ABSTRACT

Background

Sub-optimal nutrition among children remains a problem across South Asia. Appropriate complementary feeding practices (CFP) can greatly reduce this risk.

Objectives

To undertake a systematic review (SR) of studies assessing CFP; timing, dietary diversity, meal frequency and influencing factors in children under two in SAs in India.

Methods

Searches undertaken between January 2000 to June 2016; MEDLINE, EMBASE, Global Health, Web of Science, OVID Maternity & Infant Care, CINAHL, Cochrane Library, BanglaJOL, POPLINE and WHO Global Health Library. Eligibility criteria: Primary research on CFP in SA children aged 0-2 years and/or their families. Search terms: "children", "feeding" and "Asians" and derivatives. Two researchers undertook study selection, data extraction and quality appraisal (EPPI-Centre Weight of Evidence).

Findings

From 45,712 abstracts screened, 64 cross-sectional, 7 cohort, 1 qualitative and 1 case control studies were included. Despite adopting the WHO Infant and Young Children Feeding Guidelines, sub-optimal CFP were found in all studies. In 29 of 59 studies, CFP was introduced between 6-9 months, with 8 studies finding minimum dietary diversity was between 6% to 33%, and 10 of 17 studies noting minimum meal frequency was achieved in only 25-50% of the study populations. Influencing factors included: cultural influences, poor knowledge on appropriate CFP and parental educational status.

Conclusion and Implications

This is the first SR to evaluate CFP in SA in India. Campaigns to change health and nutrition behaviour and revision of nationwide child health nutrition programmes is needed to meet the substantial unmet needs of these children.

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Keywords

Infant, child, nutrition, complementary feeding, India

BACKGROUND

Undernutrition including stunting and suboptimal breast feeding accounts for 45% of all childhood deaths.[1] It is estimated that 30% of the world's stunted children live in Asia, with more than 60 million living in India; 31% of the developing world's total.[1,2] Inadequate complementary feeding has been linked to these outcomes.

The WHO defines complementary feeding as: "The process starting when breast milk alone is no longer sufficient to meet the nutritional requirements of infants, and therefore other foods and liquids are needed, along with breast milk".[3]

Complementary feeding (CF) therefore focuses on bridging the gradual transition between 6 and 24 months from exclusive breastfeeding to solid foods eaten by the whole family alongside breastfeeding. Poor CF practices (CFP) have been linked to increased risks of respiratory and gastrointestinal infections, to being underweight, and to mortality.[4–6] Complementary feeding is also important for reducing stunting, which is a current policy priority in India.[7–9] Despite this, in two published non-systematic reviews in Ramji et al. and Engle et al. on CFP in India, it was noted that complementary feeding was often started at inappropriate times.[10,11] There was also inappropriate quantities and diversity of complementary feeding, with only 55% of South Asian (SA) infants consuming appropriate complementary foods by 6 to 8 months of age, and growth retardation notable by 2 years of age.[12,13]

In policy, there has been recent increasing focus on complementary feeding. The 2010 WHO Infant and Young Children Feeding (IYCF) guidelines, an internationally ratified framework adopted in India, emphasises that as a global public health recommendation, infants should be exclusively breastfed for the first six months of life to achieve optimal growth, development and health.[14] Thereafter, infants should receive safe and nutritionally adequate complementary foods while breastfeeding continues for up to two years of age or beyond.

With no previously published systematic review identified, we aimed to assess the adequacy of CFP based on IYCF recommended criteria for minimum dietary

diversity, timing, and meal frequency. We also aimed to investigate barriers and promoters for appropriate CFP in children under 2 in SAs. By doing so, we hope to inform future work in developing and assessing the effectiveness of culturally appropriate interventions to improve CFP across these communities.

To limit the scope of our review, we focused on SA families residing in India, Pakistan, Bangladesh, and Developed Countries.

METHODS

Due to the vast number of publications identified, this review summarises publications of CFP in SA families in India only with concurrent reviews summarising publications of CFP in SA families in DC, Pakistan and Bangladesh respectively.[15] DCs were included in order to investigate any differences in practice for SAs who may have emigrated.

Eligibility criteria

Studies were included if they met the following criteria:

- Participants: Children aged 0-2 years, parents, carers and/or their families
- Outcomes: Adequacy of CF (based on minimum dietary diversity and meal frequency), timing of introduction of CF and barriers/promoters to incorporating WHO recommended CFP
- Language: Studies published in English, or with translation available
- Year: Published from 2000 or later

We excluded studies solely focusing on exclusive breastfeeding and interventional studies. Studies focusing on sub-groups, such as children with comorbidities, were considered eligible in principle.

In the IYCF indicators, introduction of CF is assessed on the proportion of infants aged 6-8 months who receive solid, semi-solid or soft foods. In contrast, minimum dietary diversity is assessed by the proportion of children 6-23 months of age who receive foods from 4 or more food groups. The 7 WHO IYCF recommended food groups consist of[14];

1. Grains, roots and tubers
2. Legumes and nuts
3. Dairy products (e.g. milk, yoghurt, cheese)
4. Flesh foods (e.g. meat, fish, poultry, and liver/organ meats)
5. Eggs
6. Vitamin A rich fruits and vegetables
7. Other fruits and vegetables.

Whilst the consumption of iron rich or iron fortified foods is commonly assessed as a separate IYCF indicator, this was incorporated within dietary diversity for ease of interpretation.

Finally, minimum meal frequency was assessed by the proportion of breastfed and non-breastfed children 6-23 months of age who receive solid, semi-solid, or soft foods (but also including milk feeds for non-breastfed children) according to the minimum number of times or more per day; 2 for 6-8 months, 3 for 9-23 months and 4 for 6-23 months (if not BF).

Due to the nature of the topic, all study types (qualitative, quantitative or mixed) were included to ensure the diversity of evidence was captured and summarised to be of relevance to both policy makers and health and social care professionals.

Information sources

A search strategy was devised to search the following databases: MEDLINE, BanglaJOL, EMBASE, CINAHL, Global Health, Web of Science, OVID Maternity & Infant Care, The Cochrane Library, POPLINE and WHO Global Health Library. The WHO ICTRP was also searched. Searches were conducted in December 2014 and updated in June 2016.

Members of electronic networks on @jiscmail.ac.uk including minority-ethnic-health and networks (e.g. South Asian Health Foundation) developed from the Specialist Electronic Library for Ethnicity and Health were contacted to request any additional or unpublished material from members of the networks themselves. We sought information specialist assistance to attempt to acquire unpublished material from each

paper itself, and contacted study authors where possible. Bibliographies of included articles were also hand-searched for possible additional publications.

Search strategy

The search strategy included terms for "feeding", "South Asian" (including terms specifying all major subgroups) and "children". For example, the search strings used for MEDLINE were:

Term 1: Children < 2 years

Infant OR Baby OR Babies OR Toddler OR Newborn OR Neonat* OR Child OR Preschool OR Nursery school OR Kid OR Pediatri* OR Minors OR Boy OR Girl

Term 2: Feeding

Nutritional Physiological Phenomena OR Food OR Feeding behavior OR Feed OR Nutrition OR Wean OR fortif* OR Milk

Term 3: Asians

Ethni* OR India* OR Pakista* OR Banglades* OR Sri Lanka OR Islam OR Hinduism OR Muslim OR Indian subcontinent OR South Asia

Study selection and data extraction

In total, 45,712 titles and abstracts were screened against inclusion criteria. Two reviewers assessed these papers independently with conflicts resolved by discussion with the team. In view of the large number of articles deemed eligible for full-text review, articles published before the year 2000 were excluded. In total, 44,852 titles and abstracts were excluded.

This left 860 potentially eligible full text articles describing CF practices in South Asian children, which were independently reviewed by two reviewers. 131 full text articles were ultimately extracted of which 73 were relevant to India, 17 were relevant to Pakistan, 36 were relevant to Bangladesh, and 10 were relevant to Developed Countries.

Data was extracted by a single reviewer using a piloted modified worksheet

including: country of study; study type; study year; study objectives; population studied, eligibility criteria and illness diagnosis; study design; ethical approval; sampling; data collection and analysis; feeding behaviors; adequacy of CF practices; timing of initiation of CF; bias; value of the research; weight of evidence. A second member of the research team checked each extraction, with further checking taking place as necessary.

Result synthesis

The eligible studies tended to address very broad research questions, were conducted using qualitative and/or quantitative and/or descriptive methods and were not presented following standardised reporting guidelines (e.g. STROBE for observational studies or COREQ for qualitative research). Meta-analyses were therefore not undertaken.

To standardise study classifications, the formal definitions below were utilised and applied:[16,17]

1. Intervention study; A study in which patients are assigned to a treatment or comparison group and followed prospectively.
2. Cohort study; An observational study in which a group of patients are followed over time. These may be prospective or retrospective.
3. Cross sectional study; An observational study that examines the relationship between health-related characteristics and other variables of interest in a defined population at one particular time.
4. Case control study; A study that compares patients who have a disease or outcome of interest (cases) with patients who do not have the disease or outcome (controls).
5. Qualitative; A study which aims to explore the experiences or opinions of families through interviews, focus groups, reflective field notes and other non-quantitative approaches.
6. Mixed methods; A study that combines both quantitative and qualitative methodology.

In view of the considerable heterogeneity in studies identified in terms of methods, participants, interventions and outcomes, a narrative approach to synthesis was

utilised using guidance developed from the University of York Centre for Reviews and Dissemination (CRD) and the Economic and Social Research Council (ESRC).[18–21]

The evidence reviewed is presented as a narrative report with results broadly categorised following IYFP indicators on (1) adequacy of CFP comprising of dietary diversity, meal frequency, timing of introduction of CFP, consumption of iron-rich foods and sources of advice for feeding, and (2) barriers/promoters influencing CF practices.

Barriers were defined as obstacles or impediments to achieving correct CFP whilst promoters were defined as supporters to achieving correct CFP.[22] These were subcategorised into factors influencing at the family (e.g. family members), and organisational level (e.g. health care providers, hospitals, political bodies).

Quality assurance

The Centre for Reviews and Dissemination (CRD) guidance emphasises the importance of using a structured approach to quality assessment when assessing descriptive or qualitative studies for inclusion in reviews. However, it acknowledges the lack of consensus on the definition of poor quality with some arguing that using rigid quality criteria lead to the unnecessary exclusion of papers.[18]

In our review, the EPPI-Centre Weight of Evidence Framework was used to allow objective judgements about each study's value in answering the review question. It examines three study aspects: Quality of Methodology, Relevance of Methodology and Relevance of Evidence to the Review Question.[23] An average of these weightings is taken to establish the study's Overall Weight of Evidence. Studies with an Overall Weight of Evidence of Low are still included in the table of included studies but not discussed further within the results and discussion. This was performed by two independent reviewers, with additional arbitration by other team members where required.

RESULTS

Of the 45,712 studies identified, 73 studies focusing on CFP in SA families in India

were ultimately included in this systematic review. The study selection process is denoted in Figure 1.

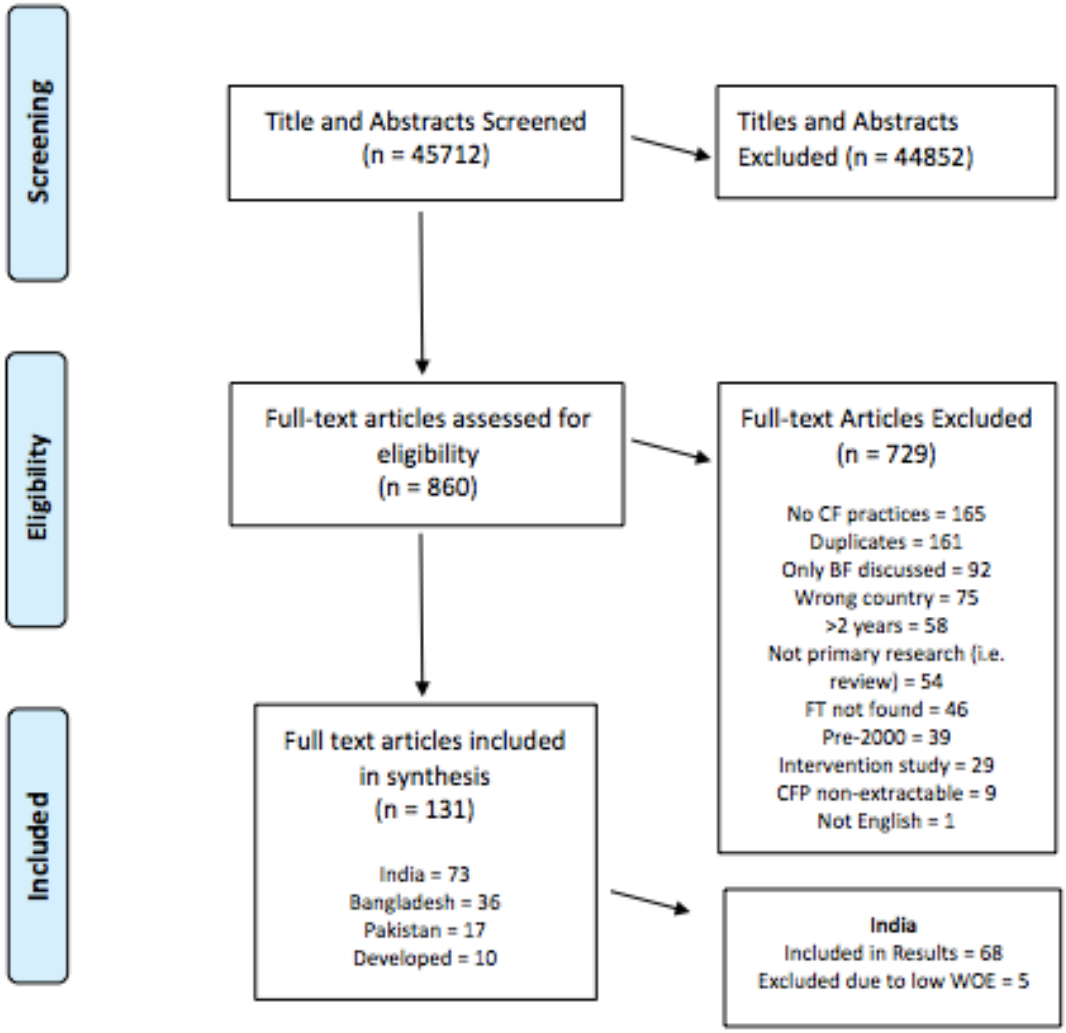

Figure 1 Study selection process

Study and participant characteristics

These 73 studies consisted of 64 cross-sectional, 7 cohort, 1 qualitative and 1 case control. 68 studies met Weight of Evidence criteria and were included in the main results. Their participants included a total of 125,326 children and 5,705 mothers or caregivers when infants were not reported. 21 studies reported details of the religion of participants, which was Hindu majority in 19 samples and Muslim majority in 2 samples.

Table 1 denotes a summary of all the included studies. Figure 2 illustrates the study locations of 63 of these 73 included studies with the remaining 9 not detailing precise study locations, due to being described as 'national' 'various' 'urban' or 'rural' without specifics. Table 1 contains further details of study locations.

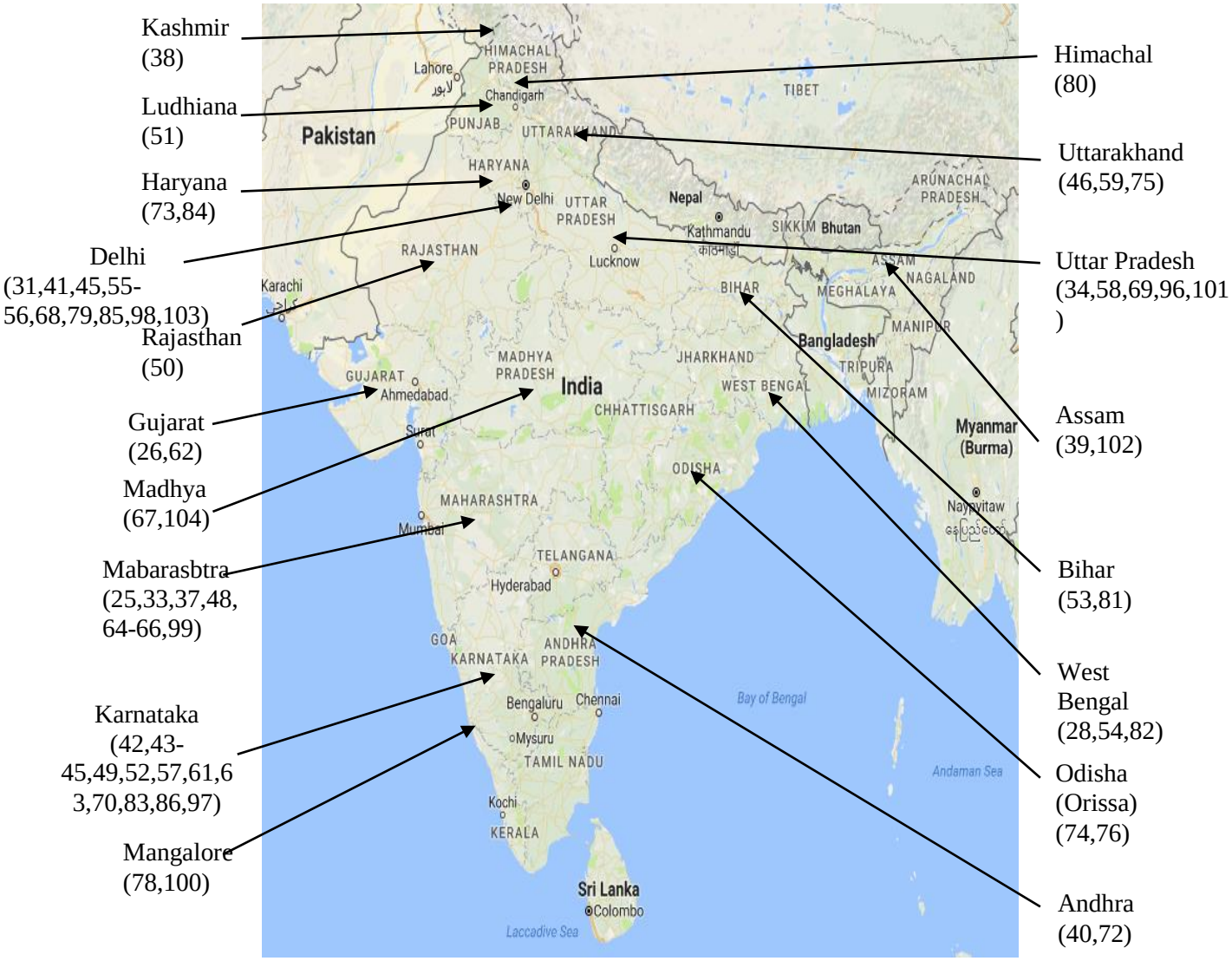

Figure 2: Location Map of included studies used. Map courtesy of Google Maps. Data copyright 2017 Google.

Table 2 presents the Weight of Evidence awarded to each of the studies. 13 studies had an Overall Weight of Evidence rating of High, 55 studies an Overall rating of Medium, and five studies an Overall rating of Low.

The core narrative themes extracted from the papers are presented under the headings; adequacy and factors influencing CFP. The former is categorised further into dietary diversity, meal frequency, timing and advice providers.

Adequacy of complementary feeding

As per the WHO IYCF indicators, adequacy of CFP is assessed according to minimum dietary diversity (MDD), meal frequency and timing of introducing CFP. These are detailed in the subheadings below with a further section discussing advice providers.

Dietary Diversity

Dietary diversity was measured in some form in 14 studies. Rates of achieved MDD varied throughout studies but were generally low, with MDD achieved by between 6% and 33% of infants in eight studies that studies that reported the MDD % for 6-23 month olds.[24–31] In de Onis (WOE=Medium(M)), infants were fed a mean of 2.8 food groups at 6 months, rising to 5.1 at 24 months.[32] Five other studies reported some information on diversity.[33–37]

Table 3 denotes a summary of all complementary foods groups identified from the studies categorised according to the WHO IYCF food groups defined above. Foods utilised for CF were identified in 53 included studies, of which 9 had High Overall WOE scores and 44 had Medium WOE scores.

31 studies identified "Grains, roots and tubers" being used for CFP. Legumes and nuts were used in 29, and 26 studies identified "Dairy products" (e.g. milk, cheese, yogurt) being used. In contrast, "eggs" were identified in 12 studies, "Flesh Foods" (e.g. Meat, Fish, Poultry and Liver/Organ Meats)" in 10 studies, "Vitamin A rich vegetables" in 8 studies and "other Fruit and Vegetables" in 22 studies.

Bentley et al. (WOE=High (WOE=H)) found that grains were consumed by 63.8% of infants in the past 24 hours.[25] In Fazilli et al. (WOE=M), Meshram et al. (WOE=H) and Neog et al. (WOE=M), cereals were also widely used.[38–40] In Katara et al. (WOE=M), cereals were the most frequently used food group, by 96% of infants.[35] In contrast, in Kapur et al. (WOE=M) cereal intake in an urban slum in Delhi was

noted as grossly inadequate.[41] Ragi, a traditional Indian grain, was identified in 4 studies as a common cereal type utilised in South India.[42–45]

The use of "other fruit and vegetables", namely fruits and vegetables not specified as Vitamin-A rich, varied across India from 95.4% of study populations in rural Andhra Pradesh, to 1.45% in Uttarakhand when given alone.[40,46] Interestingly, in Garg et al. (WOE=M) in rural India, fruits and vegetables were excluded from an infant's diet despite it being part of the family diet due to beliefs that infants could not tolerate spice-cooked fruits and vegetables.[34] In Vyas et al. (WOE=M), seasonal fruits such as guava and citrus were introduced before the addition of staples (e.g. cereals, rice) with gross undernutrition noted in the study population.[46]

In the WHO Multicenter Growth Reference Study, less than 11% of children were noted to consume flesh foods.[32] In an affluent Delhi district, Bhandari et al. (WOE=M) found that only 2.4% of infants consumed non-vegetarian food despite 57.5% of their families being non-vegetarian.[47] Consumption of iron-rich or iron-fortified foods (e.g. flesh foods) was poorly reported. Kapur et al. (WOE=M) found that children only consumed 46% of the Recommended Daily Allowance (RDA) of iron in their diets, and Pashricha et al. (WOE=M) found that delayed CF increased the risk of low dietary iron intake.[41,42] Bentley et al. (WOE=H) found that 15% of 6-23 month olds consumed iron-rich foods, which was similar to the 12.1% reported by Aguayo et al. (WOE=H).[25,48]

Regarding commercial complementary foods, Sharan et al. (WOE=M) and Samuel et al. (WOE=H) noted use of commercial foods.[45,49] Cerelac was the most frequently mentioned commercial food.[39,44,50–52] Additionally, Ananda Kumar et al. (WOE=M) Lingam et al. (WOE=H), and Chhabra et al. (WOE=M) mentioned Farex, and Narayanappa mentioned Nestum.[44,50–52] Chhabra et al. also mentioned Nutramul.[51] In Sharan et al. only 15% of infants were given commercial complementary food, with use concentrated amongst the highest socioeconomic group, in keeping with Lingam et al. (WOE=H) who that noted higher utilisation rates in urban compared to rural areas.[45,50]

Generally micronutrient intake was not discussed in the included studies. In Pasricha et al. (WOE=M), 66% of children were found to be deficient in at least one micronutrient, with micronutrient deficiencies particularly common in those who breastfed longer.[42] The high use of grains and legumes by included infants may be beneficial, as Menon et al. found that intake of these foods were associated with positive anthropometric outcomes relative to higher nutrient foods like eggs or flesh foods.[27]

Meal Frequency

Meal frequency was explored in 21 studies.[24,25,28,29,31,32,34–37,40,44,48,49,53–59] In 10 studies, minimum meal frequency (MMF) was attained in between 25 to 50% of the study population.[25,29,31,35,36,44,55–57,59] In contrast, between 50 and 96% of the population achieved MMF in seven studies.[24,28,34,37,40,48,58] Seven included studies had WOE ratings of High, and 14 had WOE ratings of Medium.

Senarath et al. (WOE=H) noted that the rate of MMF was 42% in children aged 6–23 months.[30] Patel et al. (WOE=H) and Khan et al. (WOE=M) and observed MMF in 41.5% and 48.6% of children respectively.[29,31] In contrast Chandwani et al. (WOE=M) noted that 96% breast-fed children were fed at least the minimum number of times recommended.[26]

Malhotra et al. (WOE=M) noted was a correlation between education and meal frequency in infants aged 9-18 months.[36] Finally, Lohia & Udipi (WOE=M) noted that males tended to have a high feeding frequency than females infants.[37]

Timing of introducing CF

Table 4 denotes a summary of timing of when CF was most commonly introduced across the 59 included studies that investigated timing. The most common age for the introduction of CF was between 6 and 9 months (29 studies), followed by 3 to 6 months (22 studies). 4 studies noted that CF was started between 9 and 12 months for the majority of infants, whilst one studies noted that CF was started at an age younger than 3 months for the majority of infants. Twelve studies had Overall WOE ratings of High, and 47 of Medium.

CF was noted to be delayed among children particularly in central and eastern India.[60] Inappropriate timing of initiation of CF was noted in both urban and rural regions of India with timely CF achieved by as low as 3.5%, and as late as over a year.[45,47,54,61] In 10 out of 15 studies in urban areas, the majority of children started CF at 6-9 months.[35,41,54,62–64] 8 out of 18 studies in rural areas noted that complementary feeding started during 6-9 months, and 7 out of 18 noted that CF initiated at 3-6 months.[24,26,40,43,46,50,52,59,61,65–73]

In addition, Yasmin et al. (WOE=M) noted that CF was initiated as early as 1 week.[58] However, in Mukhopadhyay et al. (WOE=M), CF timing was noted to be inappropriately early in 12.5% of the study population in West Bengal slums.[28] Similar findings were also noted in Goswami et al. (WOE=M) where only 13.2% of the infants were introduced to CF at the age of 4 to 6 months and an urban slum in Kolkata where 72% of infants were given CF at 6 months.[54,74]

Sources of advice for feeding

27 studies described advice providers for CFP, nine of which had Overall WOE ratings of High and 18 of Medium. The commonest source of feeding advice were healthcare professionals, including doctors, auxillary nurse midwives, lady health visitors and anganwadi health workers, usually at antenatal visits or during immunisations (21 studies [24,33,36,43,44,48,49,51–55,58,59,62,64,65,75–78]). The next most common source of advice was a family member, usually the grandmother or mother-in-law (11 studies [24,33,43,44,46,50,52,53,58,65,79]), with 9 further studies specifically mentioning elders [33,38,40,43,49,59,64,75,77]. Further sources of feeding advice were the media (4 studies [29,33,36,43]) and friends (3 studies [43,54,58]).

Factors associated with CF practices

We identified numerous factors that influenced CFP. These are summarised in Table 5 as either a Barrier or Promoter and subcategorised as either acting at family or organisational level. Due to conflicting study findings, factors may appear as both a Barrier and Promoter. 24 promoters and 33 barriers influencing CFP were identified. Promoters and barriers were further divided into factors influencing at the family and

organisational level. Overall 55 studies identified factors associated with CF practices, of which 12 had Overall WOE ratings of High, and 43 of Medium.

Barriers

35 studies identified barriers at the organisational level. Barriers were: cultural influences, employment, food insecurity, gender, inadequate antenatal care, lack of knowledge on optimal CFP, lack of media exposure, lack of parental education, location: Northern India and West India, focus on disability, low literacy, poor sanitation, poverty, birth in a public hospital, and price of food. The most commonly cited barrier at the organisational level was cultural influences.[38,39,43,46,49,52,53,55,59,62,72,75–77,80] Infant feeding practices in India appear to be strongly influenced by elderly women such as the mother in law.[46,65]

31 studies identified barriers at a family level. Barriers were: caesarian sections, child's age, concern about weight gain, crying infant, difficulty feeding child, inadequate breast milk production, lack of support, maternal age, maternal nutrition status, mothers from joint families, recent illness, religion, siblings, subsequent pregnancy, and primiparity. The most commonly cited barriers at the family level were lack of knowledge on optimal CFP[24,38,46,51,59,65,75,79–83] and inadequate breast milk production.[43,45,52,58,59,73,75]

Promoters

32 studies identified promoters at the organisational level. Promoters were: advice from a healthcare professional, birth within a government institute, certain castes or tribe, education of parent, effective antenatal care, family support, Hindu mothers, literacy status of mother, location: northeastern, southern or western, media exposure, social support group, socio-economic status, support system at work, and wealth. The most commonly cited promoters at the organisational level were education of parent,[24,27,29,34,37,39,40,42,46,61,62,66,71] literary status of mother,[35,64,66,70,78,84] and wealth.[24,34,50,85,86]

12 studies identified promoters at a family level. Promoters were: acknowledged importance of maternal health, advice seeking, autonomy of mother, BMI of mother, delivery with doctor present, high birth order, knowledge of optimal CFP, mother

who works from home, older age at marriage, and valuing nutrition. The most commonly cited promoter at the family level was knowledge of optimal CF.[33,54,65,76]

DISCUSSION

To our knowledge, this is the first systematic review to assess CFP in SAs. We identified that in many SA families in India, WHO IYCF standards on minimum dietary diversity, meal frequency, and timing of introducing CF were not being met.

Implications of Key Findings

Legumes, rice, wheat and cereals appear to be the mainstay of complementary foods in southern India. Whilst this is in keeping with other low and middle income countries, these foods have low nutrient density and mineral bioavailability with use of other food groups essential to satisfy the nutrient and mineral requirements of infants.[87] Consumption of dietary iron was infrequently mentioned except in the context of flesh foods, which is inadequate considering that low dietary iron has such an important role in infant health.[41,42]

Dietary diversity was found to be inadequate in almost all groups studied, with MDD varying from 6% to 33% for 6-23 month olds. Some have argued for use of media sources to influence this, with further research and interventions needed.[37]

It was found that MMF was not met by the majority of sample populations. Educational interventions may be useful to improve MMF going forward; Collison et al. found that, when given a feeding toolkit, frequency of feeds increased.[53] In a previous review, educational interventions were also shown to be effective.[88] Further research is required in order to uncover why MMF is so rarely met by care givers.

The majority of studies found that CF was started during the 6th to 9th month of life with most studies noting limited maternal awareness on recommended CFP. By improving antenatal care and education on caring for an infant alongside decreasing barriers faced by mothers when restarting employment, optimal timing of CF may improve. Having been utilised by the Ministry of Women and Child Development to distribute information, this may include mass media communication.[36,61,89,90]

Of the studies that identified sources of feeding advice, healthcare professionals were the most commonly cited. In particular, antenatal checkups were a popular time for feeding advice to be given to mothers by healthcare professionals.[29,30,36,52,74,82] Family members, particularly a mother-in-law or grandmother, were also very commonly cited sources of feeding advice. However, the advice given by them is often inappropriate. Saxena & Kumar noted that some female elders insisted mothers only started complementary feeding after 1 year.[59] There is a suggestion that family members can adversely influence mothers through conveying traditional beliefs, for example that colostrum is "dirty", and that children cannot tolerate animal-based proteins until 18 months of age.[43,53,65] Similar advice may also be conveyed by friends and peer groups. Media, including radio, newspapers, and magazines, was an important but less commonly cited source of advice. Malhotra found that increased frequencies of listening to the radio, or reading newspapers and magazines carries an increased likelihood of mothers having better feeding practices.[36]

Several studies identified cultural norms introduced by female elders that are barriers to appropriate CFP such as preferential treatment of male infants. It is therefore key that opinion leaders are equally targeted in any intervention to improve CFP in communities with studies by Senarath and Dewey & Brown noting effectiveness of systematic, participatory, and coordinated approaches to improve CFP through peers and community facilitators, in keeping with UNICEF guidance on applying best practices and design in interventions.[30,91,92]

We hope our identification of barriers and promoters will provide inspiration for further interventions to improve CFP. Existing interventions in India have been educational in nature, including counseling,[93] resulting in increased energy intake

and length; and education in complementary and responsive feeding,[94] resulting in increased energy intake and reduced stunting. The Lancet 2008 series on maternal and child nutrition included a piece on successful interventions across countries.[95]

Strengths and limitations

The strengths of our systematic review are derived by searching a large number of databases utilising very broad search strings, performing an updated search in June 2016 and having two reviewers undertake study selection, data extraction and quality assessment.

Key limitations include excluding; (1) papers which solely focused on children over 2 years where CFP described in their younger years may have been missed, (2) papers published before the year 2000 at full text review and (3) papers not published in English which would've both added to the diversity of CFP described.

In several studies where there was overlap between children under and over two years and/or SAs by Indian, Pakistani and Bangladeshi origin, CFP described and attributed to the whole study population maybe incorrect. Furthermore, we did not assess the quantities of the foods used, only the frequency with which they appeared in the studies.

Whilst we excluded interventional studies which may have described CFP in their study population, this is unlikely to be the primary focus of such studies and therefore unlikely to significantly affect our systematic review. Additionally, if we had included strict exclusion criteria for study design, this may have meant there was less of a need to exclude studies due to low WOE ratings; however, on the other hand, we may have missed some useful studies by being more prescriptive.

Regarding bias, whilst we attempted to contact numerous authors to identify relevant grey literature for our review, due to the breadth and depth of the field of nutritional research, this is unlikely to be exhaustive with publication bias likely to be present. Additionally, the vast majority of studies (64) were cross-sectional, commonly using recall methods, with only 7 cohort studies. This may mean reported results are biased

towards time points where it is convenient to collect single sets of data, such as during medical visits.

Conclusion

Despite adoption of the WHO IYCF guidelines, inadequate CFP remain in SA communities across India. Whilst India has made giant strides in decreasing child mortality over the last two decades, more must be done to improve CFP to further this aim. This systematic review has highlighted CFP and the factors that influence them, providing knowledge of current behaviors; we recommend this information be used for context-tailored interventions, which can be assessed and adopted according to their achievements.

References

1. Black RE, Victora CG, Walker SP, et al. (2013) Maternal and child undernutrition and overweight in low-income and middle-income countries. *Lancet (London, England)* **382**, 427–51. Elsevier.
2. UNICEF (2009) *Tracking Progress on Child and Maternal Nutrition - A survival and development priority*. .
3. WHO (2016) WHO | Appropriate complementary feeding. *WHO*. World Health Organization.
4. Davies-Adetugbo AA & Adetugbo K (1997) Effect of Early Complementary Feeding on Nutritional Status in Term Infants in Rural Nigeria. *Nutr. Health* **12**, 25–31.
5. Semahegn A, Tesfaye G & Bogale A (2014) Complementary feeding practice of mothers and associated factors in Hiwot Fana specialized hospital, eastern Ethiopia. *Pan Afr. Med. J.* **18**.
6. Macharia CW, Kogi-Makau W & Muroki NM (2004) Dietary intake, feeding and care practices of children in Kathonzweni division, Makueni district, Kenya. *East Afr. Med. J.*, 402–407.
7. Stewart CP, Iannotti L, Dewey KG, et al. (2013) Contextualising complementary feeding in a broader framework for stunting prevention. *Matern. Child Nutr.* **9**, 27–45.

8. Dewey KG (2016) Reducing stunting by improving maternal, infant and young child nutrition in regions such as South Asia: evidence, challenges and opportunities. *Matern. Child Nutr.* **12**, 27–38.
9. Avula R, Raykar N, Menon P, et al. (2016) Reducing stunting in India: what investments are needed? *Matern. Child Nutr.* **12**, 249–252.
10. Ramji S (2009) Impact of infant & young child feeding & caring practices on nutritional status & health. *Indian J. Med. Res.* **130**, 624–626.
11. Engle PL (2002) Infant Feeding Styles: Barriers and Opportunities for Good Nutrition in India. *Nutr. Rev.* **60**, S109–S114.
12. Senarath U & Dibley MJ (2012) Complementary feeding practices in South Asia: analyses of recent national survey data by the South Asia Infant Feeding Research Network. *Matern. Child Nutr.* **8**, 5–10.
13. Gragnolati M, Shekar M, Das Gupta M, et al. (2005) THE WORLD BANK India's Undernourished Children: A Call for Reform and Action. .
14. WHO (2010) *Indicators for assessing infant and young child feeding practices*. World Health Organization.
15. Manikam L, Robinson A, Kuah JY, et al. (2017) A systematic review of complementary feeding practices in South Asian infants and young children: the Bangladesh perspective. *BMC Nutr.* **3**, 56. BMC Nutrition.
16. Porta M (2014) *A Dictionary of Epidemiology*. 2014th ed.
17. NIHR Glossary - John Williams. .
18. University of York (2009) Critical Appraisal Skills Programme (CASP) [Internet]. Critical Appraisal Skills Programme (CASP). .
19. Dixon-Woods M, Agarwal S, Jones D, et al. (2005) Synthesising qualitative and quantitative evidence: a review of possible methods. *J. Health Serv. Res. Policy* **10**, 45–53.
20. Collins JA & Fauser BCJM (2005) Balancing the strengths of systematic and narrative reviews. *Hum. Reprod. Update* **11**, 103–104.
21. Popay J, Roberts H, Sowden A, et al. (2006) *Guidance on the Conduct of Narrative Synthesis in Systematic Reviews. A Prod. from ESRC Methods Program.*
22. Oxford dictionaries Promoter - definition of promoter in English. *Oxford Dictionaries*. https://en.oxforddictionaries.com/definition/promoter.
23. Gough D (2007) Weight of Evidence: a framework for the appraisal of the

quality and relevance of evidence. *Res. Pap. Educ.* **22**, 213–228.

24. Aruldas K, Khan MM., Hazra A, et al. (2010) Increasing appropriate complementary feeding in rural uttar pradesh. *J. Fam. Welf.* **56**, 51–56.

25. Bentley A, Das S, Alcock G, et al. (2015) Malnutrition and infant and young child feeding in informal settlements in Mumbai, India: findings from a census. *Food Sci. Nutr.* **3**, 257–271.

26. Chandwani H, Prajapati A, Rana B, et al. (2015) Assessment of infant and young child feeding practices with special emphasis on IYCF indicators in a field practice area of Rural Health Training Centre at Dabhoda, Gujarat, India. *Int J Med Sci Public Heal*, 1.

27. Menon P, Bamezai A, Subandoro A, et al. (2015) Age-appropriate infant and young child feeding practices are associated with child nutrition in India: Insights from nationally representative data. *Matern. Child Nutr.* **11**, 73–87.

28. Mukhopadhyay DDK, Sinhababu A, Saren AAB, et al. (2013) Association of child feeding practices with nutritional status of under-two slum dwelling children: A community-based study from West Bengal, India. *Indian J. Public Health* **57**, 169.

29. Patel A, Pusdekar Y, Badhoniya N, et al. (2012) Determinants of inappropriate complementary feeding practices in young children in India: secondary analysis of National Family Health Survey 2005-2006. *Matern. Child Nutr.* **8 Suppl 1**, 28–44.

30. Senarath U, Agho KE, Akram DES, et al. (2012) Comparisons of complementary feeding indicators and associated factors in children aged 6-23 months across five South Asian countries. *Matern. Child Nutr.* **8**, 89–106.

31. Khan AAM, Kayina P, Agrawal P, et al. (2012) A study on infant and young child feeding practices among mothers attending an urban health center in East Delhi. *Indian J. Public Health* **56**, 301. Medknow Publications and Media Pvt. Ltd.

32. De Onis M & Onis D (2006) Complementary feeding in the WHO Multicentre Growth Reference Study. *Acta Paediatr. Int. J. Paediatr.* **95**, 27–37.

33. D???Alimonte MR, Deshmukh D, Jayaraman A, et al. (2016) Using Positive Deviance to Understand the Uptake of Optimal Infant and Young Child Feeding Practices by Mothers in an Urban Slum of Mumbai. *Matern. Child Health J.* **20**, 1133–1142.

34. Garg A & Chadha R (2009) Index for measuring the quality of complementary feeding practices in rural India. *J. Heal. Popul. Nutr.* **27**, 763–771.
35. Katara PS, Patel S V, Kantharia SL, et al. (2013) Study on feeding practices among children 6 months to 2 years and its effect on their nutritional status in urban slums. *Natl. J. Community Med.* **4**.
36. Malhotra N (2013) Inadequate feeding of infant and young children in India: lack of nutritional information or food affordability? *Public Health Nutr.* **16**, 1723–31.
37. Lohia N & Udipi SA (2014) Infant and child feeding index reflects feeding practices, nutritional status of urban slum children. *BMC Pediatr.* **14**, 290.
38. Fazilli A, Imtiyaz A, Iqbal M, et al. (2011) Infant Feeding Practices of Multiparous Women Attending the Antenatal Clinic in a Tertiary Care Hospital. *Int J Med Public Heal* **1**, 47–50.
39. Neog N, Baruah D & Baruah DK (2012) Prevalent infant feeding practices of infants among the missing tribes of Jorhat district, Assam. *Food Sci. Res. J.* **3**, 9–13.
40. Meshram II, Laxmaiah A, Venkaiah K, et al. (2012) Impact of feeding and breastfeeding practices on the nutritional status of infants in a district of Andhra Pradesh, India. *Natl. Med. J. India* **25**, 201–206.
41. Kapur D, Sharma S & Agarwal KN (2005) Dietary intake and growth pattern of children 9-36 months of age in an urban slum in Delhi. *Indian Pediatr.* **42**, 351–356.
42. Pasricha S-RR, Shet ASS, Black JFF, et al. (2011) Vitamin B-12, folate, iron, and vitamin A concentrations in rural Indian children are associated with continued breastfeeding, complementary diet, and maternal nutrition. *Am. J. Clin. Nutr.* **94**, 1358–1370.
43. Rangaswamy K, Kumar A & Kumar HV (2013) Socio-Cultural Factors Influencing Infant Feeding Practices in Rural Tumkur. *RJPBCS* **4**.
44. Ananda Kumar TS, Rangaswamy KB & Viswanatha Kumar HM (2013) Weaning practices in rural Tumkur. *Curr. Pediatr. Res.* **17**, 115–117.
45. Sharan S, Kumari SPS & Nagabhushanam K (2001) Status of sericulture farm women and infant feeding habits. *Mysore J Agric Sci* **35**, 351–6.
46. Vyas S, Kandpal SD, Semwal J, et al. (2014) Trends in weaning practices among infants and toddlers in a hilly terrain of a newly formed state of India.

Int. J. Prev. Med. **5**, 741–748.
47. Bhandari N, Bahl R, Taneja S, et al. (2002) Growth performance of affluent Indian children is similar to that in developed countries. *Bull. World Health Organ.* **80**, 189–195.
48. Aguayo VM, Nair R, Badgaiyan N, et al. (2016) Determinants of stunting and poor linear growth in children under 2 years of age in India: An in-depth analysis of Maharashtra's comprehensive nutrition survey. *Matern. Child Nutr.* **12**, 121–140.
49. Samuel TM, Thomas T, Bhat S, et al. (2012) Are infants born in baby-friendly hospitals being exclusively breastfed until 6 months of age? *Eur. J. Clin. Nutr.* **66**, 459–465.
50. Lingam R, Gupta P, Zafar S, et al. (2014) Understanding care and feeding practices: Building blocks for a sustainable intervention in India and Pakistan. *Ann. N. Y. Acad. Sci.* **1308**, 204–217.
51. Chhabra R, Subhashini V & Verma S (2010) Existing infant feeding and weaning practices in an urban setup. *Asian J. Home Sci.* **5**, 250–254.
52. Narayanappa R, Ranganath T & Gowda K (2015) nfant Feeding Practices in Rural Field Practice Area of Medical College in Karnataka: A Cross-Sectional Descriptive Study. *Natl J Community Med* **6**, 508–512.
53. Collison DK, Kekre P, Verma P, et al. (2015) Acceptability and utility of an innovative feeding toolkit to improve maternal and child dietary practices in Bihar, India. *Food Nutr. Bull.* **36**, 24–32.
54. Roy S, Dasgupta A & Pal B (2009) Feeding practices of children in an urban slum of kolkata. *Indian J. Community Med.* **34**, 362–363.
55. Aggarwal A, Verma S, Faridi M, et al. (2008) Complementary feeding--reasons for inappropriateness in timing, quantity and consistency. *Indian J Pediatr* **75**, 49–53.
56. Rasania S & Sachdev T (2001) Nutritional status and feeding practices of children attending MCH Centre. *Indian J. Community Med.* **26**, [5] p.
57. Kuriakose JJR (2010) Nutritional Status and Feeding Practices of Infants. *Nurs J India* **101**, 184–6.
58. Yasmin H (2008) Weaning practices of ruralwomen in Chandauli District, Uttar Pradesh, India. *Nurture* **2**, 24–29.
59. Saxena V & Kumar P (2014) Complementary feeding practices in rural

community: A study from block Doiwala district Dehradun. *Indian J. Basic Appl. Med. Res.* **3**, 358–363.

60. Padmadas SSS, Hutter I & Willekens F (2002) Weaning initiation patterns and subsequent linear growth progression among children aged 2-4 years in India. *Int. J. Epidemiol.* **31**, 855–863.

61. Caleyachetty A, Krishnaveni G V., Veena SR, et al. (2013) Breastfeeding duration, Age of starting solids and high BMI risk and adiposity in Indian children. *Matern. Child Nutr.* **9**, 199–216.

62. Bhanderi D & Choudhary S (2011) A Community Based Study Of Feeding And Weaning Practices In Under Five Children In Semi Urban Community Of Gujarat. *Natl. J. Community Med.* **2**, 277–283.

63. Sreedhara MS & Banapurmath CR (2014) A study of nutritional status of infants in relation to their complementary feeding practices. *Curr. Pediatr. Res.* **18**, 39–41.

64. Bagul AS & Supare MS (2012) The infant feeding practices in an urban slum of Nagpur, India. *J. Clin. Diagnostic Res.* **6**, 1525–1527.

65. Jayant D D, Purushottam A G, Deepak B P, et al. (2010) Socio-cultural practices in relation to breastfeeding, weaning and child rearing among Indian mothers and assessment of nutritional status of children under five in rural India. *Australas. Med. J.* **3**, 618–624.

66. Farzani F & Devi R (2011) A study of feeding practices of infants in Parbhani district. *FOOD Sci. Res. J.* **2**, 1–3.

67. Meshram II, Kodavanti MR, Chitty GR, et al. (2013) Influence of Feeding Practices and Associated Factors on the Nutritional Status of Infants in Rural Areas of Madhya Pradesh State, India. *Asia. Pac. J. Public Health*, 1010539513486174-.

68. Sanjeev D & Anuradha D (2012) Women literacy and infant feeding practices in rural integraded child development scheme (ICDS) block of Delhi. **3**, 385–390.

69. Verma R & Gupta P (2015) Impact of Breast Feeding and Weaning Practices Associated with Morbidity in Rural Area of Ghaziabad, Uttar Pradesh, India: A Community Based Longi- tudinal Study. *Ntl J Community Med* **6**, 618–621.

70. Damayanthi M, Jayanth Kumar K & Professor P (2013) Breast Feeding Practices in Rural field practice area of RRMCH, Bangalore 1 2 3. *Medica*

Innov. June **2**.

71. Pathi S, Das BC, Rasania SK, et al. (2003) Feeding practices versus nutritional status of infants in a rural ICDS block of Orissa. *Heal. Popul. Perspect. Issues* **26**, 116–120.

72. Shroff MR, Griffiths PL, Suchindran C, et al. (2011) Does maternal autonomy influence feeding practices and infant growth in rural India? *Soc. Sci. Med.* **73**, 447–455.

73. Tyagi R & Bhan C (2009) Knowledge of rural mothers regarding recommended child rearing practices. *Ann Agri Bio Res* **14**, 169–73.

74. Goswami M, Dash B & Dash NC (2012) Maternal Care and Childrearing Practices: A Micro Level Study among the Bhumija Tribe of Northern Orissa, India. *South Asian Anthropol.* **12**, 51–59.

75. Saxena V & Kumari R (2014) Infant and young child feeding - knowledge and practices of ASHA workers of Doiwala block, Dehradun District. *Indian J. Community Heal.* **26**, 68–75.

76. Padhy K & Choudhury RKR (2004) Practices and attitude of mothers in initiation of infant feeding. *South Asian Anthr.* **4**, 157–160.

77. Ganguly S, Mayuri M, Mukherji C, et al. (2012) Bovine milk usage and feeding practices for infants in India. *Indian J. Public Health* **56**, 75.

78. S R, P M S, B U, et al. (2011) Study of complementary feeding practices among mothers of children aged six months to two years - a study from coastal south India. *Australas. Med. J.* **4**, 252–257.

79. Subbiah N & Jeganathan A (2012) Socio-cultural beliefs influencing breastfeeding practices among primi postnatal mothers residing in urban slum area of Delhi. *Heal. Popul. Perspect. Issues* **35**, 61–73.

80. Sharma M & Sharma S (2003) Infant feeding practices in rural women of Kangra district of HP. *Himachal J Agric Res* **29**, 79–83.

81. Sinha A & Pandey H (2000) Weaning practices of'Ho'mothers in Bihar. *Indian J. Nutr. Diet.* **37**, 338–340.

82. Sinhababu A, Mukhopadhyay DK, Panja TK, et al. (2010) Infant-and young child-feeding practices in Bankura district, West Bengal, India. *J. Heal. Popul. Nutr.* **28**, 294–299.

83. Yousafzai AK, Pagedar S, Wirz S, et al. (2003) Beliefs about feeding practices and nutrition for children with disabilities among families in Dharavi, Mumbai.

Int. J. Rehabil. Res. **26**, 33–41.

84. Dahiya S & Sehgal S (2002) Infant Feeding Practices of Working and Non-Working Urban Mothers. *Indian J. Nutr. Diet.* **39**, 367–372.

85. Chhabra P & Gupta A (2015) Infant and young child feeding practices and its determinants in an urbanized village of Delhi. *Int. J. Med. Public Heal.* **5**, 228.

86. Veena SR, Krishnaveni G V, Srinivasan K, et al. (2010) Infant feeding practice and childhood cognitive performance in South India. *Arch. Dis. Child.* **95**, 347–54.

87. Erdman J (1981) Bioavailability of Trace Minerals from Cereals and Legumes. *Cereal Chem* **58**, 21–6.

88. Shi L & Zhang J (2011) Recent evidence of the effectiveness of educational interventions for improving complementary feeding practices in developing countries. *J. Trop. Pediatr.* **57**, 91–98.

89. Dibley MJJ, Roy SKK, Senarath U, et al. (2010) Across-country comparisons of selected infant and young child feeding indicators and associated factors in four South Asian countries. *Food Nutr. Bull.* **31**, 366–375.

90. Ministry of Women and Child Development (2016) Articulating a Vision for Empowerment of Women. DRAFT Government of India Ministry of Women and Child Development. .

91. Dewey KG & Brown KH (2003) Update on technical issues concerning complementary feeding of young children in developing countries and implications for intervention programs. *Food Nutr. Bull.* **24**, 5–28.

92. Rogers P (2014) *Theory of Change: Metholodological Briefs-Impact Evaluation No.2. UNICEF Office of Research*. .

93. Bhandari N, Mazumder S, Bahl R, et al. (2004) An Educational Intervention to Promote Appropriate Complementary Feeding Practices and Physical Growth in Infants and Young Children in Rural Haryana, India. *J. Nutr.* **134**, 2342–2348.

94. Vazir S, Engle P, Balakrishna N, et al. (2013) Cluster-randomized trial on complementary and responsive feeding\neducation to caregivers found improved dietary intake, growth and\ndevelopment among rural Indian toddlers. *Matern. Child Nutr.* **9**, 99–117.

95. Bhutta ZA, Ahmed T, Black RE, et al. (2008) What works? Interventions for maternal and child undernutrition and survival. *Lancet*, 417–440.

96. Bahuguna R, Younis Khan S & Jain a (2013) Influence of feeding practices on dental caries. A case-control study. *Eur. J. Paediatr. Dent.* **14**, 55–8.
97. Dakshayani B & Gangadhar MR (2008) Breast Feeding Practices among the Hakkipikkis: A Tribal Population of Mysore District, Karnataka. *Ethno-Med* **2**, 127–129.
98. Fall CHHD, Borja JBB, Osmond C, et al. (2010) Infant-feeding patterns and cardiovascular risk factors in young adulthood: data from five cohorts in low- and middle-income countries. *Int. J. Epidemiol.* **40**, 47–62.
99. Holambe VMV & Thakur NAN (2014) Factors affecting late introduction of complementary food: a Kaplan Meier analysis. *Natl J Community Med* **5**, 140–3.
100. Jindal A (2009) Weaning practices among mothers in selected hospitals in Mangalore. *Nurs J India* **42**, 351–6.
101. Kumar D, Goel NKK, Mittal PCC, et al. (2006) Influence of infant-feeding practices on nutritional status of under-five children. *Indian J. Pediatr.* **73**, 417–421.
102. Passi GR & Shad R (2004) Breastfeeding, Weaning Practices and Nutritional Status of Infants of Tea Garden Workers of Assam. *INDIAN Pediatr.* **41**, 1277–1279.
103. Shahrawat R & Joon V (2013) Role of inter personal communication in infant and young child feeding practices in an urban slum: An overview based on case studies. In *Indian J. Pediatr.*, vol. 80, pp. 1041–1046.
104. Singh A & Vaidya M (2015) Traditional weaning foods and practices in Jabalpur district with reference to prevalence of malnutrition. *Asian J. Dairy Food Res.* **34**, 32.

Table 1 – A summary of all included tables

Author	Study Type	Location	Population	Sample Size	Adequacy of and factors influencing CFP
Aggarwal et al. (2008) [55]	Cross-sectional	Delhi, India	Mothers of infants 6 months to 2 years old attending outpatient paediatric hospital	200	**Frequency:** Frequency of complementary feeds was less than recommended in about 75% of children. **Factors**: Maternal and paternal education, lack of knowledge regarding CF, child vomiting, advice from family elders. **Timing:** 34% started up to a year
Aguayo et al. (2016) [48]	Cross-sectional	Maharashtra, India	Children under 23 months old	2561	**Diversity:** 6% of 6-23 month olds were fed 4+ food groups. **Frequency:** 77% of 6-23 month olds met minimum meal frequency. When sick, many children (up to 75%) see their complementary foods restricted in frequency. **Factors:** Poor sanitation, mother's nutrition status, poverty. **Timing:** 59% of 6-8 months had CFP introduced
Aruldas et al. (2010) [24]	Cross-sectional	Rural India	Children aged 0-23 months	4472	**Diversity:** 30 percent were fed at least three types of food as recommended. **Frequency:** 63% of children aged 6-23 months were given the minimum recommended number of feeds in a day. **Factors:** 56% of mothers commenced CF before 6 months of age because they felt that their breast milk was not sufficient for the child. Other factors include high standard of living, education, media exposure, and ANC check ups. **Timing:** 46% 7-9 months
Bagul & Supare (2012) [64]	Cross-sectional	Urban slum of Nagpur, Maharashtra, India.	Children under 1 year old	384	**Factors:** Literacy. **Timing:** 51% under 6 months
Bahuguna et al. (2013) [96]	Case Control	Uttar Pradesh, India	Children aged 1-18 years	800	**Diversity:** Milk, sweets, fruits were eaten, but this was not broken down by age
Bentley et al. (2015) [25]	Cross-sectional	Informal settlements, Mumbai, India	Children under 5	7450	**Diversity:** Dietary diversity was limited (13%). **Frequency**: Minimum meal frequency were met by less than half of infants. **Timing**: 41% commenced at 6-8 months
Bhandari et al. (2002) [47]	Cross-sectional	Delhi, India	Children aged 12-23 months	395	**Factors:** Education. **Timing:** Animal milk mean age of 3 months
Bhanderi & Choudhary (2011) [62]	Cross-sectional	Petlad town, a semi-urban area of Anand district, Gujarat, India	Children under 5 years old	300	**Diversity:** Rice, daal, curd, butter milk, ice creams, fruits. **Factors:** Educated mothers were more receptive to the message of proper weaning passed to them during antenatal visits. Other factors include maternal education, place of delivery, and sociocultural beliefs. **Timing:** 52% 4-6 months

Caleyachetty et al. (2013) [61]	Cohort study	Mysore city or surrounding rural villages, India	Mothers attending the antenatal clinic of the Holdsworth Memorial Hospital	830	**Factors:** Hindu mothers commenced CF later compared to Islam or "other" religions. Other factors include higher education and lower socio-economic status. **Timing:** 38% at 4 months, 27% at 5 months
Chandwani et al. (2015) [26]	Cross-sectional	Rural Health Training Centre at Dabhoda, Gujarat, India	Children 0-24 months old	300	**Diversity:** 28.3% were given food from four or more groups. **Frequency:** Minimum meal frequency (MMF) was adequate in 95.6%. **Timing:** 60% at 6 months
Chhabra & Gupta (2015) [85]	Cross-sectional	Urbanised villge of East Delhi, India	Children aged 0-23 months.	194	**Factors:** Wealth and gender of infant, born in government institution. **Timing:** 6-9 months for 54%
Chhabra et al. (2010) [51]	Cross-sectional	Ludhiana, India	Children under 12 months old	204	**Diversity:** Dal soup, juice, tea, Kheer, banana, khichri all used. **Factors:** Mothers believing size was a more important indicator than age. **Timing:** less than 3 months.
Collison et al. (2015) [53]	Cross-sectional	One urban and one rural community in Samastipur District, Bihar, India	Children preterm to 18 months old	60	**Diversity:** Eggs, meat, fish, fruits, vegetables were used. **Frequency:** Mothers 'generally' feed infants 2/3 times each day. **Factors:** Urban and rural status affected feeding practices
D'Alimonte et al. (2016) [33]	Cross-sectional	Slum, Dharavi, Mumbai	Mothers of children under 3 years old	22	**Diversity:** Listed 7 IYCF groups. Gave MDD details stratified by positive deviance. **Factors:** Advice sources included female elders, relatives, community health workers, the media **Diversity:**MDD achieved by majority at 6 months. **Timing:** Positive deviants mostly around 6 months
Dahiya & Sehgal (2002) [84]	Cross-sectional	Haryana, India	Mothers of children aged 6-18 months	100	**Diversity:** Khichri, dalia, rice, kheer, fruit and vegetables were used. **Factors:** Only a few mothers belonging to high socio-economic status give ready-made foods to their infants. **Timing:** Working mothers started before 6 months, non-working after
Dakshayani & Gangadhar (2008) [97]	Cross-sectional	Karnataka, India	Mothers of children aged 0-60 months	125	**Factors:** The practice of giving the infants some special type of feeds before initiating breast milk is widespread in tribal areas. **Timing:** 48% 6-9 months
Damayanthi et al. (2013) [70]	Cross-sectional	Bangalore, India	Mothers of children under 24 months	300	**Factors:** Earlier initiation when literate. **Timing:** 70% at 3-6 months
de Onis (2006) [32]	Cross-sectional	India	Children aged 0- 24 months old	8440	**Diversity:** Mean dietary diversity at different ages amongst compliant Indian children was: 2.8 foods at 6 months, 4.1 at 9 months, 4.6 at 12 months, 4.9 at 18 months, ~~4.9~~ 5.1at 24 months. **Frequency**: Frequency was around a mean of 2 non-milk meals per day amongst compliant children in India at 5 months, rising to 2.8 at 6 months, 4 at 8 months, 4.9 at 12 months, 5.4 at 18 months and 5.5 at

					24 months. **Timing:** Mean timing was 5 months
Dibley et al. (2010) [89]	Cross-sectional	29 unnamed states in India	Last-born children aged 0 to 23 months living with the respondent	20108	**Factors:** Antenatal visits, media, Living North, East or South. **Timing:** 57% timely CF rate
Fall et al. (2011) [98]	Cohort study	Brazil/Guatemala/India/Philippines/South Africa – New Delhi in India	Babies born to women in an area of Delhi	1526	**Timing:** 42% 9-12 months
Farzani & Devi (2011) [66]	Cross-sectional	Parbhani district, India	Mothers of children aged 3 – 18 months	130	**Diversity:** Cow's milk, honey, castor oil, dhal, fruit and vegetables. **Factors**: Literacy and maternal education. **Timing**: 52% at 3-6 months
Fazilli et al. (2011) [38]	Cross-sectional	Kashmir, India	Multiparous women attending the antenatal clinic of the maternity hospital of Sheri Kashmir Institute of Medical Sciences	585	**Diversity:** Cereals, fruits, banana were used. **Factors:** Many harmful infant feeding practices still hold ground in the community having their roots in cultural influences and lack of knowledge regarding CFP timing. **Timing:** 38% at 6-12 months, 32% at 6 months
Garg & Chadha (2009) [34]	Cross-sectional	Six villages of Ghaziabad district, Uttar Pradesh, India	Mothers of children aged 6 – 12 months	151	**Diversity:** 31% and 18% of the mothers in the 6–8 and 9–12 months old infants reported feeding ≥3 and ≥4 food groups respectively to their infants in the preceding 24 hours. Mothers used starchy staples, legumes, milk eggs, others. **Frequency:** 60% of the mothers fed their infants the recommended number of meals in the previous 24 hours. **Factors:** Wealth led to better practices. More children led to worse parity. Other factors include socioeconomic factors and maternal education.
Goswami et al. (2012) [74]	Cross-sectional	5 villages of the Nuapadhi Gram Panchayat, Remuna block of Balasore district of Orissa, India	Mothers of children aged 0 – 60 months	121	**Timing:** 61% initiate at 6-9 months
Holambe & Thakur (2014) [99]	Cross-sectional	Maharasha, India	Mothers attending immunisation outpatient department (OPD) with their infants (age of baby <12 months)	197	**Factors**: Maternal age, education, siblings. **Timing:** 46% started CF at appropriate age

Jayant et al. (2010) [65]	Cross-sectional	Loni, India	Mothers of children aged 0-5 years attending immunisation clinic and Pediatric (OPD)	300	**Diversity:** Milk and water mentioned. **Factors:** Knowledge and support, education on CFP timing. **Timing:** 42% at 6-8 months
Jindal (2009) [100]	Cross-sectional	Mangalore, India	Mothers of infants aged 6-12 months during their visits at the outpatient department of of two hospitals	104	**Diversity:** Fruit juice and ragi porridge. **Factors:** Early, inadequate expressing. Late=child refusing to eat. **Timing:** Majority weaned before 6 months with fruit juice
Kapur et al. (2005) [41]	Cross-sectional	Urban slum, Delhi, India	Children 9-36 months of age, in an urban slum Integrated Child Development Services project	545	**Diversity:** Cereals, pulses, flesh foods, milk, vegetables, others mentioned. **Factors**: Gender of child
Katara et al. (2013) [35]	Cross-sectional	Urban slums, India	Children aged 6-24 months	561	**Diversity:** 64.7% were given an appropriate number of food groups. Cereals, pulses, fruits/vegetables, milk mentioned. **Frequency:** 25% of children were receiving adequate frequency of CF and its association with gender was significant. **Factors:** Parents thinking their child is too old for breast milk after 6 months, high birth order, gender, maternal literacy, young mothers. **Timing:** 60.5% after 6 months
Khan et al. (2012) [31]	Cross-sectional	Urban health centers of the department of Community Medicine of UCMS, East Delhi, India	Children less 24 months old who were attending an immunisation clinic	374	**Diversity:** MDD was observed in 32.6% of the children of 6-23 months. **Frequency:** MMF was observed in 48.6% of the children.
Kumar et al. (2006) [101]	Cross-sectional	4 Anganwari areas of urban Allahbad, Uttar Pradesh, India	Children aged under 60 months	217	**Diversity:** WHO recommended food was used. **Factors:** Knowledge. **Timing:** 48% practiced CF during 6-9 months
Kumar et al. (2013) [44]	Cross-sectional	Rural Tumkur, India	Lactating Mothers	110	**Diversity:** Ragi sari, biscuits, cerelac, cow's milk, Farex, goat's milk. **Frequency:** 46% given weaning food twice daily and 31% once daily. **Factors:** Rural areas
Kuriakose (2010) [57]	Cross-sectional	Karnataka, India	Randomly selected Infants from Karnataka	112	**Frequency:** 47% given CF four times daily. **Factors:** Number of children inversely proportional to quality of CFP, Educational status of mother improved. **Timing:** 31% started CF at 4 months
Lingam et al. (2014) [50]	Qualitative	Rural Rajasthan, India	Children aged 0-24 months	87	**Diversity:** Cerelac, porridge, biscuits, roti, milk, rice, almonds, lentils were used. **Factors:** Lack of advice, poor families. **Timing:** Often a delay until 7-12

					months of age
Lohia & Udipi (2014) [37]	Cohort study	6 urban slums in 3 western suburbs, Mumbai, India	Children aged 6-24 months	446	**Diversity:** Scores provided by age, IYCF groups measured. **Frequency:** Over half of males (54.8%) <12 months of age had a higher feeding frequency score compared to one-third of females (32.7%) at the same age. **Factors:** Maternal education, male child, age, BMI of mother
Malhotra (2013) [36]	Cross-sectional	India - national	Children aged 6–18 months	9241	**Diversity**: MDD 6–8 months 3% 9–11 months 9% 12–18 months 17%. **Frequency:** MMF 6–8 months 25% 9–11 months 39% 12–18 months 54%. **Factors:** Illness, siblings, HCP advice, media, mother working from home. **Timing:** 63% had commenced weaning by 6-8 months
Mayuri et al. (2012) [77]	Cross-sectional	India – four zones	Infants from eight centers from different states across four zones (North, East, South, and West) in India	800	**Diversity:** Milk, biscuits, fennel seeds, cardamom, cereals. **Factors:** Perception of insufficient milk, or being tired after labour; convenience, and as per elders' advice
Menon et al. (2015) [27]	Cross-sectional	India - national	Children 0-24 months old	18463	**Diversity:** Grains, legumes, eggs, meat, fish. 16% 6-23 month olds met MDD. **Frequency:** 45% met MMF. **Factors:** Education, delaying age of marriage, poverty, illiteracy. **Timing:** 58% used CF before 6 months
Meshram et al. (2012) [40]	Cross-sectional	Andhra Pradesh, India	Child-mother pairs were included using systematic random sampling	805	**Diversity:** Cow/buffalo milk, home made semi solids e.g. cereals. **Frequency:** 95% received CF three times/day. **Factors:** Timely initiation was more likely among certain castes and tribes. **Timing:** Classified as 6-9 months
Meshram et al. (2013) [67]	Cross-sectional	Rural Madhya Pradesh	Children under 1 year old	5,457	**Factors:** Castes, literacy, wealth. **Timing:** 50% at 6-8 months
Mukhopadhy et al. (2013) [28]	Cross-sectional	2 slums, West Bengal, India	Children aged 0-23 months from 2 slums via two-stage random sampling technique	245	**Diversity:** Minimum dietary diversity was 24.4%. **Frequency:** Age-appropriate minimum meal frequency was found in 67.0% children. **Timing:** 12% were before 6 months
Narayanappa et al. (2015) [52]	Cross-sectional	Rural Karnataka	Children 9-10 months old	957	**Diversity:** Janam ghutti, peanuts, Cerelac, animal milk, biscuits, rice with lentils, others. **Factors:** Education of how to maintain sufficient breast milk production, and appropriate age for weaning. **Timing:** 66% before 6 months
Neog & Baruah (2012) [39]	Cross-sectional	Jorhat district, Assam, India	Children aged 1- 12 months	120	**Diversity:** Milk, dal, rice, Cerelac, banana, luthri, khichri, cooked rice. **Factors:** Community norms, education. **Timing:** 26% given CF early
Padhy & Choudhury (2004) [76]	Cross-sectional	Orissa, India	Mothers of children under 12 months	131	**Factors:** Poverty, tradition, knowledge. **Timing**: 3% between 3-6 months

Padmadas et al. (2002) [60]	Cross-sectional	6 regions of India	Children 24-47 months	6285	**Factors:** Later start in Central and East (except West Bengal) India, maternal education. **Timing**: 53.5% weaned <6 months
Pasricha et al. (2011) [42]	Cross-sectional	2 rural districts of Karnataka, India	Children aged 12 – 23 months	396	**Diversity:** Idli and dosa with rice and lentils, sambar, rice, ragi. **Factors**: Poverty and food insecurity increase breast feeding
Passi & Shad (2004) [102]	Cross-sectional	Tea Garden in Assam, India	Children aged 0 – 12 months	110	**Factors:** Poverty and illiteracy. **Timing**: Commenced by 9-10 months for 56%
Patel et al. (2012) [29]	Cross-sectional	India - national	Last-born children aged 6-23 months	15028	**Diversity:** Among children aged 6-23 months, minimum dietary diversity rate was 15.2%. Foods included potatoes, bread, noodles, milk, flesh foods, chicken, grains, roots, tubers. **Frequency:** When sick, many children (up to 75%) see their complementary foods restricted in frequency. 41.5%. **Factors**: North and West India had a higher odds of suffering from poor CF practice; education, antenatal care. **Timing:** 55% 6-8 months were introduced to solid foods
Pathi et al. (2003) [71]	Cross-sectional	Rural block of Orissa, India	Children aged under 1 year	383	**Factors**: Lack of awareness regarding proper weaning practices, education. **Timing:** 36% at 8-12 months
Rangaswamy et al. (2013) [43]	Cross-sectional	Nagavalli in Tumkur, India	Children under 1 year of age	110	**Diversity:** Biscuits, Cerelac, cow's milk, Farex, ragi porridge, rice dhal , others. **Factors:** Elderly family members were prominent influencers in decision when to add CF. **Timing:** 46% at 4-6 months
Rao et al. (2011) [78]	Cross-sectional	Mangalore	Mothers of children aged 6-24 months	200	**Diversity:** Ragi, wheat and rice. **Factors**: Number of children inversely proportional to quality of CF practice. Education, birth location. **Timing:** 78% had started CF at recommended time
Rasania et al. (2001) [56]	Cross-sectional	Mehrauli, Delhi	Children aged under 5 years old	354	**Diversity:** Top milk was given. **Frequency:** 46% 5-8 meals/day **Factors**: Education. **Timing:** Weaning times ranged from before 4 to after 12 months
Roy et al. (2009) [54]	Cross-sectional	Urban Health Centre, Chetla, Kolkata, India	Children aged 6–24 months	121	**Diversity:** Rice, dal, mashed potato, suji. **Factors:** Health facility, guardian and peer groups. **Timing:** 71.7% at 6 months
Samuel et al. (2012) [49]	Cohort study	Bangalore, India	Mothers of children aged 0 – 6 months	50	**Diversity:** Commercial cereal and milk, biscuits, mixed grain porridges, rice and lentil cakes, others. **Factors:** Reasons for the early introduction of CF included a crying infant, employment, elders. **Timing:** 64% by 6 months
Sanjeev & Anuradha (2012) [68]	Cross-sectional	Delhi, India	Children under 6 years	462	**Factors:** Lack of education **Timing:** Majority started before 6 months or after 8 months
Saxena & Kumar (2014) [59]	Cross-sectional	Doiwala Block, Dehradun, India	Mothers of children under 24 months.	336	**Diversity:** Egg, vegetarian food. **Frequency:** 31% more than 3 times a day. **Factors:** Employment and lack of expressing, lack of knowledge, vomiting, child cries. **Timing:** 13% delayed, 25% early

Saxena & Kumari (2014) [75]	Cross-sectional	Doiwala block, India	Accredited Social Health Activists (ASHA)s who consented to participate and had a child.	168	**Diversity:** Cow's milk, water, sugar, honey. **Factors**: Insufficient mother's milk (55.4%), Caesarean sections (20.2%), coercion from elders in the family to start top milk, led to cessation of exclusive breastfeeding. **Timing:** Early for 55%
Senarath et al. (2012) [30]	Cross-sectional	Bangladesh/Nepal/India/Sri Lanka/Pakistan	Children aged between 6 and 23 months old	15028	**Diversity**: MDD for 6-23 months was 15.2%. **Frequency:** MMF was 41.5%. **Factors:** Lack of maternal education and lower household wealth, Limited exposure to media, inadequate antenatal care and lack of post-natal contacts by health workers. **Timing:** 6-8 months for 55%
Shahrawat et al. (2013) [103]	Cross-sectional	Delhi	Children aged 0-24 months	5	**Diversity:** Grains, pulses, milk, fish, fruits. **Factors:** Better access to advice from healthcare professionals
Sharan et al. (2001) [45]	Cross-sectional	Bangalore, India	Farming women were randomly selected	306	**Diversity:** Ragi sari, rice with daal and ghee, vegetables, commercial baby food. **Factors:** Subsequent pregnancy, insufficient milk, child deemed old enough to wean.
Sharma & Sharma (2003) [80]	Cross-sectional	Baijnath block of Kangra district of Himachal Pradesh, India	Mothers of children under the age of two.	100	**Diversity:** Kheer, Dalia, dal, Khichri, rice, fruits, vegetables, others. **Factors:** Knowledge, traditions, health status of mother, sanitation, education. **Timing:** 70% by 4-6 months
Shroff et al. (2011) [72]	Cross-sectional	Andhra Pradesh, India	Mothers of children aged 3 -15 months	600	**Factors:** Autonomy of mother, tradition **Timing:** 24.9% were taking other foods or liquids than breast milk at 3-5 months
Singh & Vaidya (2015) [104]	Cross-sectional	Abalpur district of Madhya Pradesh	Children aged 6 months to 23 years.	300	**Diversity:** Cereals, pulses, millets, khichadi chawal, kudai bhat, latchaka, rejgeera ladoo. **Factors:** Working mothers were more likely to introduce complementary foods earlier than non-working.
Sinha & Pandey (2000) [81]	Cross-sectional	Bihar, India	Mothers of children under 72 months	200	**Diversity:** Mandi, papaya, potatoes, rice, dhal, fish and fowl, rice. **Factors:** Lack of knowledge of mothers and health workers was a barrier to appropriate CF.
Sinhababu et al. (2010) [82]	Cross-sectional	Bankura Town, West Bengal, India	Children aged 0-23 months	647	**Factors:** Insufficient knowledge, inappropriate practices. **Timing:** 56% by 6-8 months
Sreedhara & Banapurmath (2014) [63]	Cross-sectional	Urban slum community of central Karnataka, India	Infants aged 9-12 months	100	**Frequency:** 29% were given CF feed less than 3 times a day. **Timing:** 55% between 7-9 months
Subbiah & Jeganathan	Cross-sectional	Delhi, India	Postnatal mothers who had a normal	405	**Diversity:** Sugar water and honey. **Factors**: Mothers need more support and information about breast feeding and optimal times to begin CF

(2012) [79]			delivery		
Tyagi & Bhan (2009) [73]	Cross-sectional	Hisar, India	Mothers of children aged 0 – 60 months	380	**Factors:** Maternal employment, lack of milk
Veena et al. (2012) [86]	Cohort study	Mysore, India	Mothers who delivered babies at the Holdsworth Memorial Hospital	514	**Factors:** Familial socio-economic status, maternal education, primiparity **Timing:** Majority started at or after 4 months
Verma & Gupta (2015) [69]	Cohort study	Uttar Pradesh, India	Children aged below 9 months. Vast majority were under 6.	186	**Diversity:** Animal milk, cow's milk, porridge. **Timing:** Evidence of commencement at 3-6 months
Vyas et al. (2014) [46]	Cross-sectional	Uttarakhand, India	Mothers with children within 3 years of age were included	500	**Diversity**: Rice water (mand), coarse grains, Jhingora, barley, maize, pulses, Gahat, fruits, nuts. **Factors:** Lack of advice seeking, cultural influences, education, socioeconomic factors. **Timing:** 52% after 6 months
Yasmin (2008) [58]	Cross-sectional	6 different villages of Chandaulia district, Uttar Pradesh, India	Mothers of children 0-9 months	120	**Diversity:** Carrots, pumpkin, cauliflower, spinach, milk, buttermilk, potato, rice, pulses, porridge, kheer, banana. **Frequency:** 90% of 6-9 months. **Factors:** Perception of poor quality breast milk. **Timing:** 60% <3 months
Yousafzai et al. (2003) [83]	Cohort study	Mumbai, India	Carers of disabled and non disaled child	41	**Factors:** Erroneous belief that a disability is curable takes away from the focus of nutrition and its importance for the well-being of children with disabilities. Unaffordability of food.

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Table 2: Weight of Evidence Awarded to Each Study				
Studies	**Weight of Evidence A**	**Weight of Evidence B**	**Weight of Evidence C**	**Weight of Evidence D**
	Quality of Methodology: The accuracy, coherency and transparency of evidence.	**Relevance of Methodology:** The appropriateness of the methodology for answering the review question.	**Relevance of evidence to the review question:** The relevance of the focus of the evidence for answering the review question.	**Overall weight of evidence:** Overall assessment of the extent to which the study provides evidence to answer the review question
Aggarwal et al. (2008) [55]	Low	Medium.	Medium	Medium
Aguayo et al. (2016) [48]	High	High	High	High
Aruldas et al. (2010) [24]	High	High	High	High
Bagul & Supare (2012) [64]	Medium	Medium	Medium	Medium
Bahuguna et al. (2013) [96]	Medium	Medium	Low	Low
Bentley et al. (2015) [25]	High	Medium	Medium.	High
Bhandari et al. (2002) [47]	High	Medium	Low	Medium
Bhanderi & Choudhary (2011) [62]	Low	Medium	Medium	Medium
Caleyachetty et al. (2013) [61]	High	Medium	Medium	Medium
Chandwani et al. (2015) [26]	Medium	Medium	Medium	Medium
Chhabra & Gupta (2015) [85]	Medium	Medium	Medium	Medium
Chhabra et al. (2010) [51]	Low	Medium	High	Medium
Collison et al. (2015) [53]	High	Medium	Medium	High
D'Alimonte et al. (2016) [33]	High	Medium	Medium	Medium
Dahiya & Sehgal (2002) [84]	Low	Medium	Medium	Medium
Dakshayani & Gangadhar (2008) [97]	Low	Medium	Medium	Medium
Damayanthi et al. (2013) [70]	Medium	Medium	Medium	Medium
de Onis (2006) [32]	Medium	High	Medium	Medium
Dibley et al. (2010) [89]	High	High	Medium	High
Fall et al. (2011) [98]	Medium	High	High	Medium
Farzana & Devi (2010) [66]	Medium	Medium	Medium	Medium
Fazilli et al. (2011) [38]	Medium	Medium	Medium	Medium

Garg & Chadha (2009) [34]	Medium	Medium	Medium	Medium
Goswami et al. (2012) [74]	Medium	Medium	Medium	Medium
Holambe & Thakur (2014) [99]	Medium	High	High	Medium
Jayant et al. (2010) [65]	Medium	Medium	Medium	Medium
Jindal (2009) [100]	Low	Medium	Low	Low
Kapur et al. (2005) [41]	Medium	Medium	Medium	Medium
Katara et al. (2013) [35]	Medium	Medium	Medium	Medium
Khan et al. (2012) [31]	Medium	Medium	Medium	Medium
Kumar et al. (2006) [101]	Medium	Medium	Low	Low
Kumar et al. (2013) [44]	Low	Medium	Medium	Medium
Kuriakose (2010) [57]	Low	Medium	Medium	Medium
Lingam et al. (2014) [50]	High	Medium	High	High
Lohia & Udipi (2014) [37]	Medium	Medium	Medium	Medium
Malhotra (2013) [36]	High	Medium	Medium	Medium
Mayuri et al. (2012) [77]	High	Medium	Medium	Medium
Menon et al. (2015) [27]	High	Medium	Medium	Medium
Meshram et al. (2012) [40]	High	Medium	High	High
Meshram et al. (2013) [67]	Medium	Medium	Low	Medium
Mukhopadhy et al. (2013) [28]	Medium	Low	Medium	Medium
Narayanappa et al. (2015) [52]	High	High	High	High
Neog & Baruah (2012) [39]	Low	Medium	Medium	Medium
Padhy & Choudhury (2004) [76]	Medium	Medium	Medium	Medium
Padmadas et al. (2002) [60]	High	Medium	Low	Medium
Pasricha et al. (2011) [42]	High	Medium	Medium	Medium
Passi & Shad (2004) [102]	Low	Medium	Low	Low
Patel et al. (2012) [29]	High	High	High	High
Pathi et al. (2003) [71]	Low	Medium	Medium	Medium
Rangaswamy et al. (2013) [43]	Medium	Medium	High	Medium
Rao et al. (2011) [78]	Medium	High	High	High
Rasania et al. (2001) [56]	High	High	High	High

Roy et al. (2009) [54]	Medium	Medium	Medium	Medium
Samuel et al. (2012) [49]	High	High	High	High
Sanjeev & Anuradha (2012) [68]	Medium	Medium	Medium	Medium
Saxena & Kumar (2014) [59]	Medium	Medium	Medium	Medium
Saxena & Kumari (2014) [75]	Medium	Medium	High	Medium
Senarath et al. (2012) [30]	High	High	Medium	High
Shahrawat et al. (2013) [103]	Medium	Low	Medium	Low
Sharan et al. (2001) [45]	Medium	Medium	Medium	Medium
Sharma & Sharma (2003) [80]	Medium	Medium	Medium	Medium
Shroff et al. (2011) [72]	Medium	Medium	Low	Medium
Singh & Vaidya (2015) [104]	Medium	Medium	High	Medium
Sinha & Pandey (2000) [81]	Low	Medium	Medium	Medium
Sinhababu et al. (2010) [82]	Medium	Medium	Medium	Medium
Sreedhara & Banapurmath (2014) [63]	Low	Medium	Medium	Medium
Subbiah & Jeganathan (2012) [79]	Medium	Medium	Medium	Medium
Tyagi & Bhan (2009) [73]	Medium	Medium	Low	Medium
Veena et al. (2012) [86]	Medium	Medium	Medium	Medium
Verma & Gupta (2015) [69]	High	Medium	Medium	Medium
Vyas et al. (2014) [46]	Medium	Medium	Medium	Medium
Yasmin (2008) [58]	Medium	Medium	Medium	Medium
Yousafzai et al. (2003) [83]	Medium	High	Low	Medium

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Table 3: Foods utilised for CF categorised into WHO food groups

WHO classified Food Groups	**Study Reference (author)**
Grains, roots and tubers	31 studies [24–27,29,32,34,35,38,40,41,43–46,48,50–52,54,58,62,66,69,77,78,80–82,84,104]

Legumes and nuts	29 studies [24–27,29,32,35,38,41,43–46,48,50–52,54,58,62,66,67,77,78,80–82,84,104]
Dairy products (e.g. milk, cheese, yogurt)	26 studies [24–26,29,32,34,35,39–41,43–45,47,48,51,52,58,62,66,69,75,77,80,82,84]
Flesh foods (e.g. meat, fish, poultry and liver/organ meats)	10 studies [24–27,32,41,47,48,52,53,81]
Other Fruit and Vegetables	22 studies [24–26,29,32,34,35,38,39,41,45–48,51–53,58,62,66,81,84]
Vitamin A rich fruits and vegetables (e.g. Pumpkin)	8 studies [25,26,29,32,40,48,58,59]
Eggs	12 studies [24–27,29,32,34,47,48,52,53,59]

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Table 4: Timing of initiating CF	
Infant Age	**Study Reference**
<3 months	1 study [58]
3 – 6 months	22 studies [27,32,43,44,47,49,52,56,57,60–62,64,66,69,70,75,76,80,84,86,104]
6 – 9 months	29 studies [24–26,28–31,33,35,36,38–40,46,48,50,51,54,63,65,67,74,78,82,84,85,89,97,99]
9 – 12 months	4 studies [38,55,71,98]
>12 months	0 studies

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Table 5: Factors influencing CF practices			
Family level			
Promoters	Study reference	Barriers	Study reference
Knowledge of optimal CFP	4 studies [33,54,65,76]	Lack of knowledge of optimal CFP	12 studies [24,38,46,51,59,65,75,79–83]
Autonomy of mother	2 studies [72,80]	Inadequate breast milk production	7 studies [43,45,52,58,59,73,75]
Older age at	2 studies [27,37]	Siblings	5 studies [34,36,57,78,99]

marriage			
Valuing nutrition	2 studies [33,76]	Recent illness	3 studies [36,59,80]
BMI of mother	1 study [37]	Difficulty feeding child	2 studies [55,59]
Delivery with doctor present	1 study [40]	Crying infant	2 studies [49,59]
High birth order	1 study [35]	Lack of support	2 studies [24,50]
Acknowledged importance of maternal health	1 study [33]	Maternal age	2 studies [35,99]
Advice seeking	1 study [33]	Religion	2 studies [70,71]
Mother who works from home	1 study [36]	Caesarian sections	1 study [75]
		Child's age	1 study [37]
		Concern about weight gain	1 study [53]
		Maternal nutrition status	1 study [48]
		Mothers from joint families	1 study [70]
		Primiparity	1 study [86]
		Subsequent Pregnancy	1 study [45]
Organisational level			
Promoters	Study reference	Barriers	Study reference
Education of parent	14 studies [24,27,29,34,37,39,40,42,46,61,62,66,71,86]	Cultural influences	15 studies [38,39,43,46,49,52,53,55,59,62,72,75–77,80]
Literacy status of mother.	6 studies [35,64,66,70,78,84]	Poverty	6 studies [27,30,48,50,67]
Wealth	5 studies [24,34,50,85,86]	Lack of parental education	6 studies [30,55,60,68,80,99]
Socio-economic status	5 studies [34,52,61,70,84]	Low literacy	5 studies [27,30,64,67,77]
Media exposure	4 studies [24,36,61,89]	Employment	4 studies [49,59,73,84]

Social support group	3 studies [33,65,70]	Gender	4 studies [35,37,41,85]
Advice from a healthcare professional	3 studies [36,54,68]	Poor sanitation	3 studies [48,80,86]
Effective antenatal care	3 studies [24,62,89]	Inadequate antenatal care	2 studies [29,30]
Location	3 studies [60,62,89]	Food insecurity	2 studies [42,80]
Certain castes or tribe	2 studies [40,67]	Price of food	2 studies [53,83]
Support system at work	1 study [75]	Focus on disability	1 study [83]
Family support	1 study [79]	Birth in a public hospital rather than a private hospital	1 study [78]
Hindu mothers	1 study [61]	Location: Northern India, West India	1 study [29]
Birth within a government institute	1 study [85]	Lack of media exposure	1 study [30]

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