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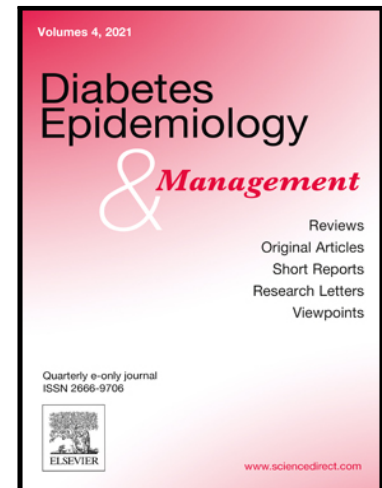
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Dietary assessment of type-2 diabetes in Africa: a systematic scoping review

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Declaration of interests

Abstract

Background: The prevalence of type 2 diabetes (t2dm) in Africa is increasing due to increase in associated risks factors such as unhealthy eating, obesity and physical inactivity. Diet monitoring is an important component in the management of t2dm to aid and prevent progression and complications. Research on dietary assessment in Africa is currently gaining interests and this paper aims to review the dietary assessment methods used with people living with t2dm.

Methods: The Cochrane Library, MEDLINE, Global Health and Web of Science databases were searched using keywords to identify studies that assessed the diet of people living with type-2 diabetes in Africa. The keywords were those related to the concepts: t2dm, dietary assessment, Africa and nutrient intake. We excluded papers not written in English, studies without a quantitative dietary assessment and studying a specific food, studies done among Africans but in developed countries, studies done among children and studies that measured neither energy intake or body mass index.

Result: Search yielded 132 papers after duplicates were removed. This reduced to 41 after the title and abstract screening and further to 10 after the full text screening. The included papers were based in six African countries: Algeria, Morocco, Uganda, Ghana, Cameroon and South Africa. The 24-hour dietary recall was the most common dietary assessment method used in 8 studies and two studies used the estimated food diaries. Five studies did not use a country-specific food composition table. Eight used a researcher-entered online dietary analysis software for nutrient intake estimation, out of which 7 contained the food database of a different country. Two studies estimated nutrient intake using a statistical tool and paper-and-pen. None of the dietary assessment methods used in the studies was validated in this patient group.

Conclusion: Limited evidence was available on the measurement of diet in patients with t2dm in Africa. There is need to improve the dietary assessment methods in Africa to prevent the progression and complication of t2dm.

1 Introduction

Diabetes mellitus is a metabolic disorder characterized by a defect in the secretion and/or action of insulin. It is a global health problem and 87% of diabetes-related deaths occur in developing countries [1]. Nineteen million (ranging from 11–36 million by country) are living with diabetes in Africa and this number is expected to increase by 48% within the next decade [1, 2]. Type-2 diabetes mellitus (t2dm) accounts for 90% of all diabetes in Africa with an estimated health cost of 9.5 billion USD [1]. Its prevalence has continued to increase in developing countries largely because of a change from a traditional to a modernised lifestyle such as physical inactivity and consumption of unhealthy diets [3].

Dietary assessment allows the food habits of a group of persons to be tracked and associations made with diet-related diseases. Here the frequency, kinds and amounts of foods eaten over a given period are monitored and recorded by a dietitian or the patients themselves using a range of tools such a 24-hour recall, food frequency questionnaire, food diaries or food record [4, 5].

The management of t2dm should be centred on healthy eating and maintenance of a healthy body weight. Dietary assessment is an essential component of t2dm management to support reduction of blood glucose levels and the risk of complications. However, dietary information is often neglected, even though at least some attention to diet is needed to achieve adequate glycaemic control [6].

Two systematic reviews found that although most people living with t2dm in Africa understood the importance of diet to their disease condition, adherence to their dietary change

was a challenge in the management of the disease [7, 8]. These studies did not report any dietary assessment method used as it was beyond the scope of their studies. Two systematic reviews [9, 10] that studied the dietary assessment methods and tools used in Africa identified that lack of assessment tools is a major challenge in nutritional epidemiology. The reviews revealed that reliable and standardized tools were lacking across the region. Furthermore, they reported that most countries either used food composition databases from the US or UK or that of neighbouring countries due to lack of country-specific food composition tables. This lack of specific food composition data will affect our ability to assess food intake in the general population. However, none of the reviews included dietary assessment of people living with t2dm. It is important that food composition is comprehensive and includes patients' frequently consumed foods. This review aims to identify the evidence that exists on dietary assessment tools that have been used in the management of t2dm in Africa.

2 METHODS

The protocol for this review has been registered in PROSPERO (CRD42021243423) [11]. A systematic literature search was used according to the reporting items for systematic reviews and meta-analysis (PRISMA) guidelines.

2.1 Literature search

The literature search was conducted on the Cochrane Library, Medline, Global Health and Web of Science for articles published from inception to March 2021. The search identified scientific papers focused on studies about the dietary intake of people living with t2dm in Africa. Specific MeSH terms used in the search were nutrient intake, dietary assessment, t2dm and Africa. Details of the search terms have been described in Table 1 below.

Table 1: Search terms and keywords

Concept 1: Type 2	Concept 2: Dietary	Concept 3: Nutrient intake	Africa

diabetes	assessment tools		
OR	AND/OR	AND/OR	AND/OR
Type 2 diabetes Non-insulin dependent diabetes T2DM NIDDM	Nutrition assessment Nutrition survey Diet record Dietary recall Food questionnaire Food record Nutrient recall Diet/nutrient measure FFQ Nutrient multiple pass	Nutritional status Nutrient/energy intake Diet quality Food intake Feeding behaviour Dietary/food habit Dietary pattern Meal pattern Micronutrient/macronutrient intake	Africa Developing countries North Africa South Africa East Africa West Africa

2.2 Inclusion and exclusion criteria

The study criteria were decided using the PICO (Population, Intervention, Comparator and Outcomes) framework [12]. The inclusion criteria were studies that assessed the dietary intake of people living with t2dm in Africa published in English. Six exclusion criteria adopted were: i) studies carried out among children and non-humans, ii) studies carried out among Africans but not in Africa, iii) studies that assessed a specific diet/food rather than the entire patients' diets, iv) studies that did not include a quantitative assessment of the diet, v) studies in non-English languages and vi) studies that did not record either energy intake or body mass index.

2.3 Screening of identified papers

Titles and abstracts screening were done independently in duplicate by members of the study team (CAU, JEC) and disagreements were resolved by discussion. Full-text articles were screened by a member of the study team (CAU).

2.4 Data extraction

Data on the characteristics of the studies, dietary assessment methods that were used in each of the studies, administration of the tools, measurements of portion sizes, dietary database

and analysis tools were extracted and collated. In addition, information on the energy intake and body mass index of the patients were extracted.

3   RESULTS

3.1   Systematic search

Using the combination of keywords described above, a total of 132 papers were retrieved after duplicates were removed. Figure 1 shows the flowchart explaining the stages involved in the selection of papers that were included in this scoping review. Out of the 132 papers, 91 papers were excluded after the title and abstract screening because they did not meet the selection criteria. The papers excluded at this stage were either review papers (4), conducted outside Africa (14) and in non-adults (10), written in any other language other than English (7), had no information of quantitative dietary assessment (9) and among people without type 2 diabetes (47). At the next stage of full text screening, 31 papers that did not meet the study criteria were excluded. Twenty studies did not include quantitative dietary assessment, 4 studies were not among people living with type 2 diabetes, there was no access to the full text of 2 papers, 1 was a review paper, 2 papers had participants residing outside Africa; and 2 had no information on either the energy intake or body mass index of the patients.
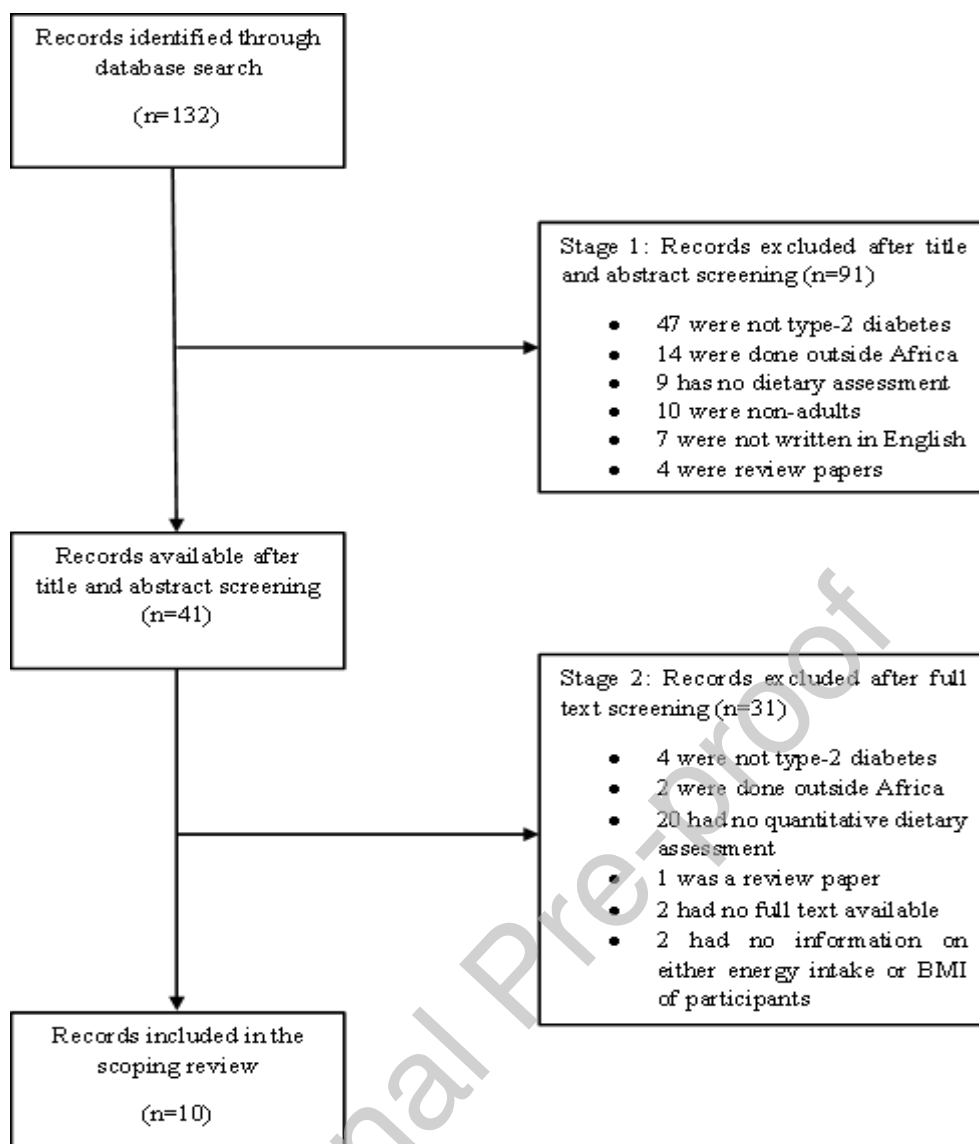
Figure 1: Flow chart indicating selection of papers included in the scoping review

3.2 Characteristics of included studies

The final number of included papers was 10 [13-22]. The regions where the included studies

were carried out have been shown in Figure 2. The study types were a randomized controlled

trial (n=1), cross-sectional studies (n=5) and case control studies (n=4). Papers included in

this review were conducted in seven different African countries located in different regions of

Africa as follows: Northern Africa -Algeria [13, 15] and Morocco [16], Eastern Africa-

Uganda [19], West Africa- Ghana [17, 21], Mali [14] and Cameroon [18], Southern Africa-

South   Africa   [20,   22]   .
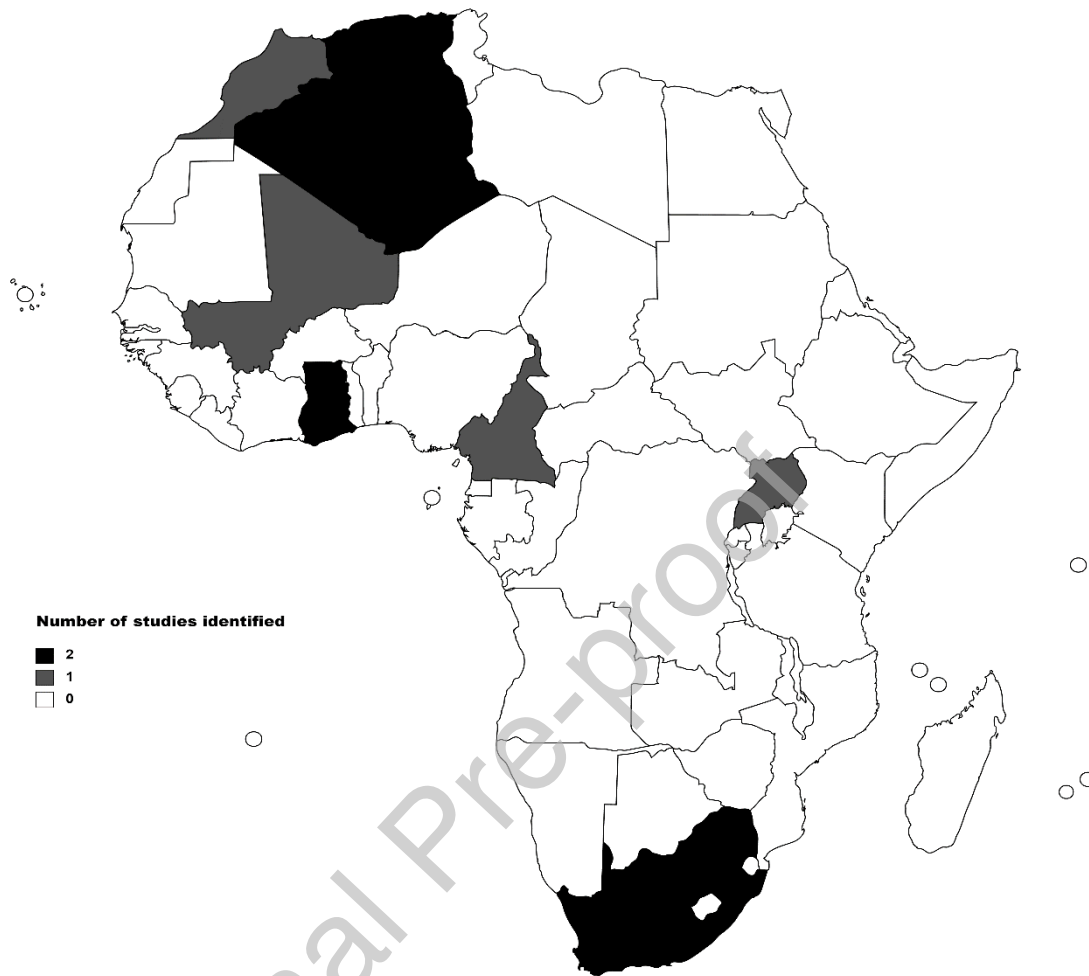
Figure 2: Map of studies that assessed dietary intake of people living with type 2 diabetes in Africa

The studies were conducted either in an urban setting [13-15, 17, 18, 21] or had participants

from both urban and rural locations [16, 20, 22]. For all the studies, sample selections were

carried out in hospital/clinical settings and the presence of t2dm, either self-reported,

confirmed through the patients' medical records or a fasting glucose test, was the eligibility

criterion.   The study characteristics have been described in Table 2 below.

Table 2: Description of included studies.

Author	Design	Country	Setting	Sample size	Age (years)	Inclusion criteria	Diagnostic criteria
1. Behar et al.	Case control	Algeria	Urban	140	59 (95%	Patients with	Not mentioned

2020 [13]				women	CI 57 to 61)	t2dm	
2. Diaf and Khaled 2018 [15]	Cross-sectional	Algeria	Urban	95 women	56 (95% CI 54 to 58)	Patients with t2dm (without cardiovascular disease)	Medical records were used to confirm t2dm.
3. Matovu et al. 2017 [19]	Cross-sectional	Uganda	Urban	200 adults	Women: 51 (95% CI 50 to 53) Men: 51 (95% CI 45 to 55)	Patients with t2dm	Selection was done with patients' medical records.
4. Muchiri et al. 2016 [22]	Randomized controlled trial	South Africa	Rural	76	58.8 (95% CI 57.1 to 60.5)	Patients with t2dm	Blood sugar and HbA1c levels.
5. Nti et al. 2016 [21]	Cross-sectional	Ghana	Urban	120 adults (82 women, 38 men)	51 (95% CI 49 to 53)	Patients with t2dm, ≥18 years and reported for regular clinic visit	Medical records were used to confirm t2dm
6. Dinar et al. 2015 [16]	Case control	Morocco	Urban (51%) and rural (49%)	240 adults (150 women, 90 men) Cases = 95 Control = 145	46 (95% CI 45 to 48) Control: 52 (95% CI 50 to 53)	Patients with t2dm who attended a diabetes education programme Control: t2dm patients who did not attend the programme	Not mentioned
7. Frank et al. 2014 [17]	Case control	Ghana	Urban	542 adults	55 (95% CI 54 to 56)	Patients with t2dm	Not mentioned
8. Coulibaly et al. 2009 [14]	Cross-sectional	Mali	Urban	57 adults (40 women, 17 men)	55 (95% CI 52 to 57)	Patients with t2dm for at least 1 year.	Medical records and fasting plasma glucose concentrations ≥7 mmol/l.
9. Makamto et al. 2005 [18]	Case control	Cameroon	Urban	81 adults (25 women, 56 men)	Women: 56 (95% CI 52 to 59) Men: 57 (95% CI 54 to 59)	Patients diagnosed with t2dm and receiving treatment for at least a year.	Not mentioned
10. Nthangeni et al. 2002 [20]	Cross-sectional	South-Africa	Urban (47%) and rural (53%)	288 adults (155 women, 133 men)	Urban: 62 (95% CI 61 to 64) Rural: 62 (95% CI 60 to 63)	Patients with t2dm for at least one year and attending diabetic outpatient clinic	Not mentioned

3.3 Dietary assessment Methods

Table 3 below summarized the dietary assessment methods and dietary analysis tools used in

the selected studies. Three different assessment methods were used across the 10 studies

included in this review. Eight of the 10 of the selected studies used a dietary recall on one or

more days [13, 14, 16, 17, 19-22], two studies used estimated diaries [15, 18] while two studies [17, 21] used a food frequency questionnaire in addition to the 24-hour recall. Three of the eight studies that used the dietary recall [13, 17, 21] reported using a single recall for the indicated reference time while three studies [14, 20, 22] chose multiple recalls. Two studies [16, 19] did not mention the number of recalls they used. Most of the studies [13, 14, 17, 19, 20, 22] reported using either household utensils or food models for description of portion sizes while two studies [16, 21] did not mention how portion sizes were described. Six studies [13, 14, 17, 19, 20, 22] reported the food composition tables/database they used in their studies. However, one of the studies [13] reported using a non-country-specific food composition table/database. In five studies, authors reported using country-specific food composition tables for Ghana [14], Mali [17], South Africa [19, 22] and Uganda [20]. In one of the studies [17], dietary intake was calculated using paper-and-pen while the rest of the studies used a digital tool. For all the studies that used a dietary recall, no information was given as to whether or not the tools were validated. Information on the dietary data collected from studies that used 24-hour dietary recall have been summarized in Table 3 above.

In addition to the 24-hour dietary recall, 2 studies [17, 21] also used a FFQ for dietary assessment. One of the studies [17] produced a semi-quantitative FFQ for the Ghanaian population, adapted from the Ghana Demographic and Health Survey; interviews were conducted by trained nurses in the respondents' local language to get information of usual dietary intake (number of days per week) for 51 food items in the last 12 months. The other study [21] had no information on the interviewer and the language of communication, source of the FFQ, and the reference time of the FFQ.

Of the ten studies selected for this review, two studies [15, 18] utilized the estimated food diaries to measure the dietary intake of type 2 diabetes patients where the participants were given instructions on how to record the foods they had eaten. Of the studies that used the

estimated food diaries, one study [15] assessed food intake for 3 days whilst the other [18] assessed for seven days. However, it was not mentioned if the number of days were consecutive or not. The details of the data collected in the studies have been summarized in Table 3.

3.4 Analysis of dietary data

Information on the dietary analysis tools used in the selected studies have been summarized in Table 3. Different food composition tables/database and dietary analysis software used in the selected studies were mentioned. The two studies carried out in Algeria [13, 15] utilized food composition database of France and Germany, respectively. Three studies [16, 18, 21] mentioned the use of food databases that were based on other countries' foods. Two studies did not use of any digital dietary analysis software but mentioned that dietary data was calculated by hand [17] or computed using a statistical tool such as SAS [20]. Only one of the studies in South Africa [22] used a dietary analysis software that contained a country-specific database.

3.5 Nutritional status of t2dm patients

Eight out of ten studies included in this review measured the energy intake and the body mass index (BMI) of the respondents. Detailed information has been shown in Table 3. Generally, men had higher energy intake (mean 2122, SD±496 Kcal/d) compared to the women (1848±459 Kcal/day) in the included studies while women had a higher BMI (mean 27.5, SD±5.4 kg/m^2) than the men (mean 24, SD±4 kg/m^2). For case-control studies, people with t2dm were found to be eating less in terms of energy compared to their non-diabetic counterparts.

Table 3: Dietary assessment of type-2 diabetes in Africa

Diet assessed by recall method								
Author	Referenc e time	Recall number	Validatio n	Measureme nt of portion size	FCT/ FCDB	Analysis Tool	Energy intake (kcal/day)	Body Mass Index (kg/m^2)

Behar et al. 2020 [13]	72 hours	1	nk	Measurement images and food models	Ciqual France	Ciqual France	-	Cases: 28.7 (95% CI 27.9 to 29.5)
Matovu et al. 2017 [19]	24 hours	nk	nk	Food models and images, utensils	HarvestPlus Ghana	DietOrganizer	All: 1960 (95% CI 1880 to 2040) Women: 1867 (95% CI 1780 to 1960) Men: 2189 (95% CI 2020 to 2360)	All: 26.7(95% CI 26.0, 27.2) Women: 27.6 (95% CI 26.7 to 28.5) Men: 24.7 (95% CI 23.6 to 25.8)
Muchiri et al	24 hours	3	nk	Food models, household measures	South Africa FCT	FoodFinder3	Intervention group:1732 (95% CI 1690 to 1770) Control group: 1665 (95% CI 1620 to 1710)	Intervention group: 31.5 (95% CI 29.4 to 33.6) Control group: 30.4 (95% CI 28.3 to 32.5)
Nti et al. 2016 [21]	24 hours	1	nk	nk	nk	ESHA Food Processor Plus	Women: 1870 (95% CI 1790 to 1950) Men: 2125 (95% CI 2020 to 2230)	24.4 (95% CI 23.8 to 25)
Dinar et al. 2015 [16]	nk	nk	nk	nk	nk	Nutrisoft Bilnut	1996 (95% CI 1950 to 2040)	26.5 (95% CI 25.8 to 27.2)
Frank et al. 2014 [17]	24 hours	1	nk	Household utensils	Ghana FCT	Paper-and-pen	1816 (95% CI 1770 to 1860)	25.8 (95% CI 21.5 to 30.1)
Coulibaly et al. 2009 [14]	48 hours	2	nk	Food models, photographs, utensils	Mali FCT	Canadian Nutrient File	1872 (95% CI 1710 to 2040)	Women- 27.0 (95% CI 25.4 to 28.6) Men- 24.1 (95% CI 22.3 to 25.9)
Nthangeni et al. 2001 [20]	24 hours	3	nk	Food models	South Africa FCT	SAS	Urban area Women: 1894 (95% CI 1790 to 2000) Men: 2019 (95% CI 1960 to 2080) Rural area: Women: 1665 (95% CI 1570 to 1760) Men: 1933 (95% CI 1830 to	-

							Energy intake (kcal/day)	
							2040)	

Diet assessed by food frequency questionnaire

Author	Reference time	Administration	Validation	Nature	Source	Number of foods	Energy intake (kcal/day)	Body Mass Index (kg/m²)
Nti et al. 2016 [21]	nk	Interview	nk	Face-to-face	nk	71	Women: 1870.3 (95% CI 1790 to 1950) Men: 2124.7 (95% CI 2020 to 2230)	24.4 (95% CI 23.8 to 25)
Frank et al. 2014 [17]	2 months	Interview	nk	Face-to-face	DHS Ghana	51	1816 (95% CI 1770 to 1860)	25.8 (95% CI 21.5 to 30.1)

Diet assessed by estimated food records

Authors	Reference	Administration	Validation	Measurement of portion size	FCT/FCDB	Analysis Tool	Energy intake (kcal/day)	Body Mass Index (kg/m²)
Diaf and Khaled 2018 [15]	3 days	Self	nk	nk	German	Nutrisurvey	-	28.49 (95% CI 27.6 to 29.4)
Makamto et al. 2005 [18]	7 days	Self	nk	Household measures	nk	World Food Dietary assessment system	Women: 2247.3 (95% CI 2030 to 2460) Men: 2477.2 (95% CI 2350 to 2610)	-

nk-not known; FCT- food composition table; FCDB- food composition database; SAS- statistical analysis software; DHS- Demographic and Health Survey

4 DISCUSSION

This study reviewed the dietary assessment methods that have been used to assess the dietary intake of type-2 diabetes patients in Africa. The small number of papers retrieved from this rapid review is an indicator of the large gap that needs to be filled around dietary assessment in people living with diabetes. This contrasts with the high number of papers (ranging from 20 to 96) included in systematic reviews of dietary assessments in t2dm patients in developed countries [23-26]. Type-2 diabetes management must be addressed in Africa and monitoring diet using valid dietary assessment methods is an important part of this process [27].

For all the studies in this review, recruitment was done in a health facility, only one of the studies [15] applied random recruitment method while the rest of the studies used the non-probability sampling methods such as convenience and purposive sampling. However, three strategies were adopted by authors of some of the included studies to ensure that the respondents had certain characteristics relevant to this review: i) defining the selection criteria for their study participants such as excluding pregnant women and t2dm patients with complications [13, 15], ii) confirming that the participants had t2dm [14, 15, 19, 21, 22] and iii) selecting those that have lived with t2dm for a specified period [18, 20, 22].

All the methods used in this review used subjective methods of dietary assessment and relied on the respondents' memory capacity and willingness to report the details of what had been eaten within the reference time. This makes these methods prone to bias such as recall biases and social desirability bias. However, this bias can be minimized if the interviewers are experienced nutritionists, dietitians or other personnel that are well-trained to collect such data [5, 28]. Other studies in Africa have also pointed out the use of trained nutritionists and dietitians in the collection of dietary information as a major challenge in many African countries due to lack of appropriately qualified individuals [9, 10]. Only one of the studies [17] used the multiple-pass 24-hour recall method used to help the respondents remember all they had within the reference time [29] .The use of multiple 24-hour recalls or a longer reference time beyond 24 hours in some of the studies was commendable as this approach can provide information about the daily dietary variations of the respondents. A multiple 24-hour dietary recall measures average dietary exposure more accurately compared to a single recall [30, 31] and is recommended for studies with people living with chronic diseases such as type-2 diabetes [28]. Whilst the drawbacks of the recall method of dietary assessment were acknowledged, authors reported using them due to their ease of administration [19, 20] and low literacy level of respondents [14, 17, 20].

Only one study described the details of the FFQ used in dietary assessment [17]. An FFQ may be used to assess the long-term and usual consumption of a defined list of foods and drinks over a given a period of time, ranging from one week to 12 months [32, 33]. A longer timeframe such as the preceding year, is recommended for FFQ so as to capture the different seasons of year, which are expected to have effect on food availability and consumption. The purpose of one of the FFQs [17] was to assess food groups consumed rather than to calculate nutrient intake. Since the FFQ in this review was interviewer-administered by trained personnel, it is less likely to be incomplete -a possible challenge of self-administered FFQs. Compared to the self-administered FFQ, interviewer-administered FFQs are less prone to bias as the interviewer can check for completeness of information supplied by the respondents [34]. Frank et al. [17] also mentioned that the FFQ used in their study was adapted from one used in that country's national survey. However, there was no information on whether the reproducibility of the FFQ was tested or not.

The two studies that used the food record method assessed intake using estimated food diaries for three [15] and seven days [18]. Dietary intake measured using estimated weights for up to 7 days was found to be more comparable with 16 days of weighed food records and use of biomarkers than the 24hr and FFQ [35]. In comparison with a single day of food record, multiple days of records will capture daily variations in what people eat. Acknowledging the limitations of the estimated food diaries, authors made efforts to reduce these by giving instructions on how to fill the diaries and interviewing and cross-checking the participants' diaries at the end of the record day.

While this review recognises the limitations of the dietary assessment methods used in the included studies to accurately measure energy intake, previous studies found underreporting of food intake to be common among people living with t2dm [36, 37]. This is likely to be

case for these case-control studies [17, 18] where a lower energy intake (up to 17%) was reported by those living with t2dm than those without t2dm.

In recall methods, the estimation of portion sizes is very important and could be done with food photographs, household measures and food models to help respondents to remember the quantity of foods they consumed. However the accuracy of this estimation is one of the limitations of recall methods and could be challenging [5, 31] especially in African countries where members of the family eat from a shared plate [9, 10]. Although it was beyond the scope of this review, it will be difficult to match the quantity of foods eaten with measured outcome in studies [15, 16, 21] that did not mention how portion size was estimated.

Food composition tables (FCTs) or food composition databases (FCDBs) contain data on the nutritional content of foods and are compiled from the analysis of representative foods within a region or country [38]. They are important in dietary research for the conversion of food intake into nutrient intakes and need to be regularly updated to capture all relevant and appropriate food items available in the setting and their nutrient contents [31]. Some African countries do not have their own FCTs and resort to FCTs/FCDBs from neighbouring countries or different regions [9, 10]. For countries that do have their own FCTs/FCDBs, there is need to regularly update their data to include more foods due to the increasing number of new (processed local and foreign) foods. However the resources and expertise needed to regularly analyse and collate nutrient composition of these new foods is lacking in Africa [39]. Only one of the studies in this review, from South Africa [22], used a software programme – FoodFinder3 [40], containing information on energy and food composition of 1741 commonly consumed foods in the country. The study in Algeria [13] used the Ciqual table, an FCDB containing nutrient data of 3,185 commonly consumed foods in France and

includes a software for calculating nutrient intake. Although Ciqual food composition table is regularly updated [41], it is unlikely to capture indigenous foods consumed by the Algerian population and will limit the reliability of the results when applied to countries other than France. On the contrary, although authors in Uganda [19] used the DietOrganizer (CNF), a mobile application containing the nutrients of over 50,000 foods commonly consumed in in the United States [42], they made efforts to improve the reliability of their results by using a Ugandan FCT for foods that were absent in DietOrganizer.

Validity and reliability should be considered in the choice of dietary analysis software in nutrition research. Most of the authors in this review used a computer software programme to calculate dietary intake [13-16, 18-22], most of which contained a food database. There has been an increasing number of new technologies for measuring diet in the form of mobile apps, web-based tools or camera tools [43]. Some of these applications are for consumer use rather than for research and may not give reliable results due to poor quality of FCT and the absence of validation of the tool against standard methods [44].

Dietary assessment in developed countries has been made easier and more reliable countries with the use of new technologies rather than the traditional methods and some of these have been used among people with diabetes [45-49]. In this review, collection of dietary data was done by interview and with paper-and-pen. Again, none of the software used contained the food database of any African country and indicates that work is needed to develop dietary assessment software with African country-specific FCTs/FCDBs or to incorporate the FCTs/FCDBs of African countries into existing software in the developed world. This will increase the accuracy of the dietary assessment methods and reduce the time and cost required for the studies.

The present review has strengths and limitation. The review is the first to study dietary assessment methodologies in t2dm in Africa and has been registered in PROSPERO. The literature search included a wide range of search terms to retrieve as many studies as possible. Again, as with scoping reviews [50], this study allowed us to explore dietary assessment methods among people living with type-2 diabetes, identify gaps and suggest possible ways of improving the methods. One of the limitations of this review was the lack of grey literature review from government websites and other peer-review articles that are not on the online databases we searched. Another limitation is that the review identified studies in only 6 out of 54 countries in Africa and none of the dietary assessment methods was reported to have been validated, limiting generalisability and reliability. However, this does identify a gap in the dietary management of t2dm in Africa. It was not possible to review non-English studies due to the language barriers of the study team. Lastly, as this was a scoping review, the quality assessment of studies included in this review was not performed [51]. However, this review provides an overview of dietary assessment among t2dm in Africa and identifies gaps that need to be filled in this area.

5 CONCLUSION

This review studied the dietary methodologies used in the dietary assessment of t2dm in Africa and reveals that there is need for countries to develop suitable country-specific food composition tables and update existing ones. The dietary assessment methods used were 24-hour recall, FFQ and estimated food diaries and work is needed to validate the methods used for more consistent and accurate results for effective management of t2dm. Lastly, efforts should be made to support the development of digital dietary assessment tools in Africa with country-specific food composition databases incorporated in them to improve management of t2dm.

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Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Author contributions

CAU, BE and JEC conceptualized the study; CAU carried out the searches; CAU and JEC selected the studies; CAU extracted the data, wrote the summaries of findings and the first draft of the manuscript; BE and JEC supervised the work, reviewed and edited the original manuscript. All authors have read and agreed to the published version of the manuscript.

Ethics declarations

Not applicable.

Declaration of Competing Interest

Janet Cade is Director of Dietary Assessment Ltd supporting measurement of diet.

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