

Determinants of post-migration changes in dietary and physical activity behaviours and implications for health promotion: Evidence from Australian residents of sub-Saharan African ancestry

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Abstract

Issue addressed: Several studies have attributed excess weight gain after immigration to changes in dietary and physical activity behaviours. However, recognising the main factors that influence post-migration changes in dietary and physical activity behaviours is less clear, particularly among Australian residents of sub-Saharan African (SSA) ancestry. Drawing on acculturation theory, this study examines main factors driving changes in dietary and physical activity behaviours among Australian residents who were born in SSA and provides insight into the extent to which the factors are related to immigration.

Methods: A qualitative design based on a phenomenological approach was employed and a quota sampling technique was used to recruit 24 study participants for in-depth interviews.

Results: The study found significant self-reported changes in dietary and physical activity behaviours after immigration that increase the risk of excess weight gain. The changes in dietary and physical activity behaviours were mainly driven by issues related to availability, accessibility and affordability of dietary and physical activity products. Time management and factors related to convenience also emerged as key determinants of change in dietary and physical activity behaviours. Apparently, some factors noted by participants shape dietary and physical activity behaviours irrespective of immigration, and these factors include: tastes and cravings for foods; friends and family influence on behaviour; and misconceptions about food and exercise.

Conclusion: Migration from SSA to Australia contributed to changes (mainly less healthy) in dietary and physical activity behaviours. To a large extent, post-migration changes in dietary and physical activity behaviours were driven by socio-economic and environmental factors.

So what? Health promotion programs that address the risky behaviours associated with excess weight gain among Australian residents of SSA ancestry should pay more attention to socio-economic and environmental factors.

KEYWORDS

behaviour change, culturally and linguistically diverse people, nutrition, obesity, physical activity

1 | INTRODUCTION

Over the years, there has been an increasing interest in understanding the impact of immigration on population health, as many countries host immigrants from various regions across the world.¹ The past decade has seen numerous studies suggesting that immigrants are, on average, healthier than native-born residents due to pre-migratory health screening and selectivity, commonly termed the “healthy immigrant effect.”^{2–4} In recent years, a number of studies have argued that the supposed health advantage of foreign-born over locally born residents of a country decreases with time, and post-migration weight gain has been proposed as one of the main indicators of immigrants’ health status decline.^{5,6} For instance, an analysis of data drawn from the Australian Bureau of Statistics found that Australian residents born overseas initially had lower rates of adiposity than those born in Australia, but they gained significant weight as their duration of residency increased.⁷

Several studies have attributed post-migration weight gain to the consumption of less healthy diets in host countries, especially in situations where the migration flows from a lower to a higher income country.^{8–10} However, what factors influence immigrants’ consumption of less healthy diets is less clear, particularly among Australian residents who were born in sub-Saharan Africa (SSA).^{11,12} Additionally, the distinction between immigration-induced factors influencing changes in dietary and physical activity behaviours and factors influencing dietary and physical activity behaviours irrespective of immigration is unclear in the empirical literature.¹³ Furthermore, whereas several studies have emphasised dietary change as the main reason for post-migration weight gain, the potential contribution of physical inactivity to post-migration weight gain has received less attention.^{13–15}

Research has shown that using theory to understand behaviour and develop interventions can generate better outcomes than interventions developed without theoretical bases.^{16,17} Several previous studies have employed acculturation theory to explain changes in weight-related behaviour after migrating to a new country.^{13,18–21} Berry defines acculturation as “the dual process of cultural and psychological change that takes place as a result of contact between two or more cultural groups and their individual members” and has proposed a framework applicable to acculturation-related studies.²² The framework suggests that cultural maintenance and cultural participation are essential in the

process of acculturation. Based on a person’s attitude towards their own culture and the culture(s) in the host country, one of four acculturation strategies may be employed: assimilation, separation, integration, or marginalisation.²³ Assimilation denotes that a person or group of people adopt the usually dominant culture of a host country over their own culture.²³ Separation refers to a person or group of people preserving their original culture and avoiding the (dominant) culture of the host country.²³ Integration refers to a person or group of persons preserving parts of their own culture and adopting parts of the dominant culture of the host country.²³ Marginalisation occurs when a person or group of people do not maintain their original culture nor integrate into the dominant culture in a host country.²³ In the long term, a relatively stable change, termed adaptation, may take place due to demands of the new environment and/or attitudes towards other culture(s).²² The framework proposes that adaptation is a gradual process that takes place with time and is influenced by moderating factors that exist prior to acculturation (eg, personality) as well as moderating manifesting factors during acculturation (eg, social support from host community members). These moderating factors are further categorised as individual or group-level factors.²² Individual-level factors, also called “person variables,” include a person’s age, gender, educational level, motivation for migrating, and personality. Group-level factors, which are also known as “situational variables,” comprise conditions in the society of origin and/or the society of settlement, such as the political context, economic situation, and ethnic attitudes.²²

Drawing on acculturation theory, previous studies have suggested that post-migration changes in dietary behaviours are associated with the extent of an immigrant’s assimilation into the host society culture(s).^{13,19–21,24} However, it is unclear what the main factors are that influence a person or group of people to adopt a new dietary and physical activity behaviour after migrating to a new country. This qualitative study examines the dietary and physical activity behaviours of Australian residents who were born in SSA and explores self-reports of factors that may influence post-migration changes in their dietary and physical activity behaviours. Insights into factors that influence post-migration changes in dietary and physical activity behaviours in this ethnic minority group may provide important information for health promotion responses that address less healthy dietary and physical activity behaviours and related noncommunicable diseases (NCDs).

2 | MATERIALS AND METHODS

2.1 | Design

This study employed a qualitative cross-sectional design. Using a phenomenological approach, data were collected regarding participants' experiences and perceptions. More specifically, semi-structured interviews were conducted in the study.

2.2 | Research setting and study participants

The interviews were conducted in two major Australian states: New South Wales (NSW) and Victoria. These two states host the largest population of Australian residents of SSA ancestry.²⁵ The inclusion criteria for study participation were as follows:

1. currently living in Australia;
2. resided in Australia for at least 12 months, to ensure that participants had settled in the new environment and could offer meaningful responses;
3. born in a SSA country; and
4. lived in SSA country until at least 18 years of age.

2.3 | Participant recruitment

Using flyers and word-of-mouth, the study was advertised at community gatherings (eg, churches, mosques, weddings and food centres) for interested and eligible persons to be identified. A list of eligible and interested participants was compiled, and these participants were called over-the-phone to confirm their time availability. To minimise the participant selection bias due to ethnic and demographic diversity, quota sampling was conducted. Quotas were set based on four characteristics: SSA sub-region of origin, gender, living arrangement and current state of residence. Using the United Nations' classification of African regions and sub-regions as a guide, four sub-regions of origin were distinguished: Western Africa, Eastern Africa, Central Africa and Southern Africa. A maximum quota of eight participants was allotted to each SSA region of origin. The selection of participants from each sub-region also paid specific attention to gender balance (men and women); living arrangements (living alone or with persons of familial relationships); and place of residence (living in NSW or Victoria).

2.4 | Data collection

Eligible and interested participants were given options to provide either written or orally recorded consent, after detailed information about the study had been presented to them. Interviews were conducted face-to-face or by telephone, depending on a participant's preference. A safe and comfortable meeting place was arranged for participants who preferred face-to-face interviews. Interviews took between 20 and 80 minutes to complete and were only recorded after receiving consent from the participant. Nevertheless, one participant did not want to be recorded and preferred the interviewer to

take notes instead. Participants were given the opportunity to freely withdraw at any time from the study without affecting their relationship with the interviewer or any other organisation supporting the study. Questions were open-ended and probing was used, when required, to promote in-depth responses. Participants were asked questions about their migration history, their demographic characteristics, and issues related to their settlement in Australia. The questions also covered the extent to which participants' dietary and physical activity behaviour patterns changed over time, and their views on underlying factors accounting for any behaviour change. Continuous comparison of interviews was conducted until a point where additional data did not generate any new information. Data saturation was achieved after interviewing the 24th participant.

2.5 | Data management, coding and analysis

Pseudonyms were assigned to each participant, and the interviews were transcribed verbatim. Using NVivo (version 11) qualitative data analysis software, transcripts were coded, and thematic content analysis was undertaken. Transcripts were thoroughly read thrice, and similar ideas were assigned unique colour codes. Based on the recurrence of an idea, sequence within which ideas were reported, and the extent to which one idea appeared to influence another, the coded transcript was reorganised into themes and sub-themes. A "constructionist" strategy of data analysis was employed which involved analysis of results based on participants' own interpretation of their experiences.²⁶ Nevertheless, participants' opinions were carefully distinguished from their lived experiences.

2.6 | Ethical considerations

Ethical approval (Reference Number: HC17018) was received from the Human Research Ethics Committee of the University of New South Wales (branded as UNSW Sydney). The study was conducted in accordance with the National Health and Medical Research Council's (NHMRC) National Statement on Ethical Conduct in Human Research. Informed consent, anonymity, privacy and confidentiality were ensured with respect to data collection, storage and reporting.

3 | RESULTS

3.1 | Participant characteristics

An overview of participant socio-demographic characteristics is presented in Table 1. Of the 24 participants, more than half ($n = 14$) were men and 10 were women (Table 1). The average age of participants was 36 years. The oldest participant was 54 years, while the youngest was 21 years. All participants had attained at least high school education and most ($n = 17$) had tertiary level education. At least three participants originated from each SSA sub-region (Western, Southern, Eastern or Central Africa). More than half ($n = 14$) were living in New South Wales (NSW) and 10 were residents of Victoria

TABLE 1 Summary of participants socio-demographic characteristics

Socio-demographic characteristics	N = 24
Gender	
Male	14
Female	10
Current age (years)	
20-29	6
30-39	11
40-49	4
50+	3
Age before migration (years)	
18-27	15
28-37	4
38-47	4
48+	1
Highest attained educational level	
Basic	-
High School	2
Tertiary	17
Other forms of formal education	5
Religious affiliation	
Christianity	12
Islam	1
Non-assigned	11
Sub-Saharan African region of origin	
Western Africa	6
Eastern Africa	7
Southern Africa	8
Central Africa	3
State of residence	
New South Wales	14
Victoria	10
Duration of stay in Australia (years)	
<2	1
2-5	5
6-10	8
11-15	8
16-20	1
20+	1

(Table 1). The longest period a participant had lived in Australia was 24 years, while the shortest was 1 year.

3.2 | Changes in dietary behaviour

Nearly all participants reported significant changes in dietary behaviour after migrating from SSA to Australia, though some aspects of their local African dietary practices continued. The reported

changes in dietary behaviour mainly include: regular eating out-of-home; modifications to food preparation methods; changes in eating periods; changes in eating frequency; replacement of organic foods by processed and genetically modified options; and replacement of local African foods by “new” products.

Eating at restaurants nearly every week, regular consumption of fast food and snacking between meals emerged as some of the newly acquired dietary behaviours in Australia. Three participants described their newly developed dietary behaviours as follows: “when I was back home (in DR Congo),... I never grew up going to eat out at a restaurant...It has never really been part of my culture” (Boala, male, 29 years).

...I've found that in Australia, I eat a lot more fast foods than I used to when I was in Kenya. A lot more chips, a lot more burgers and a lot more fast foods than I used to.... (Kubatine, male, 33 years)

...because there's so many fast food outlets (in Australia), I would go and have maybe an English breakfast, which would be like eggs, bacon and toast. Maybe hash browns if I'm really hungry...Later on, I may have a snack. (Daniel, male, 32 years)

Modifications to cooking methods, to make meal preparation quicker and less boring, also recurred in the interviews. Some participants used “ready-made” sauces and spices purchased from supermarkets and Asian food shops for meal preparation, in contrast to the period before immigration when they seasoned foods with “organic” vegetables. One participant said:

...A lot of the foods are cooked from scratch (*referring to cooking in SSA*). If you wanted to make a sauce for example, there wasn't such a thing as the Coles and you get a premium sauce and all you had to do is just cook your meat and then put the sauce into it. No! You had to make everything from scratch... (Boala, male, 29 years)

Moreover, late eating and skipping breakfast were commonly reported in the interviews. Two participants described their experiences in the following words: “instead of having breakfast,...I can just drink a bit of water...” (Baba, male, 41 years); “...sometimes you come from work late. Even if you eat, you won't settle down to eat well” (Awo, female, 27 years).

With respect to changes in eating frequency, many participants shifted from their traditional routine of eating three to four meals in a day to eating twice and eating during free times at work or school. For instance, one participant noted:

... I was living in my parents' house which involved breakfast at a certain time, usually around 06:30, lunch at around 12:30 then dinner by 19:00. Whereas in Australia, because I'm now more independent, sometimes I can eat my dinner a bit late or usually around 21:00... So, I found

that in Kenya, I had a routine, or a fixed time for my meals, whereas in Australia, it is mainly dependent on how busy the day is... (Kubatine, male, 33 years)

Additionally, while a number of participants continued to eat their local African foods, they noted an increase in the frequency of eating carbohydrates (particularly rice) as well as soft drinks.

Two participants explained in the following quotes: *"In Uganda, my major food is bananas and (to) some extent rice. Now, my major food here is to eat rice... Basically, rice and maybe chicken are the main things that I eat here"* (Yaro, male, 38 years); *"...back home (DR Congo), it's not every day that I got to drink Coke. It's not every day that I got to drink Fanta. Again, these were things I would consume on certain occasions"* (Boala, male, 29 years).

Furthermore, participants noted a change in the quality of food they consume. More precisely, they perceived Australian foods as lower, in terms of quality, than foods in SSA. Australian foods, particularly vegetables and dairy products, were described by participants as "genetically modified," as Ajo (female, 54 years) claimed: *"although we are trying to make some good choices, we are not guaranteed the sources of these foods.... given the fact that most of these present or current foods are GM (genetically modified)."* Participants also believed that foods in Australia taste differently from foods in SSA. For instance, Olu (male, 49 years) said: *"...over there (referring to Nigeria), they (foods) are more natural...the tastes of food here is a little bit different. Because they (foods) are more organic over there (Nigeria)."*

Lastly, some participants reported that they consume "Australian" food products in place of local African foods. According to them, consumption of "Australian" products was partly influenced by limited availability or accessibility of local African foods. For example,

Ali (male, 32 years) said: *"... not getting all the necessary ingredients and stuff, or the right stuff to prepare them ... So, instead of having corn or something, you have to eat semolina."*

3.3 | Factors related to changes in dietary behaviour

When asked to explain why their dietary behaviours had changed after immigration, participants noted various factors. In line with acculturation framework, factors raised by participants are categorised as either personal or situational (Table 2). The main situational factors reported by participants include: high cost of local African foods in Australia; more time needed to prepare local African foods compared with Australian foods; easy accessibility of fast and processed foods in Australia; limited availability or accessibility of some local African foods in Australia; and longer working hours in Australia compared with SSA. Some personal factors noted by participants appear to influence dietary behaviour irrespective of immigration, and these factors are: tastes and cravings; motivation to eat healthy foods; ageing; changes in responsibility for meal preparation; reluctance to explore new foods; cultural preference for large body size; request for particular foods by family and friends; and exposure to social media advertisements (Table 2).

3.4 | Changes in physical activity behaviour

When asked to report any changes in their physical activity behaviour between the periods in SSA and Australia, participants noted changes in amount and type of physical activity. With respect to changes in amount of physical activity, almost all participants said their physical activity levels reduced after they settled in Australia.

TABLE 2 A summary of reported factors related to dietary behaviour

Main factors and categories	Example of quotes/explanations from participants
<i>Personal factors</i>	
Reluctance to explore new foods	"...I think I have a weakness. I don't usually explore so many kinds of different foods" (Yaro, male, 38 years)
Tastes and cravings	"You just ask your body what you want to eat. Like... something yummy and something good in your mouth" (Barbara, female, 25 years)
Motivation to eat healthy foods	"... I need to be strong, healthy and fit, pretty much... So that's what influences all those elements of food I eat" (Baba, male, 41 years)
Ageing	"I think as I grow older, I'm becoming more sensitive to what I eat..." (Kubatine, male, 33 years)
Changes in responsibility for meal preparation after migrating to Australia	"Eating back home (Zimbabwe), because my mother would cook, ..., we would eat earlier. So, we'd have our breakfast in the morning, probably say between 8 to 10, or 11...And then in the afternoon for lunch itself, that would be anywhere from 12, 12:30 to maybe 2 o'clock. And then for dinner that could be anywhere from 5:30, 6 o'clock, to 8. Whereas now my eating varies. Like... I can eat anytime. Also, because I live by myself and I cook for myself, I tend to eat when I'm available to eat" (Faya, male, 37 years)
Cultural preference for large body size	"I think when I met her, she wanted me to gain weight and she succeeded. (<i>laughter</i>)...I think maybe it is a cultural thing where if I gain weight, then it means she is doing a good job as a wife" (Don, male, 31 years)
Request for particular foods by family and friends	"I would say that actually my husband is the one who is more cautious about what he eats.... Some things I can't cook because of him" (Abigail, female, 36 years)
Social media advertisements	"Now, I'm watching television, you Google. From where I came from (Nigeria), Google was not rapid (<i>slow internet</i>). Now with your mobile phone, you can actually find what information you need about your health... By getting information, you make choices" (Olu, male, 49 years)

(Continues)

TABLE 2 (Continued)

Main factors and categories	Example of quotes/explanations from participants
<i>Situational factors</i>	
High cost of local African foods in Australia	"... in Australia I find that I don't eat as much fruit as I used to back home. Fruit was more readily available and a lot more affordable. I also used to love, and I still do love, avocado, but in Australia, they are almost a luxury" (Kubatine, male, 33 years)
More time needed to prepare local African foods compared with Australian foods	"I found that most of our meals (<i>local African meals</i>), they take a bit of time to cook. So, I've adapted to the Australian..., so if I'm in a hurry I'll just do some noodles, put some vegetables which I don't have to boil. It doesn't take much time" (Abigail, female, 36 years)
Easy accessibility of fast and processed foods in Australia	"...coming to Australia,...because fast foods are all accessible, you would have to put in a lot of effort, if you want to eat clean (<i>eat healthy</i>)" (Lovia, female, 39 years)
Limited availability or accessibility of some local African foods	"... due to the lack of, you know, African stores selling a lot of the ingredients if I would need to make my African meals, or my Kenyan meals, I've found that I've had to do without them" (Kubatine, male, 33 years) "...The truth of the matter is that my eating habits in Australia have been different. Because some of those foods I was mentioning, you get it because you are in the village (<i>in Nigeria</i>). You don't buy them...You just go to the forest and just get it..." (Olu, male, 49 years)
Longer working hours in Australia compared with SSA	"My eating behaviour has changed... because back home, I used to eat as normally as three times, or four times a day. But, since I came here (<i>Australia</i>), I've been eating only twice a day because of the job I'm doing. You have to leave the house in the morning. You only have to take breakfast. When you go to work, you only have a cup of tea, maybe when it's break time...You just take something light, like biscuits, cakes ... Then, when I go back in the evening, I eat my dinner and then it's time to sleep" (Awo, female, 27 years)
Low cost of some familiar food products in Australia	"... I realized when I came here (<i>Australia</i>), I would drink a lot of these Coca-Colas, Fantas, energy drinks, because they were really cheap for me" (Boala, male, 29 years)

For instance, one participant said: "... I don't exercise as much as I used to in Ghana. I used to do a lot of exercise back in Ghana, but I'm not able to do that much exercise here" (Nat, male, 37 years).

Regarding changes in type of physical activity, participants reported that physical activity in SSA was usually spontaneous whereas a deliberate plan, such as gym attendance is required in Australia to remain physically active. Faya (male, 37 years) explained: "so back home, I'd walk more. And even just playing with friends and running around, I'd do that quite a lot. But here, I will go to the gym, so I'm active in that sense... but I feel like it's very different."

3.5 | Factors related to changes in physical activity behaviour

A summary of factors that participants thought had influenced changes in their physical activity behaviour after immigration is

shown in Table 3. These factors (mainly situational factors) include: availability and easy accessibility of convenient or mechanised resources in Australia (eg, cars, elevators and laundry machines); high registration and gym membership fees in Australia; colder weather conditions in Australia; and relatively structured and rigid schedules in Australia.

Similar to that observed for changes in dietary behaviour, some personal factors raised by participants appear to influence physical activity behaviour irrespective of immigration. As shown in Table 3, these personal factors are as follows: misconceptions about physical activity, sedentariness after immigration, feeling insecure when engaging in "outdoor" physical exercises, invitation from friends to join routine physical exercises, lacking physical strength to exercise, prioritising work over physical activity, family support and exposure to social media messages about physical activity.

TABLE 3 A summary of reported factors related to physical activity behaviour

Main factors and categories	Example of quotes/explanations from participants
<i>Personal factors</i>	
Misconceptions about physical activity	"Exercise is not my priority because I don't think I'm obese or I'm fat, so I think exercise is to maintain and tone, so in that instance, I don't really need to make it a priority" (Cheska, female, 28 years)
Sedentariness after migration	"I used to be a sports' girl, every kind of sports, tennis, netball, swimming, everything (<i>in SSA</i>)... When I came to Australia, I got lazy, I don't play sports anymore" (Cheska, female, 28 years)
Feeling insecure when engaging in "outdoor" exercises in Australia	"...I've had some unpleasant experiences. I used to go for walks. On two occasions and two different paths, while walking by the street, people threw things (<i>eg, eggs</i>) at me" (Ajo, female, 54 years)

(Continues)

TABLE 3 (Continued)

Main factors and categories	Example of quotes/explanations from participants
Invitation from friends to join routine physical exercises	"... they would invite you either to join a gym or some sort that they are attending, so you go together to a gym..." (Yaro, male, 38 years)
Lacking physical strength to exercise	"But the thing is because you've put on weight, you get injuries. And so, my physical activity reduced as a result of injuries that I had in my sports" (Ali, male, 32 years)
Prioritising work over physical activity	"...I would rather go and earn money than do exercise..." (Yaro, male, 38 years)
Family support	"...if I'm going to the 1000 steps for example, I will need my husband to be watching over the kids. I will actually need that support and I happen to have a supportive husband..." (Renee, female, 37 years)
Exposure and influence of media messages on physical activity	"... I'm one person who does listen to a lot of news networks and stuff like that. It does influence you, as you do tend to think about it a bit more" (James, male, 39 years)
<i>Situational factors</i>	
Availability of more convenient or mechanised resources in Australia than SSA (eg: cars, elevators, laundry machines, etc.)	"What I find interesting is that in Africa, you are not aware that you're exercising but you're exercising. We were exercising unconsciously. Because there's a lot of walking. I wasn't driving back then, so there was a lot of walking ...here (in Australia) ... I am always driving, ..." (Abigail, female, 36 years)
High registration and gym membership fees in Australia	"Like jogging, it was a normal way of life as you don't have money to afford transport (in Nigeria)... When I came here (Australia), when I try to go to the gym and I was asked to pay \$700 to register to start "gyming", I said, "this was a free thing that I was getting back home. Now, why should I be paying for it?" (Olu, male, 49 years)
Differences in weather conditions between SSA and Australia	"... in Africa, it was always warm. So just walking...back and forth and doing things, you just sweat, you're burning things...(in Australia) winter comes, too cold..., you postpone it (planned exercise) to the next day, you postpone it (to) the other day. It's just kind of start getting harder, as you get colder, it gets harder..." (Baba, male, 41 years)
Structured and rigid schedules in Australia	"Time flows differently here (Australia). Everything is scheduled, everything is tick tock, tick tock, clock, clock and everything works clockwise. You find that you always have to schedule things, whereas back home (DR Congo) time flows in a different way" (Boala, male, 29 years)

4 | DISCUSSION

This study aimed to investigate post-migration changes in dietary and physical activity behaviours among Australian residents who were born in SSA, explore factors that may account for their behaviour change patterns, and examine the extent to which the factors are related to immigration. Though the study mainly focused on post-migration changes in dietary and physical activity behaviours, maintenance of dietary and physical activity behaviours was also noted by participants. Maintenance of some aspects of participants' own dietary and physical activity behaviours in combination with some significant changes suggests that participants have employed the integration strategy of Berry's acculturation scheme.²³

The findings more specifically show a complex pattern of change in dietary behaviours that mainly relate to eating period, eating location, food preparation method, quality of food and frequency of food consumption. There is some evidence to suggest that before participants migrated from SSA to Australia, they followed routine and well-planned eating schedules, hardly ate out-of-home, and usually prepared home meals with unprocessed ingredients. Consistent with previous studies,^{13,27-29} participants noted that skipping breakfast, eating out-of-home, snacking between meals, and using readymade sauces for home meals have become common for them in Australia. However, findings from the present study further suggest other newly developed dietary behaviours that were

not clearly seen in a previous study focused on this ethnic minority group.¹³ Notably, some participants reported that they started eating dinner late, eating only twice a day, and eating genetically modified foods, after they settled in Australia. Despite these complex reports from participants, one common point that has been reached is that changes in dietary behaviours certainly occurred after immigration.

Regarding the question, why dietary behaviours changed after immigration, a number of situational factors were noted by participants. When viewed through the lens of acculturation, the situational factors given by participants mainly relate to changes in their socio-economic and physical environment. For example, given that all local African foods were readily available in Australia, replacement of local African foods by similar Australian foods may not have occurred. An earlier study also recognised environmental and economic factors as key determinants of change in dietary behaviours after immigration.¹³ However, the current study seems to present more insights into the role-played by some socio-economic factors. For instance, participants in the current study explained in detail that jobs in Australia are more structured (little flexibility) and have longer working hours compared with jobs in SSA. The relatively long working hours in Australia appear to affect meal preparation at home. Therefore, there is a strong possibility that some dietary behaviours such as eating dinner late evolved in response to the challenges associated with the socio-economic and physical environment of Australia.

Though studies suggest that migration to a new and different country may affect a person's physical activeness,^{30,31} recognising changes in physical activity behaviour after immigration is complicated.^{32,33} Unsurprisingly, previous studies have reported inconsistent findings about the relationship between immigration and changes in physical activity behaviour.^{21,33} Explanations for the inconsistent findings may be situated in the differences in ethnic backgrounds of participants, varying research methods, and differences in migration contexts.^{31,33} In this study, however, findings show that participants reduced their engagements in low and moderate intensity physical exercises (eg, long walks to public transport stations) after they settled in Australia. While recognising that self-report of physical activity behaviour may be unreliable,³⁴ the common report from participants of diverse ethnic backgrounds suggests a need to take their concerns seriously.

Similar to the factors that affected participants' dietary behaviours, a number of situational factors emerged as reasons for the changes in participants' physical activity behaviour. There is reason to suggest that these situational factors are related to participants' socio-economic and physical environment. For instance, it has commonly been reported by participants that relatively cold weather conditions in Australia discourage engagements in outdoor physical activities, such as long-distance walks. In addition, participants have noted that availability of more convenient and mechanised resources in Australia (eg, easy and numerous modes of transport, elevators, and laundry machines) contributes to reductions in some common physical exercises (eg, climbing staircases) that incidentally occurred in SSA. According to some participants, one possible strategy to address their reduced physical activity levels is to develop a routine physical activity plan. However, it appears that adherence to a physical activity plan is mainly challenged by difficulty of managing time in Australia and unaffordability of gym membership fees for some participants. Evidence in this study suggests that though some participants seemed interested in physical exercises, challenges associated with their socio-economic and physical environment affected their physical activity behaviour.

Though unrelated to immigration, factors such as consistent cravings for a favourite food and misconception that routine physical exercise is for people who are overweight also affected participants' dietary and physical activity behaviours. In a broader view, it appears that the factors unrelated to immigration were mostly personal or individual-level issues whereas those related to immigration were situational or group-level factors. The body of research on post-migration changes in dietary and physical activity behaviours among SSA residents in Australia has paid less attention to these distinctive factors.^{13,35} Recognition of these complex factors can assist health promoters to develop appropriate interventions that focus on less healthy dietary and physical activity behaviours related and/or unrelated to immigration.

4.1 | Strengths and limitations

Available literature shows that this study is among the first to employ a qualitative design in the exploration of changes in dietary and

physical activity behaviours, especially among Australian residents who were born in SSA.^{13,35} The use of a qualitative design enabled participants to provide more detailed insights into their dietary and physical activity behaviours; and as a result, yielded richer responses compared with previous studies.^{13,35} Despite the strengths associated with the use of a qualitative design, it was difficult to explore detailed interplay between background characteristics of participants (eg, duration of residence) and post-migration changes in dietary and physical activity behaviours. Additionally, findings cannot be extrapolated to all immigrants of SSA ancestry. In future, a quantitative assessment of the correlations between participant background characteristics and changes in dietary and physical activity behaviours will provide additional understanding of changes in the health status of this ethnic minority group.

Another strength of the study is that employment of quota sampling increased representation of persons from different SSA regions (Western, Eastern, Central and Southern Africa). Quota sampling also allowed for inter-group comparisons of dietary and physical activity behaviours. Though quotas allotted for each SSA sub-region were small, data saturation was achieved.

One more limitation that needs to be considered is that responses from participants may contain exaggerations which is a weakness attributed to self-reported methods.³⁴ However, given that this study is a low risk type, participants freely expressed their thoughts and experiences; hence the data are compelling.

4.2 | Implications of findings for health promotion

Though some positive dietary behaviours (eg, adoption of new fruits and vegetables in Australia) were reported by participants, most of the newly acquired behaviours put them at risks of excess weight gain and weight-related diseases.³⁶⁻³⁸ For instance, skipping breakfast, snacking between meals and late eating can impact negatively on participants' health, as studies have identified an association between such behaviours and weight-related problems.³⁶⁻³⁸ Increase in the consumption of fast foods and regular eating out-of-home could also be a risk factor for weight gain and related NCDs.³⁹ Replacement of organic foods by genetically modified foods may also result in poor health in the long term.^{40,41}

Furthermore, reduction in low and moderate intensity physical activities after immigration may increase risks of excess weight gain.^{42,43} In line with the findings from this study, public health interventions need to focus on the socio-economic and environmental factors that influenced less healthy dietary and physical activity behaviours.

One potential strategy to enhance positive dietary behaviours among the participants and people in similar circumstances is to make local African foods more accessible, available, and less costly in Australia. In addition, Australia's food environment can be improved by the provision of more healthy food options, particularly in restaurants. With respect to physical activity, one key recommendation given by a participant is to incorporate physical activity breaks into Australian occupational structure. Creation

of free community gym centres could also assist in promoting physical activeness among participants and people of similar circumstances.

5 | CONCLUSIONS

This study has shown complex patterns of maintenance and change in dietary and physical activity behaviours among Australian residents who were born in SSA. It mainly concludes that migration from SSA to Australia is associated with changes in dietary and physical activity behaviours. However, the extent and nature of change in dietary and physical activity behaviours mainly depend on situational factors within the socio-economic and physical environment of the host country. The study has further revealed that some personal factors affect dietary and physical activity behaviours irrespective of immigration and more research is required to measure the impact of these factors on behaviour change. Given that the changes in dietary and physical activity behaviours found in this study were significantly less healthy, there is a need for urgent strategies for promoting healthier dietary and physical activity behaviours in this immigrant group.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

DATA ACCESSIBILITY

The data supporting this study have been deposited in the OneDrive system of the University of New South Wales. Interested persons might require permission to access the data.

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