Evidence for factors associated with diet and physical activity in African and Caribbean countries

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Objective To identify and describe summarized evidence on factors associated with diet and physical activity in low- and middle-income countries in Africa and the Caribbean by performing a scoping review of reviews.

Methods We searched the Medline®, LILACS, Scopus, Global Health and Web of Science databases for reviews of factors associated with diet or physical activity published between 1998 and 2019. At least 25% of studies in reviews had to come from African or Caribbean countries. Factors were categorized using Dahlgren and Whitehead’s social model of health. There was no quality appraisal.

Findings We identified 25 reviews: 13 on diet, four on physical activity and eight on both. Eighteen articles were quantitative systematic reviews. In 12 reviews, 25–50% of studies were from Africa or the Caribbean. Only three included evidence from the Caribbean. Together, the 25 reviews included primary evidence published between 1926 and 2018. Little of the summarized evidence concerned associations between international health or political factors and diet or associations between any factor and physical activity across all categories of the social model of health.

Conclusion The scoping review found a wide range of factors reported to be associated with diet and physical activity in Africa and the Caribbean, but summarized evidence that could help inform policies encouraging behaviours linked to healthy diets and physical activity in these regions were lacking. Further reviews are needed to inform policy where the evidence exists, and to establish whether additional primary research is needed.

Abstracts in العربية, 中文, Français, Русский и Español at the end of each article.

Introduction

Almost three quarters of deaths from noncommunicable disease occur in low- and middle-income countries, particularly in Africa and the Caribbean. Moreover, the burden of noncommunicable disease in the World Health Organization’s (WHO) African Region is expected to exceed that of communicable disease by 2030. Premature death from noncommunicable disease in these regions is relatively common; for example, the probability of dying between the ages of 30 and 70 years from disease by 2030.

In Africa, these include the regional 2011 Brazzaville Declaration and national policy initiatives. In the Caribbean, the 2007 Port of Spain Declaration on noncommunicable diseases was a first for lower-middle-income regions. This declaration provided a framework for the development and implementation of policies on the prevention and control of noncommunicable disease, both regionally and nationally. An evaluation of the Port of Spain Declaration in 2018 found that taking effective measures to address the distal (or upstream) determinants of an unhealthy diet and physical inactivity (e.g. cultural and environmental conditions) remained challenging, although new initiatives, such as taxing sugar-sweetened beverages, were being implemented.

Behaviours associated with a healthy diet and physical activity are core contributors to good health and, thus, the ability to participate in these behaviours can be viewed as a universal right. These behaviours are shaped by a range of factors, including: (i) international policies and politics; (ii) socioeconomic, cultural and environmental conditions; (iii) living and working conditions; (iv) social and community networks; and (v) more proximal individual factors (e.g. age and sex). Evidence on factors associated with these behaviours, on their distribution across different population groups and on whether they are modifiable is important for understanding the drivers of disease burden, for predicting future trends and for identifying targets for interventions and policy changes.

Most existing research summaries on the determinants of diet and physical activity come from high-income countries.

464 Bull World Health Organ 2021;99:464–472 doi: http://dx.doi.org/10.2471/BLT.20.269308
Consequently, the generalizability of their findings to Africa and the Caribbean is questionable and evidence is needed from low- and middle-income countries to inform research, interventions and policy development.\textsuperscript{10,11} Scoping reviews adopt a systematic approach to map published evidence on a topic, summarize the main themes and highlight knowledge gaps.\textsuperscript{12} We chose to conduct a scoping review of reviews because systematic reviews and meta-analyses provide the highest level of evidence on which to draw evidence-based conclusions.

The principle aim of our study was to identify and summarize existing reviews on a broad range of factors associated with diet and physical activity in low- and middle-income countries in Africa and the Caribbean. A secondary aim was to identify gaps in the current evidence. Our review was conducted as part of an initial scoping exercise for the Global Diet and Activity Research Network,\textsuperscript{13} which is a collaboration of researchers in the Caribbean, Cameroon, Kenya, South Africa and the United Kingdom. The overall goal of the network is to generate evidence on the determinants of diet and physical activity to inform noncommunicable disease prevention in Africa and the Caribbean.

### Methods

This scoping review of reviews was conducted according to a previously described method\textsuperscript{12} and followed reporting guidance in the preferred reporting items for systematic reviews and meta-analyses extension for scoping reviews.\textsuperscript{14} A review protocol was developed beforehand and was consistent with the scoping review method.\textsuperscript{15} The review question and the study selection criteria were developed iteratively as familiarity with the literature increased.

We searched the Medline\textsuperscript{(a)}, LILACS, Scopus, Global Health and Web of Science databases for reviews of factors associated with physical activity and dietary behaviour in Africa and the Caribbean that were published between January 1998 and December 2019. A search was carried out in April 2018 and, again, in December 2020 to include literature to the end of 2019. No author search was carried out in April 2018 (January 1998 and December 2019). A Caribbean that were published between dietary behaviour in Africa and the Caribbean. A secondary aim was to identify gaps in the current evidence. Our review was conducted as part of an initial scoping exercise for the Global Diet and Activity Research Network,\textsuperscript{13} which is a collaboration of researchers in the Caribbean, Cameroon, Kenya, South Africa and the United Kingdom. The overall goal of the network is to generate evidence on the determinants of diet and physical activity to inform noncommunicable disease prevention in Africa and the Caribbean.

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Dietary outcomes summarized in the reviews included: (i) subsistence skills, such as food gathering, hunting, and food preparation;22 (ii) child feeding complementary to breastfeeding;23,25,34,40 (iii) school meals or nutrition policies;26,29 (iv) access to and choice of food;25 (v) food security;17,23,37,38 (vi) diet diversity or quality;27 (vii) adherence to a prescribed diet;27 (viii) calorie or food group consumption (e.g. fruit and vegetables, animal protein or processed food);21,24,28,32,34,39 and (ix) macro- and micro-nutrient intake.30,32 Physical activity outcomes included: (i) active travel (e.g. walking or cycling for transport);19 (ii) total physical activity; (iii) domains of physical activity (e.g. occupational or leisure);20,26,28 (iv) total sedentary behaviour; (v) domains of sedentary behaviour (e.g. television watching);18,26 and (vi) physical inactivity (e.g. not meeting physical activity guidelines).26,34,38,21,35 Several reviews also reported physical fitness.20,28

The reviews reported a range of hypothesized and demonstrated relationships between various factors and diet and physical activity. These were categorized using Dahlgren and Whitehead’s social model of health (Table 2). Little of the summarized evidence was related to distal factors in the category of international health, policy and politics in the social model of health and there were relatively few reported associations with physical activity in any category.2

A wide range of associations were described, particularly for diet (Table 2). Several reviews reported that the shift to an urban, westernized lifestyle and diet and the threat of a competitive, globalized market were permeating influences.22,24 On diet, reviews that considered factors in the category of international health, policy and politics mentioned: the historic influence of colonization; humanitarian and development aid; the epidemiological transition; the transition to a western lifestyle and diet; the dual burdens of over- and undernutri-
### Table 2: Factors associated with diet and physical activity in Africa and the Caribbean, scoping review of reviews, 1998–2019

| Social model of health category | Factors associated with diet | Factors associated with physical activity |
|--------------------------------|-----------------------------|------------------------------------------|
| **Distal factors** International health, policy and politics | Colonization; high-economic-value or cash crops; humanitarian aid (such as donated cereals); development aid and poverty reduction; gross domestic product; nutritional or epidemiological transition; dominance of major international retailers and producers; globalized (i.e. western) diet – high energy and low nutritional value; infectious diseases (including HIV/AIDS); dual burden of under- and overnutrition; and climate change or variability (e.g. erratic rainfall) | Epidemiological transition |
| General socioeconomic, cultural and environmental conditions | Access to, and availability of, food; price of food; individual purchasing power; availability of energy-rich, cheaper foods; frequency, quality or size of meals; socioeconomic status; parental socioeconomic status; mass media; cultural beliefs; extreme weather (e.g. drought); food security; wild food sources; indigenous vegetable crops; infectious disease; gendered roles; institutional exclusion of women (e.g. powerlessness, vulnerability and lack of control over assets); deagrarianization; urbanization; habit loss; human–environment interactions; lack of desire to engage in agriculture (signal of poverty); and social grants (particularly for HIV/AIDS) | Socioeconomic status; cultural heritage and gender disparity; weather (e.g. heavy rain disrupting travel across unbridged rivers); international health, cultural practices and norms (e.g. running to school); urbanization; indoor leisure activities; technology (e.g. television, computer or mobile phone use); gendered roles; household responsibilities and work burden; punishment (including corporal) if late for school; fear of attack from people (e.g. violence, rape or harassment); dangerous vehicles; dangerous animals; and topography (such as rivers to cross or difficult terrain) |
| **Proximal factors** Living and working conditions (including agriculture, food production, education, work environment, unemployment, water, sanitation, health-care services and housing) | Poverty; occupation; unemployment; distance from markets; market access for rural development; available land and land rights; geography (e.g. coastal versus inland, highlands versus lowlands, and particular regions or provinces); seasonality (particularly of fresh fruit and vegetables); locally grown produce; street-food nutritional composition; convenience and taste of food; fortified foods; urban versus rural areas; school meals; nutrition education interventions; cooking demonstrations; agricultural interventions (e.g. for poverty reduction); agricultural expertise and training; urban agriculture (including food gardens); home gardening; nutritional advice from health-care workers; road improvements; personal assets; education on nutrition and health; integration of nutrition education into existing curriculum; school physical environment; school nutrition policies (e.g. availability of healthy snacks); prompts or rewards for healthy food choices; parental education; water availability; agricultural inputs; household size and composition; household food allocation; food preparation techniques; antiretroviral medication (needs to be taken with food); antenatal and postnatal care; and multicomponent interventions | Urban versus rural areas; built environment and perceived access to destinations (e.g. schools, shops and bus stops); lack of green space; unsafe neighbourhoods; multicomponent interventions; agricultural interventions (e.g. for poverty reduction); personal assets; education; integration of physical activity into existing curriculum; exercise classes or after-school sports; school travel time; school type (e.g. public versus private); school physical environment; physical activity equipment; and gendered roles |
| **Social and community networks** | Social capital, networks, support and relationships; trust, reciprocity and exchange; exclusion and power imbalances; social meaning-making; church membership; collective action and cooperation (such as a savings club); self-esteem; social interaction and skills acquisition; perception of the consumption of healthy food; community-based platforms or committees; social behavioural change interventions; key influencers or family members; caregiver involvement; paternal involvement; maternal diet; knowledge of quantity of food to eat during pregnancy; advice from health-care professionals; intervention delivered by community members; peer support; counselling and communication skills; declining indigenous knowledge; strategies to procure food (e.g. selling assets); perspectives and experience of food security; consumer acceptability and perceptions of processed cereals; taboos, beliefs, rules and norms; and psychosocial determinants | Cultural practices and norms (e.g. running to school); girls afraid of encounters with strangers; restriction of girls’ mobility after puberty; feeling travel to school is safe; insecure neighbourhoods; caregiver involvement; sport tournaments; peer training and support; perceived importance of physical activity; and psychosocial determinants |
| **Age, sex and constitutional factors** | Sex; age; and infection status | Sex; ethnicity; and age |

**Notes:**
- HIV/AIDS: human immunodeficiency virus and acquired immunodeficiency syndrome.
- Factors reported in reviews as associated with diet or physical activity were categorized using Dahlgren and Whitehead’s social model of health.
tion; infectious and chronic disease; and the impact of climate change. In addition, associations were described with: socioeconomic, cultural and environmental conditions, including access to food, the availability of food, prices, food security, deagrarianization and urbanization; living and working conditions, including education, poverty, household composition, land rights, skills, assets, rurality, and agricultural and school-based interventions; social and community networks, involving for example social capital, skills acquisition, peer support, key influencers, taboos and norms; and constitutional factors, particularly age and sex.

On physical activity, only one review described evidence on determinants in the most distal category of the social model of health (i.e. international health, policy and politics; Table 2). As expected, there were similarities and differences between the associations described for diet and physical activity. For example, both featured urbanization, socioeconomic status and gendered roles. In contrast, certain associations were described only for physical activity: (i) topography and climate; (ii) aspects of the built environment; (iii) dangerous traffic; (iv) fear of violent crime; (v) access to leisure facilities and green spaces; and (vi) restrictions on girls' mobility after puberty.

Many reviews reported the heterogeneity and lack of standardization of the assessment methods used in the primary studies. For example, one review on food insecurity reported that the studies included used 26 distinct indicators of food insecurity and that many studies neither directly measured food insecurity nor adequately reported the measures they used. On physical activity, reviews typically reported that the primary studies tended to use self-report assessments and not objective assessments or measuring tools.

**Discussion**

We identified 25 reviews published between 1998 and 2019 that described factors associated with diet and physical activity in Africa and the Caribbean. Although our scoping review considered only evidence from these regions, our findings confirm that evidence is generally lacking from such settings on which to base policy and design interventions for improving diet and physical activity. Moreover, our findings are consistent with those of a previous study, which carried out a systematic review of research from low- and lower-middle-income countries published between 1990 and 2015 on the effect of interventions aligned with WHO's “best buy” interventions on noncommunicable disease. They identified 36 studies, which covered only nine of the 83 low- and lower-middle-income countries. Only two of the 36, both from Pakistan, concerned diet and physical activity. In our study, we found no review from Africa or the Caribbean that summarized evidence relevant to WHO's “best buy” interventions. Similarly, none of the literature we identified assessed primary research relevant to WHO's global action plan targets on noncommunicable diseases or to targets set for the relevant sustainable development goals (SDGs).

Although there may be research from Africa and the Caribbean that has not yet been reviewed, our findings suggest that, to date, policies on diet and physical activity are not informed by summarized research evidence on their determinants from these settings. This conclusion has two clear implications: (i) relevant primary research that has not yet been reviewed should be identified and evaluated; and (ii) new research should be undertaken to fill gaps in the evidence.

The policy responses and types of intervention required to improve health outcomes associated with diet and physical inactivity may be quite different in Africa and the Caribbean than in higher-income settings. In the absence of evidence indicating how different they need to be, current international guidance (e.g. WHO's “best buy” interventions and recommendations in the global action plan on noncommunicable diseases) should be followed, so long as the interventions employed are robustly evaluated and can subsequently contribute to the evidence available from Africa and the Caribbean. Research funding bodies could help fill knowledge gaps and encourage the production of evidence summaries to guide policy. It would help if the terminology and definitions used for outcomes and their hypothesized determinants were much more consistent than we found in our study. In addition, international research networks that cover a range of different settings across Africa and the Caribbean could help develop and promote the high-quality, multidisciplinary research needed to address the complexity inherent in understanding how behavioural determinants vary between different contexts.

In choosing to carry out a broad scoping review of factors associated with diet and physical activity and by adopting the review as the unit of analysis, our intention was to highlight gaps in the summarized literature (rather than in the primary literature) as an aid to policy-making. We did not directly look for primary research on the determinants of diet and physical activity, nor did we summarize policy documents. Consequently, our review does not indicate, for example, whether or not there exists a large number of primary research studies that have not yet been included in systematic appraisals of the evidence. Nor can we evaluate the degree to which existing policies are evidence-based; we can only comment on whether there is sufficient summarized evidence to inform those policies.

Our search strategy and the study's conclusions were limited to factors that had a hypothesized or demonstrated association with behaviours affecting diet or physical activity. It is likely that, in some settings, academic research investigated factors associated with obesity or noncommunicable disease but did not explicitly categorize behaviour. Consequently, given that we were primarily interested in factors associated with behaviour rather than disease, our search strategy – though broad – could have missed some reviews of the determinants of diet and physical activity. Moreover, the cut-off date for inclusion in our review was 2019, which was just 4 years into the period covered by the SDGs. Most of the research included was, therefore, conducted during the era of the millennium development goals, which focused on undernutrition and did not stipulate any targets or indicators for noncommunicable disease.

Another limitation was that we did not appraise the quality of the reviews or the robustness of their evidence because our scoping review was intended primarily to map work in this area. Moreover, we identified papers only in English and may have missed reviews in other languages. We did not search the grey literature as our focus was on peer-reviewed academic journals. However, having identified gaps in the literature,
In conclusion, our scoping review of reviews provides an overview of an important and rapidly evolving area of work. As our search strategy was kept broad by design, we found that a wide range of factors were reported to be associated with diet and physical activity in Africa and the Caribbean. However, evidence on which to base policy or to design interventions was lacking, which highlights the need for further reviews of the primary evidence to inform policy responses where the evidence exists, and to establish whether additional primary research is needed. As the modifiability of determinants of diet and physical activity and the feasibility of modifying them vary widely, future research should be aligned with policy targets and should evaluate the effectiveness of policy responses in different contexts.

Acknowledgements

We thank members of the Global Diet and Activity Research Network: Rosemary Musuva, Charles O Onyono, Pamela Wadendre and Vincent Were (Kenya Medical Research Institute, Kenya); Anna Brugulat, Ebele Mogo, Tolui Oni, Lambed Tatah, Nicholas J Wareham and James Woodcock (University of Cambridge, England); Estelle Victoria Lambert, Feyi Odunitan-Wayas, Kufre Okop, Maylene Shung-King and Amy Weimann (University of Cape Town, South Africa); Nadia Bennett, Ishtar Govia, Nathalie Guthrie-Dixon, Ian Hambleton, Alafia Samuels, Joanne Smith and Marshall Tulloch Reid (University of the West Indies, Jamaica); Agnes Erzse, Karen J Hofman, Kelsey Lebard, Gugulethu Mabena, Lisa K Micklefield, Molebogeng Mothlahedi and Shane A Norris (University of Witwatersrand, South Africa); and Felix Assah, Clarisse Mapa, Jean Claude Mbanya and Yves Wasnyo (University of Yaoundé, Cameroon).

Funding: This research was funded by the National Institute for Health Research (NIHR; 16/137/64) using UK aid from the UK Government to support global health research.

Competing interests: None declared.

Financial disclosure: None declared.

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Objectif
Identifier et décrire les synthèses de données probantes consacrées aux facteurs liés au régime alimentaire et à l’activité physique dans les pays à faible et moyen revenu en Afrique et dans les Caraïbes, en examinant la portée des revues.

Méthodes
Nous avons examiné les bases de données Medline®, LILACS, Scopus, Global Health et Web of Science en quête de revues publiées entre 1998 et 2019, consacrées aux facteurs liés au régime ou à l’activité physique. Au moins 25% des études citées dans ces revues devaient provenir d’Afrique ou des Caraïbes. Nous avons ensuite classé les facteurs à l’aide du modèle social de santé Dahlgren et Whitehead. Aucune évaluation de la qualité n’a été effectuée.

Résultats
Nous avons repéré 25 revues: 13 sur le régime, quatre sur l’activité physique et huit réunissant les deux thèmes. Dix-huit articles étaient des revues systématiques quantitatives. Dans 12 revues, 25 à 50% des études avaient été réalisées en Afrique ou dans les Caraïbes. Seulement trois contenaient des éléments de preuve relatifs aux facteurs liés à la nutrition ou l’activité physique dans ces régions. En 12 revues, entre 25 et 50% de ces études provenaient d’Afrique ou des Caraïbes. Prises dans leur ensemble, les 25 revues renfermaient des preuves primaires publiées entre 1926 et 2018. Rares étaient les synthèses de données probantes consacrées aux liens entre la santé internationale ou les facteurs politiques d’une part, et le régime alimentaire de l’autre, ou encore entre n’importe quel facteur et l’activité physique dans toutes les catégories du modèle social de santé.

Conclusion
L’examen de la portée a permis de découvrir un large éventail de facteurs considérés comme en lien avec le régime alimentaire et l’activité physique en Afrique et dans les Caraïbes. Toutefois, il manquait une synthèse des données probantes, qui aurait pu contribuer à orienter les politiques destinées à encourager les comportements favorisant un régime alimentaire sain et la pratique d’une activité physique dans ces régions. D’autres revues sont nécessaires pour fournir des informations aux politiques lorsqu’il existe une preuve, et pour déterminer si une recherche préliminaire supplémentaire est requise.
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Box 1. Search strategies, scoping review of reviews of factors associated with diet and physical activity in Africa and the Caribbean, 1998–2019

Medline® search strategy
1. diet.mp. OR exp DIET
2. exp NUTRITION DISORDERS/ OR nutrition*.mp.
3. food intake.mp. OR exp Eating/
4. exp Feeding Behavior/ OR eating behavior*.mp.
5. junk* food*.mp.
6. (calori* adj2 intake*).mp.
7. meat consumption.mp.
8. (high adj2 (fat* OR salt* OR sugar*)).mp.
9. malnutrition.mp. OR exp MALNUTRITION/
10. exp Malnutrition/ OR malnourish*.mp.
11. (fruit AND veg*).mp.
12. exp Energy Intake/ OR energy intake*.mp.
13. (physical* adj2 activ*).mp.
14. exp Exercise/
15. exercis*.mp.
16. (active adj2 (living OR transport* OR travel*)).mp.
17. walk*.mp. OR exp Walking/
18. (bike OR bicycl* OR biking).mp.
19. exp SEDENTARY LIFESTYLE/ OR exp Physical Exertion/ OR sedentary.mp.
20. (physical* adj2 exert*).mp.
21. (screen time OR screentime).mp.
22. manual labo?r*.mp.
23. subsistence.mp.
24. mobi*.mp.
25. or/1–24
26. determinant*.mp. OR exp "SOCIAL DETERMINANTS OF HEALTH”/
27. exp SOCIOECONOMIC FACTORS/ OR socioeconomic*.mp.
28. associat*.mp.
29. correlat*.mp.
30. (policy OR policies).mp.
31. legislat*.mp.
32. exp Risk Factors/ OR risk factor*.mp.
33. built environment.mp. OR exp Environment Design/
34. exp SOCIAL ENVIRONMENT/ OR exp ENVIRONMENT/ OR environment*.mp.
35. cultur*.mp.
36. ethnograph*.mp.
37. psychosocial*.mp.
38. exp Demography/ OR demograph*.mp. OR exp Population Dynamics/ OR exp Population Characteristics/
39. exp Epidemiology/ OR exp Epidemiologic Studies/ OR exp Epidemiologic Methods/ OR exp Epidemiological Monitoring/ OR epidemiolog*.mp.
40. (cohort* OR longitudinal* OR observation*).mp.
41. or/26–40
42. Developing Countries.sh,kf.
43. ((developing OR less* developed OR under developed OR underdeveloped OR middle income OR low* income OR underserved OR under served OR deprived OR poor*).adj (country* OR nation? OR population? OR world)).ti,ab.
44. ((developing OR less* developed OR under developed OR underdeveloped OR middle income OR low* income) adj (economy OR economies)).ti,ab.
45. (low* adj (gdp OR gnp OR gross domestic OR gross national)).ti,ab.
46. (low adj3 middle adj3 countr*).ti,ab.
47. (lmic OR lmics OR third world OR lami countr*).ti,ab.
48. transitional countr*.ti,ab.
50. or/49–50

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... continued ...

49. review.pt.
50. review.ab,ti.
51. 49 OR: 50
52. (Africa OR Caribbean OR West Indies)hw,ti,ab,cp.
53. exp AFRICA/
54. exp Caribbean Region/
55. (Africa OR Caribbean OR Sub Saharan OR “Sub Sahara” OR Algeria OR Angola OR Belize OR Benin OR Botswana OR “Burkina Faso” OR Burundi OR “Cabo Verde” OR “Cape verde” OR Cameroon OR “Central African Republic” OR Chad OR Comoros OR Comores OR Comoro OR Congo OR “Cote d’Ivoire” OR Cuba OR Djibouti OR Dominica OR “Dominican Republic” OR Egypt OR Eritrea OR Ethiopia OR Gabon OR Gambia OR Ghana OR Grenada OR Grenadines OR Guinea OR “Guinea Bisau” OR Guyana OR Haiti OR Jamaica OR Kenya OR Lesotho OR Liberia OR Libya OR Madagascar OR Malawi OR Mali OR Mauritania OR Mauritius OR Morocco OR Mozambique OR Namibia OR Niger OR Nigeria OR Principe OR Rwanda OR Ruanda OR “Sao Tome” OR Senegal OR “Sierra Leone” OR Somalia OR “South Africa” OR “South Sudan” OR “St Lucia” OR “St Vincent” OR Sudan OR Surinam OR Suriname OR Swaziland OR Tanzania OR Togo OR Tunisia OR Uganda OR Zambia OR Zimbabwe).tw.
56. or/52–55
57. (non-infectious* OR noncommunicable* OR NCD OR non-communicable*).mp.
58. 42 OR: 43 OR: 44 OR: 45 OR: 46 OR: 47 OR: 48 OR: 49 OR: 56
59. 25 OR: 57
60. 59 AND 41 AND 58 AND 51
61. review.m_titl.
62. 59 AND 41 AND 58 AND 61
63. (‘scoping review’ OR ‘systematic review’ OR ‘narrative review’ OR ‘literature review’ OR ‘evidence review’ OR ‘mixed methods review’ OR ‘realist review’ OR ‘realist synthesis’ OR ‘meta-ethnography’ OR ‘meta ethnography’).ab,ti.
64. 59 AND 41 AND 58 AND 63

Search strategy for other databases
#1 TS = (diet)
#2 TS = nutrition*
#3 TS = food intake
#4 TS = eating behavior*
#5 TS = (junk* food*)
#6 TS = (“calori* intake*”)
#7 TS = (meat consumption)
#8 TS = (“high fat” OR “high salt” OR “high sugar”)
#9 TS = malnutrition
#10 TS = malnourish*
#11 TS = (fruit* AND veg*)
#12 TS = (energy intake*)
#13 TS = (“physical* activ*”)
#14 TS = exercis*
#15 TS = (“active living” OR “active transport” OR “active travel”)
#16 TS = (walk)
#17 TS = (bike OR bicycl* OR biking)
#18 TS = sedentary lifestyle
#19 TS = physical* exert*
#20 TS = (screen time OR “screen time”)
#21 TS = manual labo?r
#22 TS = subsistence
#23 TS = mobilisa*
#24 #23 OR #22 OR #21 OR #20 OR #19 OR #18 OR #17 OR #16 OR #15 OR #14 OR #13 OR #12 OR #11 OR #10 OR #9 OR #8 OR #7 OR #6 OR #5 OR #4 OR #3 OR #2 OR #1
#25 TS = (determinant* OR socioeconomic* OR associat* OR correlat* OR policy OR policies OR legislat* OR risk factor* OR built environment OR environment* OR cultur* OR ethnograph* OR psychosocial* OR demograph* OR epidemiolog* OR cohort* OR longitudinal* OR observation*)
#26 TS = (“scoping review” OR “systematic review” OR “narrative review” OR “literature review” OR “evidence review” OR “mixed methods review” OR “realist review” OR “realist synthesis” OR “meta-ethnography” OR “meta ethnography”)

continues ...
Systematic reviews
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Note: Each numbered line was run as a separate search. Then, the searches were combined in different ways using Boolean operators and the line numbers for each search.
### Table 1. Reviews included in scoping review of factors associated with diet and physical activity in Africa and the Caribbean, 1998–2019

| Review author (publication year) | Publication years of studies in review | Type of review | No. studies in review | No. studies in Africa or the Caribbean | African or Caribbean countries in studies reviewed | Population group studied | Factors associated with diet or physical activity | Notes on factors | Outcomes | Notes on outcomes |
|---------------------------------|----------------------------------------|----------------|-----------------------|----------------------------------------|-----------------------------------------------|--------------------------|-------------------------------------------------|-----------------|-----------|------------------|
| ≥ 50% of studies in review from Africa or the Caribbean |
| Abubakari and Bhopal (2008)\(^a\) | 1964–2003 | Systematic review of quantitative studies | 16 | 16 | Ghana and Nigeria | Adults | Sex, socioeconomic status and urban or rural residence | NA | Physical activity | Additional outcomes of interest were diabetes prevalence and body composition |
| Raschke et al. (2008)\(^b\) | 1963–1969 | Systematic review of historic data (design of included studies unclear) | 6 | 6 | East Africa | Children and adults | Colonialization, natural environment and urbanization | (i) Cash-crop farming and replacement of indigenous crops; (ii) global food systems; (iii) urbanization; and (iv) destruction of natural ecosystems | Diet | (i) Food shortages; (ii) dependence on introduced or donated cereals; and (iii) loss of dietary diversity |
| Abubakari et al. (2009)\(^c\) | 1964–2003 | Systematic review and meta-analysis of quantitative studies | 15 | 15 | West Africa | Adults | Age, sex and urban or rural residence | NA | Physical activity | An additional outcome of interest was diabetes prevalence |
| Larouche et al. (2014)\(^d\) | 1982–2013 | Systematic review of quantitative studies | 20\(^e\) | 20 | Africa | Children and young people | Socioeconomic status and urban or rural residence | NA | Physical activity | Active travel (walking, running or cycling for transport) |
| Muthuri et al. (2014)\(^e\) | 1967–2013 | Systematic review of quantitative studies | 71 | 71 | Sub-Saharan Africa | Children and young people | Age, socioeconomic status, sex and urban or rural residence | NA | Physical activity | Additional outcomes of interest were sedentary behaviour and physical fitness |

(continues . . .)
| Review author (publication year) | Publication years of studies in review | Type of review | No. studies in review | No. studies in Africa or the Caribbean | Review setting | African or Caribbean countries in studies reviewed | Population group studied | Factors associated with diet or physical activity | Notes on factors | Outcomes | Notes on outcomes |
|---------------------------------|---------------------------------------|----------------|-----------------------|----------------------------------------|----------------|------------------------------------------------|--------------------------|-------------------------------------------------|-----------------|----------------|------------------|
| Sobers-Grannum et al. (2015)13  | 2007–2013                             | Systematic review and meta-analysis of quantitative studies | 50                     | 50 Caribbean             | Bahamas, Barbados, Cuba, Grenada, Guadeloupe, Jamaica, Puerto Rico, Saba, Suriname, Trinidad and Tobago and Virgin Islands (USA) | Children and adults | Ethnicity, socioeconomic status and sex | (i) Only findings on sex were summarized in the review; and (ii) socioeconomic status was derived from educational level, occupation and income | Diet and physical activity | (i) More studies were on physical activity than on diet; and (ii) additional outcomes of interest were body composition, tobacco smoking, metabolic syndrome and diabetes |
| Lew-Levy et al. (2017)15        | 1939–2015                             | Meta-ethnographic review of quantitative and qualitative studies | 58                     | 31 Hunter–gatherer societies | Botswana, Cameroon, Central African Republic, Democratic Republic of the Congo, Ethiopia, Madagascar, South Africa and United Republic of Tanzania | Children | Age, interventions, sex and social environment | Interventions included teaching, imitation and participation | Diet and physical activity | Self-sufficiency and subsistence skills for hunter–gatherer societies |
| Misselhorn and Hendriks (2017)16  | 1997–2014                             | Systematic review (design of included studies unclear) | 169                    | 169 South Africa (mainly rural areas) | South Africa | Assumed children and adults (unclear from article and appendices) | Access to food, food prices, urban or rural residence, socioeconomic status and sex | (i) Food stability (variability over time in supply and access); (ii) access to food (mediating factors of affordability, allocation and power relations); (iii) food utilization (nutritional value in terms of dietary quality, diversity and quantity, social value, food preparation and safety); and (iv) food availability (production, distribution and exchange) | Diet | Food insecurity |

(continues...)
| Review author (publication year) | Publication years of studies in review | Type of review | No. studies in review | No. studies in Africa or the Caribbean | Review setting | African or Caribbean countries in studies reviewed | Population group studied | Factors associated with diet or physical activity | Notes on factors | Outcomes | Notes on outcomes |
|----------------------------------|----------------------------------------|----------------|-----------------------|---------------------------------------|----------------|-----------------------------------------------|------------------------|-----------------------------------------------|----------------|----------|------------------|
| Pullar et al. (2018)             | 1999–2015                              | Systematic review of quantitative intervention studies | 29 | 15 | Low- and middle-income countries | Burkina Faso, Burundi, Democratic Republic of the Congo, Egypt, Ethiopia, Ghana, Kenya, Malawi, Mali, Mozambique, Niger, Nigeria, Rwanda, Senegal, Uganda and United Republic of Tanzania | Children and adults | Interventions (i) Poverty reduction; and (ii) development interventions targeting economic development, social inequalities, community engagement, agriculture, fisheries, water or sanitization, or human rights | Diet and physical activity | More studies were on diet than on physical activity |
| Abdurahman et al. (2019)         | 2013–2018                              | Systematic review of quantitative studies | 26 | 26 | Ethiopia | Ethiopia | Infants and young children | Antenatal care, age, household composition, interventions, parental socioeconomic status, region and urban or rural residence | NA | Diet | Infant and young child feeding practices |
| Adom et al. (2019)              | 2000–2018                              | Systematic review of quantitative intervention studies | 10 | 10 | Africa | South Africa and Tunisia | School children | Interventions | School-based interventions targeting diet, physical activity or weight | Diet and physical activity | An additional outcome of interest was weight |
| Gyawali et al. (2019)            | 2003–2015                              | Systematic review of quantitative intervention studies | 10 | 5 | Low- and middle-income countries | Cameroon, South Africa and Uganda | Adults | Interventions | Community-based interventions for the prevention of type 2 diabetes | Diet and physical activity | Additional outcomes of interest were glycated haemoglobin levels, fasting blood glucose levels, blood pressure and weight |
| Klingberg et al. (2019)          | 2009–2016                              | Systematic review of quantitative intervention studies | 17 | 17 | Africa | South Africa, Tunisia and Uganda | Children | Interventions | Primarily school or after school programmes | Diet and physical activity | (i) More studies were on physical activity than on diet; and (ii) additional outcomes of interest were anthropometry, physical fitness and screen time |

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| Review author (publication year) | Publication years of studies in review | Type of review | No. studies in review | No. studies in Africa or the Caribbean | Review setting | African or Caribbean countries in studies reviewed | Population group studied | Factors associated with diet or physical activity | Notes on factors | Outcomes | Notes on outcomes |
|---------------------------------|---------------------------------------|----------------|----------------------|----------------------------------------|----------------|-------------------------------------------------|-------------------------|-----------------------------------------------|-----------------|----------|-------------------|
| Kristjansson et al. (2007) 39   | 1926–2004                             | Systematic review and meta-analysis of quantitative intervention studies | 18                    | 5                       | Worldwide | Jamaica and Kenya | School children (low socioeconomic status) | Age, interventions, sex and socioeconomic status | Interventions were school meal programmes | Diet | Additional outcomes of interest were physical health, psychological health, behavioural variables and adverse events |
| Lee et al. (2013) 30            | 1989–2010                             | Systematic review of quantitative studies | 62                    | 16                      | Low- and middle-income countries | Burkina Faso, Egypt, Ethiopia, Ghana, Jamaica, Kenya, Malawi, Morocco, Seychelles and South Africa | Pregnant women | Region and country | NA | Diet | NA |
| Johnston et al. (2015) 31       | 1978–2014                             | Systematic review of quantitative and qualitative studies | 89                    | 27                      | Low- and middle-income countries (rural areas) | Unspecified countries in sub-Saharan Africa, the Middle East, North Africa and Latin America | Children and adults | Age, household composition, interventions, sex, social environment and socioeconomic status | Agricultural interventions and practices | Diet | (i) Diet and nutritional outcomes; and (ii) time use related to agriculture |
| Osendarp et al. (2016) 32       | 2001–2014                             | Systematic review of quantitative studies | 23                    | 10                      | Low- and middle-income countries | Cambodia, Ethiopia, Malawi, South Africa, United Republic of Tanzania and Zimbabwe | Infants and young children | Age, interventions | The hypothetical optimization of intake of locally available foods | Diet | NA |
| Allen et al. (2017) 33          | 1994–2015                             | Systematic review of quantitative studies | 75                    | 35                      | Low- and lower-middle-income countries | Benin, Burkina Faso, Chad, Comoros, Côte d’Ivoire, Democratic Republic of the Congo, Egypt, Eritrea, Eswatini, Ethiopia, Ghana, Kenya, Malawi, Mali, Mauritania, Morocco, Niger, Senegal, Togo, United Republic of Tanzania, Zambia and Zimbabwe | Children and adults | Age, sex and socioeconomic status | Socioeconomic status based on household or individual measures of income, wealth, assets, education, caste and occupation | Diet and physical activity | (i) More studies were on physical activity than on diet; and (ii) additional outcomes of interest were harmful use of alcohol and tobacco use |

(continued . . .)
| Review author (publication year) | Publication years of studies in review | Type of review | No. studies in review | No. studies in Africa or the Caribbean | Review setting | African or Caribbean countries in studies reviewed | Population group studied | Factors associated with diet or physical activity | Notes on factors | Outcomes | Notes on outcomes |
|----------------------------------|----------------------------------------|---------------|-----------------------|----------------------------------------|----------------|-----------------------------------------------|--------------------------|-----------------------------------------------|----------------|-----------|------------------|
| Graziose et al. (2018) 34        | 2006–2016                              | Systematic review of quantitative intervention studies | 18 5                     | Low- and middle-income countries       | Burkina Faso, Kenya, Madagascar and Nigeria | Infants and young children | Interventions | Mass media and nutrition education interventions | Diet           | Infants’ and young children’s feeding practices and related psychosocial factors, including the knowledge, attitudes and beliefs of caregivers |
| Kavle et al. (2018) 35           | 2004–2015                              | Systematic review of quantitative and qualitative studies | 23 8                     | Low- and middle-income countries       | Burkina Faso, Egypt, Ethiopia, Kenya, Nigeria and Senegal | Pregnant and lactating women | Access to food, food prices, socioeconomic status and social environment | Specific barriers and facilitating factors associated with maternal diet during pregnancy and the postpartum period | Diet           | NA |
| Abrahale et al. (2019) 441       | 1985–2017                              | Systematic review | 441 162                | Worldwide                             | Unspecified countries in Africa | Children and adults | Interventions | Street food availability and consumption | Diet           | An additional outcome of interest was food safety |
| Audate et al. (2019) 310         | 1996–2017                              | Systematic review of quantitative and qualitative intervention studies | 101 36                   | Worldwide                             | Benin, Botswana, Cameroon, Côte d’Ivoire, Eswatini, Ghana, Kenya, Lesotho, Malawi, Mozambique, Namibia, Nigeria, South Africa, Uganda, United Republic of Tanzania, Zambia and Zimbabwe | Children and adults (in urban areas) | Interventions | Urban agriculture | Diet           | Additional outcomes of interest were food security, nutrition, social capital, health, sanitation, socioeconomic status, natural or physical environment, cultural connections and lifestyle |
| Boneya et al. (2019) 17          | 2009–2017                              | Systematic review and meta-analysis of quantitative studies | 17 6                     | Worldwide                             | Ethiopia, Senegal and Uganda | HIV-infected adults receiving antiretroviral therapy | Sex | NA | Diet | Food insecurity |
| Leandro et al. (2019) 11         | 2001–2016                              | Systematic review of quantitative studies | 11 4                     | Lower- and middle-income countries | Ghana, Lesotho, Nigeria, Sudan and Uganda | Adolescents | Barriers to and enablers of obesogenic behaviour | NA | Diet and physical activity | Additional outcomes of interest were overweight and obesity |

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(continued)

| Review author (publication year) | Publication years of studies in review | Type of review | No. studies in review | No. studies in Africa or the Caribbean | Review setting | African or Caribbean countries in studies reviewed | Population group studied | Factors associated with diet or physical activity | Notes on factors | Outcomes | Notes on outcomes |
|----------------------------------|---------------------------------------|----------------|----------------------|----------------------------------------|----------------|-----------------------------------------------|--------------------------|-----------------------------------------------|----------------|----------|------------------|
| Webb Girard et al. (2020)\(^b\)   | 2000–2017                             | Systematic review of quantitative intervention studies | 64                   | 23                       | Low- and middle-income countries         | Egypt and unspecified countries in sub-Saharan Africa | Infants and young children | Interventions | Interventions to shift complementary feeding behaviours | Diet | Infant and young child feeding practices |

HIV: human immunodeficiency virus; NA: not applicable.

\(^a\) An additional 19 studies assessed the psychometric properties of assessment tools. These were not restricted to Africa and predominantly included high-income countries.

\(^b\) First published online in 2019.