21(22.8)	11(12.0)	6(6.5)
	A	16(17.4)	37(40.2)	28(30.4)	9(9.8)	2(2.2)
		No	**Yes, 1-3 cigars/ day**	**Yes, 4-6 cigars/day**	**Yes, 7-9 cigars/day**	**Yes, >10 cigars/ day**
Smoking	**B**	63(68.5)	8(8.7)	11(12.0)	3(3.3)	7(7.6)
	D	61(66.3)	6(6.5)	9(9.8)	9(9.8)	7(7.6)
	A	68(73.9)	7(7.6)	8(8.7)	5(5.4)	4(4.3)
		No	**Yes, on special occasion**	**Yes, on weekends**	**Yes, more than once in a week**	**Yes, almost daily**
Alcohol drinking	**B**	10(10.9)	30(32.6)	34(37.0)	10(10.9)	8(8.7)
	D	17(18.5)	22(23.9)	19(20.7)	20(21.7)	14(15.2)
	A	13(14.1)	27(29.3)	30(32.6)	16(17.4)	6(6.5)

Source: Collected Data (2023).

*Data are given as frequency (%)

P: Period; **B:** Before Covid-19 period; **D:** During Covid-19 period; **A:** After Covid-19 period

Supplementary Table 3. Descriptive frequency count results for Nigerian survey BeCov, DuCov & AfCov period (other scales).

Item	P	<2 hours	2-4 hrs.	4-6 hrs.	6-8 hrs	>8 hrs.
How much was your daily sitting time at work	**B**	13(12.4)	20(19.0)	26(24.8)	29(27.6)	17(16.2)
	D	28(26.7)	18(17.1)	33(31.4)	26(24.8)	-(-)
	A	12(11.4)	23(21.9)	34(32.4)	12(11.4)	24(22.9)
		0	**1-2**	**3-4**	**5-6**	**>6**
Break from sitting such as standing, stretching, walking	**B**	10(9.5)	45(42.9)	25(23.8)	11(10.5)	14(13.3)
	D	20(19.0)	38(36.2)	18(17.1)	3(2.9)	26(24.8)
	A	8(7.6)	42(40.0)	29(27.6)	10(9.5)	16(15.2)
		< 1hr.	**1-2**	**2-4**	**>5 hrs.**	
Screen time watching TV, social media, videogames, and mobile phones	**B**	16(15.2)	29(27.6)	37(35.2)	23(21.9)	
	D	11(10.5)	17(16.2)	34(32.4)	43(41.0)	
	A	15(14.3)	35(33.3)	33(31.4)	22(21.0)	
		<6 hrs.	**6-8 hrs.**	**>8 hours**		
Hours of daily sleeping	**B**	28(26.7)	49(46.7)	28(26.7)		
	D	20(19.0)	46(43.8)	39(37.1)		
	A	34(32.4)	40(38.1)	31(29.5)		
		Excellent	**Very Good**	**Good**	**Bad**	**Very bad**
Sleep quality	**B**	20(19.0)	42(40.0)	32(30.5)	10(9.5)	1(1.0)
	D	45(42.9)	33(31.4)	19(18.1)	3(2.9)	5(4.8)
	A	27(25.7)	40(38.1)	28(26.7)	6(5.7)	4(3.8)
		Not at all	**A little**	**Much**	**Very much**	**Extremely**
Stress & Anxiety	**B**	11(10.5)	47(44.8)	28(26.7)	11(10.5)	8(7.6)
	D	16(15.2)	54(51.4)	19(18.1)	8(7.6)	8(7.6)
	A	16(15.2)	40(38.1)	32(30.5)	10(9.5)	7(6.7)
		No	**Yes, 1-3 cigars/ day**	**Yes, 4-6 cigars/day**	**Yes, 7-9 cigars/day**	**Yes, >10 cigars/ day**
Smoking	**B**	96(91.4)	4(3.8)	2(1.9)	2(1.9)	1(1.0)
	D	92(87.6)	4(3.8)	5(4.8)	2(1.9)	2(1.9)
	A	91(86.7)	6(5.7)	7(6.7)	-(-)	1(1.0)
		No	**Yes, on special occasion**	**Yes, on weekends**	**Yes, more than once in a week**	**Yes, almost daily**
Alcohol drinking	**B**	90(85.7)	5(4.8)	7(6.7)	1(1.0)	2(1.9)
	D	91(86.7)	5(4.8)	5(4.8)	1(1.0)	3(2.9)
	A	91(86.7)	8(7.6)	3(2.9)	-(-)	3(2.9)

Source: Collected Data (2023).

*Data are given as frequency (%)

P: Period; **B:** Before Covid-19 period; **D:** During Covid-19 period; **A:** After Covid-19 period

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