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CLINICAL REVIEW

A review of complementary feeding practices in South Africa

Nazeeia Sayed* and **Hettie C Schönfeldt**

Department of Animal & Wildlife Sciences, University of Pretoria, Pretoria, South Africa
**Corresponding author, email: nazeeia.sayed@gmail.com*

Introduction: Infant health and nutrition in South Africa are a priority, as evidenced by the political commitment and policy development history of the last 25 years. Current efforts focus on improving breastfeeding rates, but the action plan for complementary feeding receives less attention and resourcing. A thorough analysis of the current infant feeding situation is required to assist with policy and targeted programmes associated with complementary feeding.
Aim: The aim of this review was to identify and collate all published research in South Africa on the complementary feeding practices of infants and young children, aged 0–24 months.
Methodology: Searches included English-language research published between 2006 and 2017, within PubMed, Scopus, Web of Science and Google Scholar. All papers included in the review had to meet defined eligibility criteria. Papers older than 11 years were excluded. In total 34 papers relevant to South Africa were identified and included in this review.
Main findings: Early introduction of foods and liquids other than breast milk is a common practice. Maize porridge is a common first food for infants, but there is also a high reliance on commercial infant cereal. Water and other liquids (e.g. tea, herbal mixtures) are commonly given to infants younger than six months. There is little information on the number of meals per day. The diets of many older infants do not meet the criteria for a minimally acceptable diet. Few animal source foods are used in complementary feeding. There are indications that processed meats, soft drinks, sweets and salty crisps are given regularly to older infants between six months and one year.
Conclusion: Complementary feeding practices in South Africa are suboptimal and appropriate action is needed to improve this situation. Further investigation is needed on whether older infants and young children can achieve their required dietary intakes from the food that is available to them. If a change in older infant and young child feeding behaviour is desired, then existing methods and approaches need to change.

Keywords: complementary feeding, IYCF, infant nutrition, weaning, South Africa

Infant and young child feeding in South Africa

Infant health and nutrition in South Africa are a priority, as evidenced by the political commitment and policy development history of the last 25 years (Table 1). The 2016 South African Demographic and Health Survey[2] indicated improved exclusive breastfeeding (EBF) to a level of 32% in infants younger than six months. However, in the same report, the rates of stunting for infants below the age of six months (32.3%) and for children younger than five years (27%) show that there is a need to improve older infant and young child nutrition through addressing complementary feeding practices in South Africa.

In 2003, Piwoz *et al.*[3] suggested that, globally, complementary feeding has not received adequate attention with regard to infant and young child feeding. Often, complementary feeding was not sufficiently addressed and the main objective has been the promotion, protection and support of breastfeeding. Similarly, in South Africa, the importance of complementary feeding during older infancy and young childhood (6–36 months) has not received adequate attention amongst the various stakeholders and research institutions.

Bhutta *et al.*[4] assessed various interventions and modelled how many lives could be saved if these interventions were implemented. This was done for the 34 countries in which 90% of the world's children with reported stunting are to be found. Following management of severe acute malnutrition (SAM), preventative zinc supplementation in infants and children and promotion of breastfeeding, complementary feeding interventions (scaled up to 90% coverage), are estimated to have the fourth largest impact on deaths averted from 10 interventions that were assessed. Furthermore, a focus on Infant and Young Child Feeding (IYCF) is second to management of malnutrition in terms of numbers of lives saved.[4] A South African assessment of lives saved attributed only 117 lives saved to appropriate complementary feeding, but this assessment only assumed coverage of complementary feeding education scaled up from 10% to 20%, and that complementary feeding education and provision of supplementation was scaled up from 5% to 15%.[5]

Older infants from six months are most vulnerable to malnutrition and growth faltering during the transition period from a milk diet to a diet that includes complementary food.[6] There may also be consequences to the late introduction of complementary foods; for example, the late introduction of complementary foods may also affect adult obesity[7] and predispose the infant to obesity later on.

In 2014, the Department of Health/Department of Social Development/Department of Performance Monitoring and Evaluation (DOH/DSD/DPME) evaluation report[8] highlighted the need to change the focus across sectors from current practices to nutrition promotion, exclusive breastfeeding, complementary

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Table 1: Selected strategies of the South African government to improve infant and young child nutrition[1]

Year	Action
1990, revised 2005	Innocenti declaration signed
1994, revised 2007	BFHI (Baby Friendly Hospital Initiative) Renamed MBFI (Mother Baby Friendly Initiative)
2007, revised 2013	IYCF (Infant and Young Child Feeding) policy
2011	Tshwane declaration of support for breastfeeding by Minister of Health
2012	Regulations relating to Foodstuffs for Infants and Young Children
2012	Maternal New-born, Child and Women's health and Nutrition strategy
2012	Roadmap for Nutrition in South Africa

feeding, dietary diversity and hygiene education. In assessing high-impact nutrition interventions, complementary feeding was singled out as the only one that was not prioritised and received a low (red) implementation score of 37.5%.[8]

South Africa has excellent policies in place and political commitment to improve infant health and nutrition, but the action plan for complementary feeding receives less attention and resourcing when compared with breastfeeding efforts. To the authors' knowledge, national food consumption surveys have not been conducted in South Africa on older infants between six months and one year, and there are no comprehensive literature reviews on complementary feeding practices during this critical life stage. A thorough analysis of the current complementary feeding situation is needed to facilitate policy and programme decisions.

Aim of this review

The aim of this review was to identify and collate all research that has been published in South Africa on the complementary feeding practices of infants, aged 0–24 months. Information on breastfeeding, age of introduction of other foods/liquids, the types of foods/liquids consumed, dietary diversity/adequacy and feeding frequency were investigated. It is anticipated that this review will provide more information regarding the complementary feeding practices in South Africa and encourage decision-makers to prioritise programmatic and research action on complementary feeding initiatives in South Africa.

Methodology

Electronic databases were searched using selected keywords in the following four search engines: PubMed, Scopus, Web of Science and Google Scholar.

The search terms used were:

- 'Complementary feeding South Africa';
- 'Complementary food South Africa';
- 'Infant feeding South Africa';
- 'Infant food South Africa';
- 'Infant nutrition South Africa';
- 'Weaning South Africa';
- 'Weaning food South Africa';
- 'IYCF South Africa';
- 'Infant and young child feeding South Africa';
- 'Breastfeeding South Africa';
- 'Formula feeding South Africa'.

To ensure more recent information on complementary feeding practices, articles older than 11 years (published before 2006) were excluded. However, two older articles (from 2005) were included as they were frequently cited in other articles. Studies on breastfeeding alone were also included, as they added valuable information to create a more comprehensive picture. One study was excluded because it included a sample of preschool children. All articles included in this review were read by the first author and their inclusion was confirmed by the second author. A total of 34 articles were included in this review.

Results

The published research mainly comprised cross-sectional studies with varying sample sizes, and varying sites of data collection across South Africa. Two national surveys (2016 SADHS[1] and the 2012 SANHANES[9]) were included. The supplementary table provides additional information pertaining to the details of each of the studies included in the review such as sample size, description, where the study was undertaken and type of study.

Data from all the articles included were collected using standardised questionnaires. There were three qualitative studies.[10–12] In the articles included in the review, breastfeeding estimates were made by asking about the current situation and by recall of past behaviour, and complementary feeding practices were obtained by the food frequency,[13–17] 24-hour[14,16–23] and 7-day recall of foods. Four studies[1,13,24,25] used the WHO IYCF indicators.[26]

The public health implications of infant feeding during HIV, and the research funding available for HIV research has undoubtedly led to an increase in the number of studies on IYCF that have been conducted. This is evidenced by the high number of HIV/PMTCT infant and young child feeding studies included in this review ($n = 14$ articles).[11,20,22,23,25,27–35] However, the results on breastfeeding practices found by this review need to be interpreted against the existing policy background and the changes made in HIV and infant feeding guidelines in South Africa. The practice of giving free formula might have influenced more mothers to choose to formula feed and might have made formula feeding more acceptable in communities.

Key findings of this review are given in Table 2.

Discussion

The recent South African Demographic and Health Survey[1] results showed an increase in stunting in older infants and young children between 8 and 23 months. This is the time when a child is introduced to and gradually makes the transition to the family diet, clearly indicating a problem with the complementary feeding practices. While it is imperative to continue investing in breastfeeding, it is also important to realise that complementary feeding practices are also suboptimal. It is clear from this review that actions to improve complementary feeding practices are urgently needed.

Lutter *et al.*[44] proposed 3 broad interventions to improve complementary feeding: 1) counselling of mothers and social and behaviour change communication, 2) helping families overcome barriers to feed their children appropriate complementary foods,

Table 2: Key findings of review of the complementary feeding practices in South Africa

Criteria	Finding
(1) Initiation of breastfeeding	Nine studies indicated that breastfeeding initiation rates were high in South Africa, ranging from 75% to 100%[13,16–18,21,23,24,32,36] One national survey indicated 83% breastfeeding initiation[9] One study indicated 51.1% breastfeeding initiation in the first hour, which increased to 85.2% by 24 hours[28] Another study indicated 42% breastfeeding initiation in the HIV-positive group but 97% in the HIV negative group[23] Pre-lacteal feeds were being given and colostrum was not given by some mothers (3 studies)[19,28,32]
(2) Exclusive breastfeeding	Results for exclusive breastfeeding were mixed—but overall exclusive breastfeeding practices were suboptimal National studies reported 7.4%, and more recently 32%, of children younger than six months were exclusively breastfed)[1,9] Other studies: • < 1% were exclusively breastfed up to 6 months[17] • < 1% were exclusively breastfed at 24 weeks[22] • 6% of < 1-month–5-month-olds were exclusively breastfed[36] • 7.6% of < 12-month-olds were exclusively breastfed[37] • 12% were exclusively breastfed for 6 months[21] • 13% were exclusively breastfed for 6 months[13] • 18% were exclusively breastfed at 14 weeks[32] • 27% of 0–10-month-olds were exclusively breastfed[33] • 29.5% were exclusively breastfed at 30 days[19] • 35.6% of 3–6-month-olds were exclusively breastfed[31] • 36.5% were exclusively breastfed > 3 months[38] • 38.5% of < 6-month-olds were exclusively breastfed[24] • 40% of HIV positive and 45% of HIV negative mothers exclusively breastfed for 6 months[34] • 52% were not exclusively breastfed beyond 2 months[15] • 61.8% were exclusively breastfed in HIV infected mothers and 72.6% were exclusively breastfed in HIV uninfected mothers at 3–4 months[29] Three studies reported that there was no exclusive breastfeeding in the surveyed community[12,16,30] The duration of exclusive breastfeeding reported in studies was not standardised and this makes it difficult to draw any conclusions about this aspect of IYCF
(3) Continued breastfeeding	One study reported that 31% of mothers had stopped breastfeeding before 24 weeks[27] In studies that reported breastfeeding for longer than 6 months: • 80% of 6–12-month-old infants were being breastfed,[16] • 58% were still being breastfed at 12 months,[13] and • 14.4% of 6–24-month-olds were still being breastfed[14]
(4) Age of introduction of complementary foods	There was significant evidence of the early introduction of foods/drinks other than breastmilk/other milk In the first month: • 2.6% had completely stopped breastfeeding,[19] • between 17%[21]–32%[12] had been introduced to food, and • 66.8% of HIV positive women who did not breastfeed, gave water and other foods from 3 weeks[30] Ninety-one per cent had food introduced by 7 weeks:[39] • 73% had food introduced by 14 weeks,[32] • 72.7% of mothers gave food/liquids by 12 weeks,[18] • about a third gave food/liquids before 3 months,[36] • 43.2% at 3 months, 15% before 3 months,[37] • half by 3 months,[40] • solid food or formula introduced within 3 months,[41] • 19% before 4 months,[13] • 61% before 4 months, 87% before 6 months,[17] and • 84.6% had introduced food before 6 months[38] • Age of introduction of solid foods was 3.5 months in rural and 4.2 months in urban areas[14]

(*Continued*)

Table 2: Continued.

Criteria	Finding
(5) Types of foods used in complementary feeding	Cereal based foods were the most popular type of complementary food (13 studies)—specifically maize meal porridge (sometimes described as soft and thin), and commercial infant cereal[10,12–15,17,19,20,21,36,37,39,41]
(6) Use of water and other non-milk liquids	Water was commonly given to infants before 6 months (10 studies)[1,11,12,15,19,20,30,32,36,39] Black tea, rooibos tea, sugar water, traditional herb mixtures, gripe water, antacid preparations and ijuba (a sorghum beer) were also given to children from birth[11,12,14,19,20,36]
(7) Foods of concern	Processed meats, soft drinks, sweets and salty crisps were some of the foods being given to older infants and young children that are cause for concern[13,14,17]
(8) Meal frequency	Only four studies reported on the total number of feeds per day: • Food was given between 2 and 6 times to infants aged 8 weeks or younger[39] • Fifty-nine percent (59%) of 0–12-month-olds had 3 meals a day, and 38% had food twice during the day[37] • Seventy-one percent of 6–23-month-olds received food the recommended minimum number of times or more[24] (the recommended minimum number of times being 2 times for breastfed infants 6–8 months, 3 times for breastfed children 9–23 months, and 4 times for non-breastfed children 6–23 months)[26] • Fifty-four percent of 6–24-month-olds received 3 meals a day and 76% had one snack a day[38]
(9) Dietary diversity (the number of items consumed from different food groups)	The number of older infants and young children who consumed food from 4 or more food groups were: • 5% at 6 months, 24% at 9 months, 75% at 12 months,[13] • 44% of 6–23-month-olds,[24] and • less than 25% of 6–24-month-olds[14] One study reported that only one infant aged 6 months and younger met the criterion for minimum dietary diversity[21] There is some evidence of dietary diversity increasing as the infant gets older—this was found in two studies, one with a 6–12-month-old group and another with a 6–24 month-old group of older infants and young children[13,35] It was reported that for urban areas in KwaZulu-Natal chicken consumption in older infants and young children (6–24-month-olds) was 18.5%, meat 14.8% and eggs 46.3% in the previous 7 days (in rural areas this was 38.6%; 18.5%; and 42.6% respectively)[14]. One study reported that no infant aged 6 months and younger received meat, poultry, egg or fish[21]
(10) Minimum acceptable diets	The number of older infants and young children reportedly meeting the criteria for a minimally acceptable diet varied In the recent South African Demographic and Health Survey, only 15% of 6–8-month-olds and 15% of 9–11-month-olds were found to have met the criteria for a minimally acceptable diet[1] Another study reported that 44.4% of 0–23-month-olds met the criteria for a minimally acceptable diet[24]
(11) Reasons for introducing solid foods	• Breast milk was not enough[12] • Told by friends/relatives; babies hungry; babies not sleeping[37] • Advised by family members; to keep baby full and help baby sleep at night[42] • Solid food introduction was the mothers' own decision but grandmothers (33%) and nurses (6%) were also named as sources of advice[32] • The main reason for starting solids was that the baby was still hungry after getting milk (73%)[32] • A crying baby and one that did not sleep well at night[43] • Thirty per cent said breast milk alone was insufficient, while returning to work (23%) and that the infant was thirsty (19%) were the other main reasons[21] • Insufficient milk production (14%), returning to studies (11%) and advice of a family member (10%) were also cited[21]
(12) Home-made versus commercial food choice	• Thirty-five per cent of caregivers said special baby foods are better than ordinary foods[17]
(13) Knowledge relating to or about complementary feeding	• Eighty-two per cent of caregivers said that solid foods should be introduced at 4–6 months[17] • The majority of mothers (76%) said they had not been told about foods to give their older infants and young children[37] • Fifty-nine per cent said that 3 months was the recommended age to introduce solid foods, 13% said 2 months[40]

and 3) making the best of promoting local foods to reduce the dependence on aid or purchased foods. Local cultural and traditional practices in South Africa also affect complementary feeding practices. This review did not find much information on this topic, and more research is needed to understand how cultural/traditional practices influence complementary feeding.

Sanghvi *et al.*[45] shared knowledge that had been gained from Alive & Thrive efforts to improve infant feeding in Bangladesh. These authors emphasise that advocacy, community mobilisation, mass communication and strategic use of data are necessary for optimal complementary feeding efforts to succeed.

The causes of stunting are multi-factorial and concerted efforts on all fronts are needed to combat stunting. Stewart *et al.*[46] proposed an expanded conceptual framework for stunted growth and development with causes grouped as: household and family factors, inadequate complementary feeding, inadequate breastfeeding and infection, within a context of broader community and societal factors. The 2016 SANHANES-1 study[9] showed that at a national level only 45.6% of the population were food secure, with 28.3% at risk of hunger, and 26.0% experienced hunger (classified as food insecure). The SANHANES-1 also found the national mean Dietary Diversity Score was 4.2 (the cut-off for dietary adequacy being 4). The complementary feeding diet is reflective of a lack of diversity present in the adult diet and the struggle of dealing with food insecurity.

In 2015, Lartey[47] discussed stunting prevention in sub-Saharan Africa, and emphasised the important role of education for girls, improved socioeconomic situations, provision of water, sanitation and hygiene, and integrated actions across health–education–agriculture and social protection. Supporting mothers to follow older infant and young child feeding guidelines they have learned is also important: whether this is breastfeeding support or making nutrient dense or fortified foods more accessible, affordable and appealing.[47] Breastfeeding support would enable mothers to breastfeed for longer and not introduce foods too early. Making the appropriate foods more accessible, affordable and appealing would mean that mothers are more likely to use them for complementary feeding.

It is beyond the scope of this review to critically assess the various interventions that could be employed to improve complementary feeding in South Africa, but the findings of this review merit discussion on possible ways forward. Consideration is warranted in two specific areas: (1) the older infant and young child feeding messages, and (2) actions beyond training and nutrition education.

(1) The older infant and young child feeding messages:

Investing in nutrition education efforts aimed at healthcare workers and mothers in South Africa by providing evidence-based and best practice messages on older infant and young child feeding is important.

- *Training of healthcare workers to improve counselling of mothers*: Globally, it has been seen that healthcare workers do not use the contact they have with mothers to convey evidence-based and best practice older infant and young child feeding messages.[44] This is also true in South Africa, where identification of malnutrition and appropriate older infant and young child feeding counselling implementation could still be strengthened in the South African healthcare system.[48] Current training needs to be critically assessed and the barriers to health worker implementation investigated and addressed.
- *The message emphasis*: The information that is given to mothers about older infant and young child feeding practices needs to be reconsidered.
  - One specific problem which was highlighted is that only the exclusivity of breastfeeding and not the duration is emphasised in South African older infant and young child feeding policy communication.[27]
  - Furthermore 'exclusive' breastfeeding may be interpreted as 'not mixing two milks' and does not include information about the early introduction (i.e. before six months) of other liquids and food.[43]
  - Crocetti *et al.*[49] propose that pre-emptive advice given early and consistently may help influence behaviour and prevent early introduction of solids. Parents also need to be taught to understand older infant and young child cues, e.g. sleepiness and dealing with babies who have different characters/personalities, in addition to when and what to feed.
  - Critical aspects of the complementary feeding messages include how often to feed, how to prepare and make best use of foods available to the household, nutrient density, consistency of meal prepared, giving of water, teas, juices and snacks, and responsive feeding.[50]
  - Related practices like hand washing before food preparation also need to be included.[44]
- *Receiver of the message*: Although the mother is targeted with older infant and young child feeding information, she may not be the only one making the decisions.[42] Mothers function in a broader sociocultural context and influences from the community (their friends and family, even the media), as well as the healthcare system, need to be considered.[43] Communication of older infant and young child feeding messages needs to extend beyond just the mother or caregiver if an impact on optimal older infant and young child feeding is to be achieved. The attitudes and advice of the father, grandmothers and creche owners would also influence feeding.

(2) Other nutrition interventions that need consideration:

Funding and strategy play a major role in the available nutrition interventions. Piwoz *et al.*[3] creatively suggest a 'Ten steps approach to complementary feeding'—similar to the 10 steps of the baby-friendly hospital initiative. Complementary feeding interventions should consider linking with the Mother Baby Friendly Initiative (MBFI) in South Africa since it is well established and understood by many South African healthcare workers. The use of multiple micronutrient powders for home fortification of complementary foods is also a venture with promising returns. Research has indicated that it is feasible and well accepted by caregivers.[41] This intervention has the added advantage of providing an opportunity for the healthcare worker to talk about feeding. Another opportunity that cannot be ignored is partnership with other stakeholders: these could be partnerships with creative marketing agencies to assist with behaviour change campaigns or partnerships with the food industry to provide affordable and appropriate complementary foods that are appropriately promoted. Improving complementary feeding is not just the domain of nutrition and health professionals.

There is an emerging discipline of conducting opinion leader research to inform strategy and evidence-based advocacy.[51] In consideration of action to improve complementary feeding practices in South Africa, perhaps opinion leader research is one of the first actions that need to take place, as it may identify opportunities to strengthen current activities and new actions that may be considered by the government.

Conclusion

In summary, the key findings of this review are that:

1. Breastfeeding initiation rates range from 75% to 100%.
2. Exclusive breastfeeding up to six months is not a common practice.
3. Continued breastfeeding after six months varies.
4. Early introduction of foods and liquids other than breast milk is widespread.
5. Maize porridge is a common first food for infants, but there is also a high reliance on commercial infant cereal.
6. Water and other liquids (e.g. tea, herbal mixtures) are commonly given to infants younger than six months.
7. There are indications that processed meats, soft drinks, sweets and salty crisps are being given regularly to children between six months and one year.
8. There is little information available about the number of meals per day that older infants and young children receive.
9. Dietary diversity is poor in many older infants and young children, and the use of animal source foods appears to be low.
10. The diets of many older infants and young children do not meet the criteria for a minimally acceptable diet.
11. Mothers have varying knowledge, and there are a variety of influencers and reasons for introducing complementary foods.

From the information gathered from the 34 studies, which included two national surveys, it can be concluded that complementary feeding practices in South Africa are suboptimal and appropriate action is needed to improve this situation. Policy-makers and implementers need to be sure that it is indeed worthwhile to invest in behaviour change and education in a resource-limited setting. They need the evidence that a continued emphasis on a food-based approach is the right action to improve the complementary feeding situation. An investigation into whether older infants and young children can achieve their required dietary intakes from the food that is available to them, in an affordable manner, would be a good first step. Nutrition modelling software can be helpful to assess whether older infant and young child nutrient needs can be met with foods commonly available, and to test specific food-based recommendations.

If a change in older infant and young child feeding behaviour is desired, then existing methods and approaches need to change: a paradigm shift is required—changes in infant feeding behaviour are not just about education and information given to mothers but must also include support for the desired behaviour change. There are a host of internal and external enablers and barriers to change, but there is little information and even less understanding of the many factors that impact on a mother's complementary feeding decisions in South Africa. Whichever strategy and actions are pursued to improve complementary feeding practices, they need to be supported by research that takes into account current challenges, and ensures that the action can be scalable and sustainable.

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ORCID

Nazeeia Sayed http://orcid.org/0000-0003-4629-5230
Hettie C Schönfeldt http://orcid.org/0000-0003-2388-4489

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