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# Lifestyle Transition towards Sedentary Behavior among Children and Youth in Sub-Saharan Africa: A Narrative Review

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## Abstract

Worldwide lifestyles are changing with the fastest transition being witnessed in lower-income countries, especially in developing countries like Sub-Saharan Africa (SSA). An influx of easily acquired labor saving screen-based gadgets in many homes has affected many lives. This phenomenon is widespread affecting urban and rural affluent households with income deprived communities playing quick 'catch up' in the belief that this is a sign of prestige. This has led to prolonged sitting hours and excessive screen-based sedentary time especially among children. The high crime rate in urban settings has forced more parents to keep children indoors and "keep them busy" with screen gadgets. Children and youths are vulnerable and easily influenced and habits formed in childhood are seen to be carried forward into adulthood. This chapter highlights the increased sedentary lifestyle of the unique SSA population, whose unique cultural and socioeconomic factors gave them very active lifestyles previously. The plight of children and youth as vulnerable groups; and the resulting effects of sedentary screen-based activities have been discussed. Ongoing monitoring and surveillance of sedentary behavior and time among children and youth in SSA for policy development and strategic intervention is strongly advised.

**Keywords:** sedentary behavior, screen time, sedentary screen-based devices, physical activity, children and youth, Sub-Saharan Africa

## 1. Introduction

In addition to meeting physical activity (PA) recommendations, globally, increasing evidence supporting sedentary behavior as a distinct health concern is attracting more attention of public health agencies [1]. Sedentary behavior is characterized by sedentary screen-based behaviors such as television (TV) viewing, computer and cell phone use and video games; and sedentary non-screen-based behaviors involving extended sitting, as in school or in a car [2]. Technological advancements towards automated and less labor intensive performance, even in our daily chores, have led to increased time spent in sedentary behavior. Incidentally, such perceived advancement in lifestyle and labor-saving activities is thought to indicate better living conditions. Unfortunately, instead there is an increase in the

incidence and prevalence of chronic-degenerative diseases directly related to low levels of physical activity and excessive time spent in sedentary behaviors. This has now become an urgent public health concern leading to numerous initiatives for raising awareness about risks associated with excessive time spent in sedentary behaviors. Children and youth are the most vulnerable and easily influenced. Despite the perception that children are 'naturally' active [3], evidence suggests that they spend a significant amount of time in sedentary activities; and many do not accumulate recommended levels of PA for health [4, 5]. Habits formed in childhood are also carried forward into adulthood [6]. Longer periods of exposure of such behaviors allows NCDs time to develop and severely affect subsequent health [7], thus making it imperative that the foundation for lifelong PA and reduced sedentary time be laid as early in life as possible.

This chapter highlights the physical activity transition and resulting sedentary lifestyle of the SSA population, whose cultural, socioeconomic activities and unique characteristics was previously endowed by a very active lifestyle compared to the rest of the world. Though sedentary behavior has generated tremendous research interest over the past decade around the world, there has been a paucity of data in scientific literature concerning lifestyle habit changes from sub-saharan countries. Perhaps this is because of the attention placed on poverty-associated malnourishment at the expense of a very serious emerging lifestyle change associated with reduced activity.

This chapter will however, attempt to consolidate the findings of the available few studies from SSA to paint a picture of the phenomenon. It gives a general understanding of the status of sedentary behavior in various contexts, in the severely under-reported lives of children and youth. The chapter's attention is on the plight of children and youth and their notable increased engagement in screen-based sedentary activities. They require urgent intervention and public health strategies to avert a serious health crisis.

## **2. The physical activity transition in LMICs in Africa**

Worldwide, lifestyles are changing as a result of economic, educational, cultural and technological developments, with the fastest transition witnessed in lower-income countries. One consequence of this, as evident in many developing countries, such as in SSA, is the physical activity transition which is characterized by a change in lifestyle towards decreased engagement in energy demanding activities and transportation activity and increases in less active leisure-time physical activity. While many factors may have caused the increase in physical inactivity and sedentary behavior, cultural shifts, globalization and urbanization, that often accompany drastic changes in lifestyle, may account for this phenomenon in low and middle-income countries [8, 9].

In his explanation of the physical activity transition, Popkin [10] relates the effect of industrialization and modernization to a shift in the energy expenditure patterns and time allocation in most occupations. He also describes the shift in physical effort at home and leisure activities, allowing engagement in increasingly sedentary work.

In Africa, home electrification as well as motorization of farming activities, have transformed daily home chores and time-consuming, often back-breaking, fulltime occupation for the peasant or the working woman. This has also touched the lives of children, even in their education pursuits. In the past, especially in the African rural settings, education activities and programmes took place in outdoors, focusing on nature based learning, survival and experiential learning, characterized by physical

engagement and active transportation. We are now witnessing rapid digitization of education materials with an overdependence on screen-based sedentary activities. Most African children, especially in urban settings, now depend on school bus transportation to and from school, perhaps due to dangerous, chaotic heavy traffic and increased crime brought about by modernization.

Possibly, an even more astounding shift has come in leisure time activities. In the past, children were mainly in the outdoors engaging in active physical activities that 'produced a good sweat'. The rapid shift in television viewership, internet connectivity and cable linkages to very many households and many public spaces, as well as motorization of movement and entertainment resorts are now key elements to the shift in leisure pursuits especially in Africa. In the past, leisure activities for children often meant active play outdoors for long hours until it was too dark to play anymore. Unfortunately, today this is characterized by sedentary activity involving screen-based gadgets especially in urban settings [9, 11]. Developing countries, have witnessed an influx of cheap easily acquired and accessible labor saving gadgets that have flooded homes and the lives of children. This is common among urban households and the rural community is quickly 'catching up', perceiving this to be a sign of affluence and prestige. As evident in the few studies, this has led to prolonged sitting hours and excessive sedentary time especially, among children.

Shifts in the physical environment have drastically affected lifestyle in SSA, particularly in high density towns and cities that have been linked to environmental factors ranging from street connectivity, availability of walking spaces, street safety and the organization, layout of buildings and communities. With increased economic advancements, modernization and development, the rural communities are gradually catching on [12, 13]. In an attempt to address this notion, Popkin, [10] advocates increasing opportunities for physical activity, such as public and private recreation facilities, parks, recreation centers and, green spaces. Also recommended are provision for active transportation options, such as sidewalks, cycle paths, high road connectivity, and lower automobile transportation density that will all increase physical activity levels. Further, there is need for legislation to control constraints of physical activity such as crime and air pollution. The neighborhoods in many urban settings in SSA have high crime rates; thus, forcing parents to keep their children indoors and providing screen gadgets to keep them occupied instead of being engaged in active physical activity outdoors.

### **3. Sedentary behavior**

#### **3.1 Physical inactivity and sedentary behavior**

Sedentary behavior is distinct from physical inactivity. Sedentary behavior is defined as any waking behavior characterized by low energy expenditure ( $\leq 1.5$  metabolic equivalents) while in a sitting, reclining or lying posture [14]. Physical inactivity on the other hand describes low involvement in light, moderate, or vigorous physical activity. These two terms are often mistakenly used interchangeably yet there is a clear difference. Being 'physically inactive' means not doing enough physical activity and consequently not meeting the physical activity guidelines while being 'sedentary' means sitting or lying down for long periods. It is possible for a person to have sufficient physical activity and meet the recommended daily PA guidelines, yet still be considered sedentary if they spend a large portion of their day sitting or lying down [15, 16].

Sedentary behaviors are a set of behaviors, with unique environmental determinants and a range of health consequences. There are many different forms of



sedentary behavior, especially in the lives of children and youth that include educational activities such as homework, passive traveling such as motorized transport, seated hobbies like reading and talking with friends, and screen time behavior like TV viewing and video games. Although screen time serves as a valuable index for sedentary lifestyle, it accounts for only about a third of total sedentary time [17], with the rest of sedentary time being spent in other sedentary activities [18]. Guidelines that recommend limiting time spent in sedentary behavior [19, 20], focus primarily on limiting screen time and breaking up prolonged sitting. However, there is need for clearer guidance regarding other forms of sedentary behavior, which may also be important for health.

### **3.2 Sedentary behavior among children and youth**

The last decades have seen worldwide notable decrease in PA among young people with concomitant increase in sedentary time, probably due to the drastic increased exposure to screen-based behavior [21]. There is evidence that risk behaviors acquired during childhood may continue into adulthood [6]. Sedentary behavior guidelines recommend that children aged 5 to 11 years should not engage in more than 2 hours of recreational screen time daily as part of a healthy lifestyle. It further recommends that children should reduce motorized transport, long periods of sedentary sitting and time spent indoors throughout the day in order to gain health benefits [22, 23]. Reviewed literature concerning sedentary time found that children spent 6 hours on average in sedentary pursuits during and out of school [24]. The adolescence period encourages independent lifestyle behaviors where they can make independent choices and change behaviors that can have immediate and long-term health impact [25]. Unfortunately, adolescents are found to be the most sedentary of pediatric populations. Evidence shows that they spend 57% of after-school period in sedentary activity [26]. It is also noted that the highest increases in sedentary behaviors may occur during the early adolescence 9 to 12 years [27]. This reemphasizes the notion and risk of sedentary behavior in childhood persisting into adulthood [28]. Therefore, investigation that addresses sedentary behavior and health during adolescence will enhance their present health, improve health over their life course, and protect the future generation's health and wellbeing [29]. There is worrying evidence of increasing levels of sedentariness among school-going children, majority of who do not meet the recommendations for PA, in the developing world [30]. Regrettably, in-depth research regarding sedentary behavior during childhood and adolescence remains poorly described, especially in SSA.

### **3.3 Sedentary behavior and health and wellbeing**

Physical inactivity and sedentary behavior are recognized as important modifiable behavioral health risk factors associated with the development of various chronic diseases and mortality [31, 32]. The WHO classifies physical inactivity as the fourth leading cause of global mortality and one of the greatest health challenges [33]. Physical inactivity and SB are the main causes for approximately 30% of ischemic heart disease cases, 27% of diabetes cases, 21–25% of breast and colon cancers [33] and have also been associated with many other NCDs [34, 35].

Several studies have documented adverse negative effects of increased sedentary behavior on children's health [14, 36–40] and independent of level of PA [41]. Studies have reported associations between higher levels of sedentary behavior and numerous negative health markers that include physical, behavioral and psychological outcomes among the youth [42]. In-depth examination of sedentary behavior during leisure-time is crucial because it has been more consistently associated with

health outcomes [39, 43]. Increased sedentary behavior is related to higher depressive symptoms, unfavorable body composition, cardiovascular risk factors, poor physical fitness, lower self-esteem, and lower quality of life [39, 43, 44]. Although evidence varies with specific type of sedentary behavior, there is a link between sedentary behavior and impaired anthropometric, cardio-metabolic fitness and social-health indicators in youth [39, 43]. Studies focused on screen-based behaviors have also found a significant relationship between self-reported TV-viewing/screen time and cardiovascular health outcomes in youth population [39, 43, 45].

### **3.4 Correlates of sedentary behavior**

There is considerable public health interest in understanding the correlates and implications of sedentary behavior on all segments of the population. There are however, unique considerations and challenges when studying correlates of sedentary behavior among children and youth [46]. Current evidence suggests that sedentary time increases with age [47–49] and further investigation of sedentary behaviors across age groups could reveal specific aspects during youth that may benefit future age-targeted interventions. Also noted is lower overall level of actual physical activity in physical education classes, lower levels of PA among adolescent girls than adolescent boys, and decreasing PA levels among girls after puberty [50]. Whereas sedentariness is also inversely associated with socioeconomic status in high income-countries, it is associated positively in low- and middle-income countries with association tending to vary by sedentary behavior domains [51].

In summary, the following have been identified as being positively associated with sedentary behavior during adolescence; among the older age groups, [52, 53], female [53, 54] higher socioeconomic position and income [52, 53, 55], higher parental education and professional level [52, 54], overweight [52], and alcohol use [52]. However, living in the country side [52], being physically active [52–54], parents physical activity level [54], parental and friends supportive of physical activity [54], and having positive perceptions of the neighborhood [54] were found to be negatively associated with sedentary behavior.

Since young people spend considerable proportion of their time at home [56], the physical environment of the house could also exert an important influence on their lifestyle behavior. Factors such as neighborhood design, traffic, and accessibility to green areas or sports facilities are important, bearing in mind the environmental differences and unique characteristics, especially in SSA. For instance, crime and violence in the neighborhood that is linked with urbanization tend to also limit activities outside of the home, limiting outdoor play and physical movement thus increasing sedentary activities among children and youth [57]. Further, higher access to media equipment at home has been related to increase in screen-based sedentary behavior [58]. The influx of screen-based sedentary gadgets, technological advancements and use of labor-saving modern amenities by young people can promote sedentary activities. Given that non-screen based sedentary behavior may represent a high percentage of sedentary time in young people [59], its existing associations and impacts have not been conclusively determined. Further investigation, especially in SSA, is necessary to establish key indicators for purposes of designing targeted intervention and policy.

### **3.5 Screen-based sedentary behavior among children and youth**

One important sedentary lifestyle exploratory dimension among children is determining their time spent engaged in screen-based activities such as watching television, playing video games and computer work [49], collectively referred to as

screen time (ST) [60]. As screen-based sedentary behavior is taking over the lives of children and adolescents, it is becoming a key public health concern in managing their health and wellbeing. The influx of electronic media and child focused programming has dramatically increased screen-based sedentary activity. As documented in developing countries, the introduction of video, computer, tablet and internet games, concomitant with saturation of cell phones with built-in games, is rapidly replacing the time that children would have otherwise spent in more physically active pursuits [61]. Seemingly, as screen time increases significantly, physical activity continues to decline. For a long time, the time spent watching TV has been treated as a representative measure of screen time [62–64]. However, TV time alone is not an adequate representative measure of screen time. Many other devices like computers, tablets, mobile phones, and games consoles have now become a common part of the youth lifestyle [65]. Therefore, a more inclusive investigation is necessary when assessing sedentary behavior as a whole, and particularly screen-time among youth. Research reports a significant increase not only in TV time; but in other types of screen time as well. All of which appears to be the driving trend in recent years [66]. Such behavior, especially watching TV, has also been linked to unhealthy eating habits. In fact, researchers have linked unhealthy eating practices to the biological effects of prolonged sitting watching TV and reduced physical activity or a combination of these factors to overweightness and obesity among youth [24].

Given the amount of screen time and screen-based sedentary behavior related to educational activities, there is urgent need for public health guidelines regarding education-related sedentary behaviors both, at home and at school. This is important for teachers and students and policy development. Increasing investigation into the effects of sedentary behavior on academic performance has revealed negative association between [67]. However, it is important to note that the time spent in screen-based activities might be only a small part of the total sedentary behavior of youth during their leisure-time [68], and that each sedentary activity could influence on a youth's academic performance differently. For instance, screen-based sedentary activities related to studying and completing academic homework may be associated with higher academic performance, but entertainment such as watching or listening to music may influence academic performance negatively [69].

In view to the negative impact of screen-based sedentary behavior on the health of young people, Barnett et al. [70] recommend interventions that would reduce television and recreational screen-based time. Strategies could include removal of such devices from the bedroom and where meals are eaten. They argue that this could promote social interaction during meal times and more outdoor activities that do not involve screen devices.

#### **4. Sedentary behavior among children and youth in SSA**

Majority of the few studies that have examined sedentary behavior in SSA have non-representative samples that majorly target isolated population groups scattered throughout the region and present inconclusive data. They also do not focus on all aspect of sedentary behavior. In single country studies, there are notable differences in the prevalence and status of sedentary behavior among children and youth, perhaps due to obvious study methodological differences and unique social cultural and geographical characteristics across the continent. There are notable inconsistent findings on sedentary behaviors presenting varying results on sex (boys vs. girls), type of school attended (private vs. public), SES groups (high vs. low), day (weekdays vs. weekend days) and area of residence (urban vs. rural), making it

difficult to adequately draw conclusions. There are also a number of multicounty studies on sedentary behavior of school-aged children in sub-Saharan Africa. For instance, a systematic review [9] examined 17 studies and concluded that the reported means of time spent in sedentary pursuits ranged from 1.3 hours to 6 hours on weekdays, and were as high as 8 hours on weekends. The study concluded that the noted urbanization trend suggests an increase in sedentary behaviors over time as the data revealed higher sedentary activity among urban and higher SES children than rural and lower SES children. The following is a summary of research findings from studies in SSA (**Table 1**).

Lead author (reference)	Countries	Age (years)	Main findings with respect to sedentary behavior and physical inactivity
Peltzer [71]	Uganda, Namibia, Kenya, and Zimbabwe	13–15	29.7% in Uganda, 25.7% in Namibia, 43.4% in Kenya, and 43.7% in Zimbabwe reported less than 3 hours of sitting per day.
Peltzer [72]	Ghana and Uganda	13–15	27% of children spent more than 3 hours per day in sedentary pursuits.
Peltzer [73]	Botswana, Kenya, Namibia, Senegal, Swaziland, Uganda, Zambia, and Zimbabwe	13–15	39.4% spent less than one hour per day sitting, and an additional 32.7% spent 1–2 hours per day sitting when not in school or doing homework. Zambian and Senegalese children were the least active (9.0% and 10.9%, respectively).
Malete [74]	Botswana	14	Participants spent an average of 6.2 hours per day sitting. Public school students and those living in rural villages (lower SES) reported significantly more minutes of sitting than students in private schools or those from cities (higher SES).
Omuemu [75]	Nigeria	6–19	35% to 90.7% engage in screen time activities daily. Television viewing and video games were the most common screen-based sedentary behavior, while reading magazines and books for pleasure (45%), followed by listening to music (38%) were the reported non screen-based sedentary behavior. Above 95% of 11- to 19-year-old children and youth in a city of a South–south region of Nigeria spent an average of 3 hours and 15 minutes on the non-screen-based sedentary behavior.
Manyanga [76]	Zimbabwe	5–17	Approximately 75% of Zimbabwean children and youth spend the recommended $\leq 2$ hours per day in sedentary behaviors. About 15% reported watching 5 or more hours of television the previous day. Electronic video games (23%) and watching television (26%) were the most common sedentary behaviors reported among Zimbabwean children and youth.
Benefice [77, 78]	Senegal	13.3 $\pm$ 0.5	Participants reported only 1.33 to 1.41 hrs of sedentary time per day. Senegalese adolescent spent 50% of their time in sedentary activities, and most school girls were less active than those who did not attend school.
Garnier [79]	Senegal	13–15	Senegalese girls spent more time in sedentary behaviors than boys (4.23 h <i>vs.</i> 2.49 h).



Lead author (reference)	Countries	Age (years)	Main findings with respect to sedentary behavior and physical inactivity
Diouf [80]	Senegal	8–11	Participants spent 65% of their time in sedentary pursuits. All the children presented light PA level and spent most of their time (min/day) in sedentary behavior.
Prista [81]	Mozambique	5–17	Noted substantial increase in sedentary habits due to the growth and availability of the internet in the lives of children and adolescents. There was also a shift from familiar agricultural practices to small trading (involving a lot of sitting), including children traders, which has subsequently led to an increase in their sedentary time.
Ghana Health Services [82] Nyawornota [83]	Ghana	15–19	Between 20% and 70% of children and youth were sedentary. Children attending private schools are more sedentary and more likely to be transported to school in a car, use a computer more often, and watch television not only more frequently but for longer hours.
Ocansey [84]	Ghana	5–17	Over 60% of Ghanaian children do not meet minimum levels of PA for health enhancing benefits. Less than 30% of basic school pupils were transported in an automobile to school every day.
Asare [85]	Ghana	13–18	Ghanaian adolescents perceive walking to school an indication of poverty. 54.1% were highly sedentary with more females being in highly sedentary category than males (52.5% versus 47.5% respectively). Computer and internet use were higher during weekend days than weekdays and made the larger contribution to the total sedentary time of both boys and girls (weekday: 4.65 h/d, 4.08 h/d; weekend: 7.09 h/d, 6.41 h/d). Boys and girls used the computer for similar hours (4.65 h/d, 7.09 h/d versus 4.08 h/d, 6.41 h/d respectively). Private school scored higher on sedentary behavior than those in public school [9.91 (6.37) h/day versus 4.78 (5.71) h/day respectively] mainly because these students in private schools are from affluent homes, and have more access to screen devices, especially the internet and computer games at home.
KNBS [86]	Kenya	15–19	61% of adolescent girls and 36% of the adolescent boys (years) do not engage in continuous physical activity optimally.
Muthuri [87]	Kenya	9–11	Direct measurement of sedentary time among Kenyan children was 398 minutes (6.6 hours), while self-report data showed that urban children spent an average of 1.75 hours in screen-based sedentary activities during the school day and 4.25 hours during weekend days.
Onywera [88]	Kenya	9–12	Higher SES and urban living children in Kenya were found to spend significantly more time in sedentary pursuits than their lower SES and rural counterparts, with approximately 50% of the urban children, and only 30% of the rural children reporting over 2 hours each week on screen time activities.
Ojiambo [89]	Kenya	13 ± 1	Urban children in Eldoret Kenya spent 72% of their wake time sedentary.

Lead author (reference)	Countries	Age (years)	Main findings with respect to sedentary behavior and physical inactivity
Wachira [90]	Kenya	9–11	Overall, children accumulate a lot more recreational ST during weekend days than on school days. Among those that had moderate to-high levels of ST, 75.9% had a TV in their bedroom, 13.8% had a computer, 25.3% had a hand-held video game device, 33.3% had a cell phone, and 19.5% had a non-hand held video game system such as Play-station or Xbox. 76.7% of those who engage in TV viewing over the weekend recorded higher levels of ST. There was a significant association between the overall ST levels and sex ( $\chi^2 = 12.036$ , $p = 0.002$ ) and school type ( $\chi^2 = 8.340$ , $p = 0.015$ ) but no association with SES. Male participants were 2.1 times more likely to have higher ST levels than female participants (OR = 2.1; 95% CI: 1.32 ± 3.37; $p = 0.002$ ). Private school participants were found to be 1.5 times more likely to have high ST than public school participants.
Uys [91]	South Africa	10–17	Children seem to not meet the recommended guidelines of 2 hours of screen time or less per day and their social media and cell phone activities recording high usage. Children watched an average of nearly 3 hours of television per day. South Africans are heavy users of social media, averaging 2.7 hours per day, active social media accounts grew by 20% in 2014 and a further 10% in 2015, and youth-dominated Instagram use grew by 133% from 2014 to 2015. These have significantly increased screen-based sedentary behavior.
Micklesfield [92]	South Africa	9	Weekend television viewing among children and youth is higher during weekends, with older children generally presenting higher viewing times.
Lennox [93]	South Africa	15	Children in higher SES schools spent more time watching television than children in lower SES schools on both weekdays and weekends.
Micklesfield [94, 95]	South Africa	11–12 and 14–15	Rural lower socioeconomic status was associated with less sedentary time and more walking for transport. Higher maternal, household, and community level SES were significantly associated with increased sedentary time.
<b>Abbreviations:</b> KNBS-Kenya National Bureau of Statistics, OR- Odds Ratio, SES- Socioeconomic Status, ST- Screen Time, TV- Television, $\chi^2$ - Chi Square analysis result.			

**Table 1.**  
*Summary of research finding on sedentary behavior and physical inactivity among children and youth in SSA.*

There is evidence of sedentary behavior among children and youth in SSA but with inconsistent findings across populations. More studies revealed a higher level of sedentary behavior among girls, children attending private school, those from urban areas, and those from high SES than their counterparts. The weekend days seem to attract increased sedentary activity and sedentary time than weekdays. Time is ripe for targeted interventions that focus on such groups while future studies pursue conclusive positions on prevalence and trends in sedentary behavior among children and youth in SSA.

## 5. Conclusion


This chapter describes the characteristics of the noted transition towards a more sedentary lifestyle, particularly in the lives of children and youth. It also presents a narrative of the status of sedentary behavior among the children and youth in SSA based on published findings of available literature. To the best of my knowledge, there are no existing guidelines for sedentary behavior for children and youth in SSA. Researchers, practitioners and policy developers rely on guidelines and recommendations developed elsewhere [17, 18]. Over the last decade, though sedentary behavior has been a research topic of interest globally, few studies have examined this phenomenon in SSA. The available studies present inconsistent findings that might be attributable to environmental variability, unique social-cultural characteristics across the continent and study methodological differences. They also present inconclusive data focused on isolated population groups scattered throughout the region, making it difficult to present a clear prevalence and pattern of sedentary behavior among children and youth in SSA. Although a large portion of the African population (especially in the rural settings) may not exhibit high physical inactivity, the rapid increase and trend towards higher sedentary time and behavior is now an urgent public health concern affecting population health, productivity and the economy. It is recommended that sedentary behavior, especially among children and youth (a vulnerable group that represent the future workforce), be given priority in research, public health initiatives and policy development.

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