


# BMJ Open Interventions to improve infant and young child feeding practices in Ethiopia: a systematic review

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## ABSTRACT

**Objective** In Ethiopia, despite the implementation of several interventions to improve infant and young child feeding (IYCF) practices, no published studies have highlighted the most effective IYCF interventions in the country. This systematic review investigated the impacts of various interventions on IYCF in Ethiopia.

**Source of information** A systematic search was conducted on seven computerised bibliographic databases (Embase, ProQuest Central, Scopus, PsycINFO, Web of Science, MEDLINE/PubMed and CINAHL) to locate experimental or quasi-experimental studies published between the year 2000 and May 2021.

**Study eligibility criteria** Interventional studies that measured IYCF indicators (early initiation of breast feeding (EBF), exclusive breast feeding (EBF), the introduction of complementary foods, minimum dietary diversity (MDD), minimum meal frequency (MMF) and minimum acceptable diet) as outcome variables were included.

**Study appraisal and synthesis** All included studies were examined for biases related to interventional studies (ie, selection bias, performance bias, attrition bias, detection bias and reporting bias). Author reports of effect size measures were used to narratively report the findings of each study.

**Results** Of the 23 eligible studies, 14 studies were quasi-experimental and 9 studies were cluster randomised trials (CRTs). Eight quasi-experimental studies had a serious risk of bias, while two CRTs had a high risk of bias. Four studies for EBF and six studies for EIBF showed significant impacts of policy advocacy, health service strengthening, interpersonal communication, community mobilisation and mass media campaigns. Six studies for MDD and three studies for MMF indicated significant effects of community-level and health facility complementary feeding promotions on infants and young children. Interventions that delivered in combination increased the impacts in improving EIBF, MDD and MMF compared with a single intervention.

**Conclusion** Our review showed that 12 out of 21 eligible studies that implemented in the form of community-level and health facility interventions improved EIBF, EBF, and/or MDD in Ethiopia.

**Protocol registration number** PROSPERO, CRD42020155519.

## Strengths and limitations of this study

- A meta-analysis was not conducted due to the wide heterogeneity of the study designs and outcome measures.
- This review was limited by the incompleteness of information from the individual studies (however, the study authors were contacted for information when necessary).
- Despite the limitations, the application of multiple search strategies in consultation with the medical librarian and registration of the systematic review protocol can be considered as strengths of this review.

## INTRODUCTION

Appropriate infant and young child feeding (IYCF) improves childhood growth (through reduced risk of diarrhoea and respiratory infections as well as improved nutrition),<sup>1-7</sup> increases the intellectual capacity of children<sup>4,8</sup> and reduces the risk of mothers experiencing diabetes mellitus, overweight and obesity.<sup>4,9</sup> Promoting appropriate IYCF using evidence-based interventions is essential to protect and support maternal knowledge, beliefs and confidence in IYCF practices.<sup>10-13</sup> Community-based and facility-based interventions that range from direct support and education to mothers and families on appropriate IYCF behaviours to training of health professionals can significantly improve IYCF behaviours.<sup>14-16</sup>

Global efforts to improve maternal IYCF behaviours have increased in the past three decades. These efforts included the International Code of Marketing of Breast-milk Substitutes<sup>17</sup>; the Innocenti Declaration<sup>18</sup>; the Baby-Friendly Hospital Initiative (BFHI)<sup>19</sup>; the Millennium Development Goals (MDGs)<sup>20</sup>; and more recently, the Global Nutrition Targets 2025<sup>21</sup> and the Sustainable Development Goals (SDGs).<sup>22</sup> The WHO



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and United Nations Children's Fund (WHO/UNICEF) have played major roles in driving these initiatives, which aimed to protect, promote, and support breast feeding and child nutrition.<sup>19</sup> For example, the WHO Global Nutrition Targets (WHO GNT, including Targets 1 and 5) aim to reduce the global number of under-5 children who are stunted by at least 40% and increase the exclusive breastfeeding (EBF) rate to at least 50% by the year 2025, respectively. However, most subnational areas of many African countries (including Ethiopia) are not on track to achieve WHO GNT goal-5.<sup>23</sup>

In Ethiopia, while both government and non-governmental organisations have implemented various maternal and child health-related policy interventions over the last two decades to increase infant feeding,<sup>24–26</sup> a recent study has revealed that early initiation of breastfeeding (EIBF) prevalence was 75.5% and that for EBF was 59.9%,<sup>27</sup> with a wide heterogeneity across subnational areas of the country.<sup>23</sup> These rates are well below the Ethiopian Health Sector Transformation Plan (HSTP) target of 90% and 72%, respectively.<sup>25</sup> Additionally, the proportion of children who met minimum dietary diversity (MDD) and minimum meal frequency (MMF) was 7.1% and 43.6%, respectively.<sup>28</sup> In Ethiopia, more than five million children were stunted in 2016,<sup>29</sup> and this is a major public health issue that is largely attributable to inappropriate IYCF.

To date, no previously published studies have examined the most effective IYCF interventions in the Ethiopian context. A detailed understanding of the specific types of interventions that can be implemented to improve IYCF in Ethiopia is essential, to specifically guide the allocation of scarce resources and the provision of targeted strategies to increase childhood feeding. This information will also be helpful in scaling-up and/or improve on current and future IYCF interventions in the country. Data from the assessment of relevant IYCF interventions would be crucial to stakeholders as Ethiopia implements national nutrition efforts (eg, HSTP)<sup>25</sup> and global health programmes such as the Sustainable Development Goal, SDG-2.2, to end all forms of malnutrition.<sup>22</sup> Accordingly, this systematic review investigated the impacts of community-based and facility-based interventions in improving IYCF practices of mothers/caregivers with children under 2 years of age in Ethiopia.

## MATERIALS AND METHODS

Our review adhered to the 2009 Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines<sup>30</sup> (online supplemental file 1), and the protocol for the review was registered in PROSPERO (International Prospective Register of Systematic Reviews, CRD42020155519).<sup>31</sup>

### Eligibility criteria

Studies were included if they meet the following criteria: (1) experimental or quasi-experimental study design

(including randomised controlled trials (RCT), non-RCTs, before and after studies, and interrupted time-series studies) with or without comparison groups or cluster; (2) conducted among pregnant women and mothers living with alive children under 2 years to improve IYCF practices; (3) used any type of IYCF interventions delivered between the antenatal period and 24 months' postpartum; (4) measured at least one core IYCF indicator such as EIBF, EBF, the introduction of solid, semi-solid and soft foods, continued breast feeding at 1 year, MDD, MMF and minimum acceptable diet (MAD); (5) were published in the English language and (6) conducted in Ethiopia from the year 2000 to date. We considered studies published over this period to demonstrate the impacts of the specific IYCF interventions in the context of Ethiopia to reflect the implementation of relevant global health programmes, including the MDGs and the current SDGs.<sup>23</sup>

The intervention strategies considered in this review focused on those performed at both facility and community levels. The interventions included nutritional education and counselling, interpersonal communication, mass media campaigns, nutrition-sensitive agricultural activities, group demonstration sessions and strengthening of health facilities.

Studies conducted among mothers with health problems such as HIV/AIDS and children with cleft palate were excluded.

The IYCF practices included EIBF, EBF, the introduction of solid, semi-solid and soft foods, continued breast feeding at 1 year, MDD, MMF and MAD, measured according to the WHO definitions for assessing IYCF indicators.<sup>32</sup> These indicators were selected based on their effect on the health and development of infants and young children<sup>11 12 33</sup> and the evidence from previously published systematic reviews.<sup>11 34</sup>

- ▶ EIBF was defined as the proportion of children aged 0–23 months who commenced breast feeding within the first hour of birth.
- ▶ EBF was defined as the proportion of infants 0–5 months of age who were fed no other food or drink, not even water, except breast milk (including milk expressed or from a wet nurse), but allows the infant to receive oral rehydration salt (ORS), drops and syrups (vitamins, minerals and medicines).
- ▶ Continued breastfeeding at 1 year was defined as the proportion of children 12–15 months of age who are fed breast milk.
- ▶ Introduction of complementary foods (solid, semi-solid and soft foods) was defined as the proportion of infants 6–8 months of age who received solid, semi-solid or soft foods in the previous 24 hours, during the day and at night.
- ▶ MDD was defined as the proportion of children 6–23 months of age who received foods from four or more of the seven food groups. The seven food groups included grains, roots and tubers; legumes and nuts; dairy products (milk, yoghurt, cheese); flesh foods

(meat, fish, poultry and liver/organ meats); eggs; vitamin-A-rich fruits and vegetables; and other fruits and vegetables.

- ▶ MMF was defined as the proportion of breastfed and non-breastfed children 6–23 months of age, who received solid, semisolid or soft foods (including milk feeds for non-breastfed children) the minimum number of times or more (ie, two times for breastfed infants aged 6–8 months, three times for breastfed children aged 9–23 months and four times for non-breastfed children aged 6–23 months, on the previous day).
- ▶ MAD was defined as the proportion of children 6–23 months of age who received both MDD and MMF.

### Information sources and search strategy

Consistent with previously published systematic reviews,<sup>15 35</sup> a three-stage search strategy was applied to locate both published and unpublished studies. In stage 1, a manual search of previously published systematic reviews and the reference lists of all the eligible studies was performed to check for systematic reviews of interventions on IYCF in Ethiopia. In stage 2, index terms (eg, medical subject headings (MeSH) for Medline) and key terms were generated using the identified articles from the initial search for the full search strategy. In stage 3, a full search strategy was conducted on seven computerised bibliographic databases (Embase (OVID), ProQuest Central, Scopus, PsycINFO (EBSCO), Web of Science, MEDLINE (OVID)/PubMed and Cumulative Index to Nursing and Allied Health Literature (CINAHL)/ (EBSCO) to locate published studies, and secondary searching of OpenGrey and Grey Literature Report was conducted to locate unpublished works. The Population Intervention Comparator Outcome (PICO) criteria were used to devise the review question and related search terms. A combination of specified MeSH terms and keywords was drafted with some assistance from our institution-based medical librarian. The search strategy, including all identified index and keywords terms, was slightly adapted for each of the information sources. All electronic searches were conducted for eligible studies published between the year 2000 and May 2021. A full electronic search strategy developed for the Embase (OVID) is provided as online supplemental files 2 and 3.

The overall list of search terms used included:

#### Term 1 (population)

child, infant, newborn, baby, neonate, perinatal, postnatal, kid, toddler, young child, paediatric, mother, female, women, and caregiver

#### Term 2 (interventions)

- ▶ **Education and counselling:** breastfeeding promotion, breastfeeding support, breastfeeding education, health education, health promotion, nutrition education, food education, parent education, mother education, counselling, and nutritional counselling

- ▶ **Social behavioural change communication:** health behaviour, health-related behaviour, behaviour change, communication, interpersonal communication, information education communication, behaviour change communication (BCC), social change, social movement, social mobilisation, social behaviour, social network, peer group, advocacy, advocacy group, mass communication, mass media, print media, mobile phone, mHealth, eHealth, internet, radio, social media, television, text message and social market
- ▶ **Community-based approaches:** baby-friendly community initiative, community programme, community project, home visit, community health action, community health service, community healthcare, community intervention, community engagement, community leader, community mobilisation, demonstration, cooking demonstration, community role-play, model breastfeeding community, community health worker and health extension worker
- ▶ **Facility-based approaches:** maternal care, child healthcare, child health service, paediatric healthcare, neonatal care, newborn care, rooming-in-care, newborn nursery, essential nutrition action, caregiver contact, baby-friendly hospital initiative, BFHI, antenatal care, postnatal care, Kangaroo care and skin-to-skin contact
- ▶ **Intervention designs:** effectiveness, impact, evaluation study, programme evaluation, healthcare programme, project, health project, experimental study, interventional study, quasi-experimental study, randomised controlled trial, clinical trial, cluster-randomised trial, time-series study, control, placebo, comparison, and usual care

#### Term 3 (context)

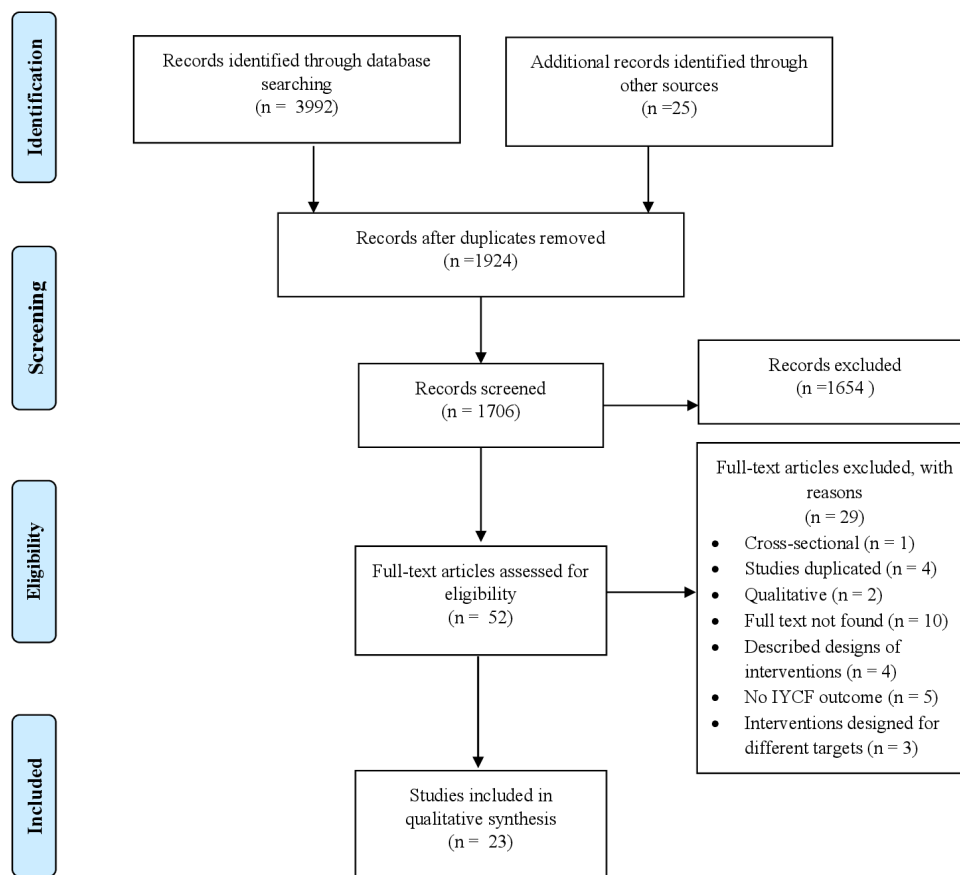
Ethiopia

#### Term 4 (outcomes)

Infant and young child feeding, breast feeding, early initiation of breast feeding, timely initiation of breast feeding, exclusive breast feeding, breast milk substitute, complementary food, complementary feeding, weaning, introduction of complementary food, baby food, infant feeding, child feeding, meal, dietary diversity, meal frequency, child nutrition, infant nutrition, nutritional supplement, dietary supplement, lactation, and nursing

#### Study selection

Following the full search, all articles retrieved from the search databases were exported to EndNote X9 (Clarivate Analytics, USA) for removing duplicates, screening and selection. Titles and abstracts were screened by two reviewers (KYA and FAO) independently for assessment against the inclusion criteria. Potentially relevant articles that were selected in the first screening phase were retrieved in full and their citation details imported into the Joanna Briggs Institute System for the Unified Management, Assessment and Review of Information (JBI



**Figure 1** Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) flowchart for selection of eligible studies. IYCF, infant and young child feeding.

SUMARI). Full texts of the included studies were read and checked by two independent reviewers (KYA and FAO) against the eligibility criteria. Studies that did not meet the eligibility criteria were excluded and reasons for the exclusion of studies were recorded and reported in the systematic review. Any disagreements between the two independent reviewers were resolved by consensus and arbitration by the third (KEA) author of the review. For studies with uncertainties regarding eligibility, the authors were contacted to seek additional information. A total of two contact attempts were made, and if no response was received, the articles were screened for eligibility based on the information available. The results of the study selection process are presented in a PRISMA flow diagram (figure 1).

#### Data collection process and data items

Relevant data were extracted from the eligible studies by KYA and independently verified by FAO using piloted forms adapted from the Joanna Briggs Institute (JBI) reviewer's manual<sup>33</sup> and the Cochrane Pregnancy and Childbirth Group for Systematic Reviews.<sup>36</sup> Eligible studies were identified using the following information: first author, publication year, study design and setting, study participants, sample size, geographical region, intervention components, location of intervention delivery, outcome measures, statistical analysis and

results. Corresponding authors of eligible studies were contacted for information that was not clear in the data extraction. A total of two contact attempts were made, and if no response was received, only the information available was used.

#### Risk of bias assessment

All included studies were examined for the five types of biases of interventional studies: (1) selection bias; (2) performance bias; (3) attrition bias; (4) detection bias and (5) reporting bias. KYA and KEA independently conducted the risk of bias assessment using the revised Cochrane risk of bias tool for clustered randomised trials (ROB 2.0)<sup>37 38</sup> and the risk of bias in non-randomised studies—of interventions (ROBINS-I) tool<sup>39</sup> for assessing the risk of bias in quasi-experimental studies. Cluster randomised trials were assessed for five domains (ie, randomisation and identification or recruitment bias, deviations from intended interventions, missing data, measurement of outcomes and selection of reported result), and quasi-experimental studies were assessed for seven domains (ie, confounding, selection of participants, classification of interventions, deviations from intended interventions, missing data, measurement of outcomes and selection of reported result). For cluster randomised trials, the overall risk of bias judgement included low risk, some concerns and high risk,<sup>37 38</sup> and

for the quasi-experimental studies, the overall risk of bias outcome included low, moderate, serious and critical risk of bias.<sup>39</sup> There was no disagreement between reviewers in the risk of bias assessment, no third arbitrator was needed.

### Data synthesis

Author reports of effect size measures were used in reporting the findings of each study. Effect size measures included a comparison between experimental and control groups (eg, OR), as well as the difference in proportion between preoutcome and postoutcome measures (eg, change in proportion). Where available, 95% CI and p value were obtained from the eligible studies. Based on published methodological studies,<sup>40 41</sup> 95% CI and p value were calculated using the available information where the full text of the eligible studies did not report these estimates. Narrative methods including text, table and figure were also used as a tool for data presentation.

### Patient and public involvement

There was no direct patient or public involvement in this review.

## RESULTS

### Characteristics of eligible studies

A total of 4017 articles were retrieved from the database and hand searching. Of these, 1924 were retained in the EndNote library after removing duplicates. Titles and abstracts of the articles were screened, and 1654 articles were removed. Full-text eligibility checks of the remaining 52 articles excluded 29 studies. The reasons for exclusion of studies included: 4 studies were duplicates,<sup>42–44</sup> 1 study was cross-sectional,<sup>45</sup> 2 studies used qualitative evaluation,<sup>46 47</sup> 10 studies were abstracts,<sup>48–57</sup> 4 studies were based on the design and implementation of interventions,<sup>58–61</sup> 5 studies did not measure IYCF outcomes,<sup>62–70</sup> and 3 studies were based on interventions designed for different target groups<sup>71–73</sup> (figure 1).

Among the 23 included studies, 14 were quasi-experimental studies,<sup>74–87</sup> while the remaining 9 were cluster randomised trials.<sup>88–96</sup> At least one interventional study was conducted in Southern Nations Nationalities and Peoples' Region (SNNPR),<sup>77–79 81 82 84–86 90</sup> Oromia,<sup>74 77 78 83–88 91 95</sup> Amhara,<sup>76–78 84–87 89 92 93 95</sup> Tigray<sup>77 79 84–87 95</sup> and Afar<sup>80</sup> regions, but we did not find published interventional studies conducted in either Addis Ababa and Dire Dawa city administrations, Harari, Benishangul, Gambella, or Somali regions.

### Risk of bias in included studies

Online supplemental files 4 and 5 present the risk of bias assessment of the included studies. Nine cluster randomised trials were assessed for risk of bias using the Cochrane RoB 2.0 tool. Overall, studies by Muluye *et al*,<sup>94</sup> and Passarelli *et al*<sup>95</sup> judged as high risk of bias, while studies by Abdulahi *et al*<sup>91</sup> and Kim *et al*<sup>89</sup> had a low risk

of bias. Two cluster randomised studies had a high risk of bias in the domains for randomisation.<sup>94 95</sup> Out of 14 quasi-experimental studies assessed using the ROBINS-1 tool, eight studies had a serious risk of bias<sup>74 77 78 81–84 86</sup> and four studies had a moderate risk of bias.<sup>79 80 85 87</sup> The remaining two studies were judged as critical risk of bias.<sup>75 76</sup> Seven out of 14 studies had a serious or critical risk of bias in the confounder adjustment,<sup>74–78 81–83</sup> while 8 out of 14 studies had a low risk of bias in outcome measurement.<sup>77–81 84 85 87</sup>

### Evidence from reviewed studies

In the eligible studies, n=23, the majority of the interventions were provided in the form of BCC using nutrition education,<sup>81 82 92 93 95</sup> community mobilisation,<sup>76 78 87 89</sup> health education materials<sup>74 80 82 83 91</sup> and mass media communication.<sup>79 89</sup> Other interventions were also provided in the form of peer/group support and training of mothers,<sup>91–93</sup> promotion of chicken husbandry and home gardening,<sup>95</sup> productive safety net programme (in-cash/food rations),<sup>84</sup> strengthening of healthcare system,<sup>78 80 85–87</sup> training and supervision of healthcare providers,<sup>76 78 83</sup> and food preparation and practical demonstration sessions.<sup>81 82 88 91 94 96</sup> Additionally, two studies used the health belief model (HBM) as a mode of intervention delivery for BCC<sup>81 90</sup> (table 1).

Sixteen studies used control groups for comparison with experimental groups,<sup>78 80–84 87–96</sup> while seven studies did not use control or comparison group.<sup>74–77 79 85 86</sup> Two studies used two experimental arms as an intervention group<sup>90 95</sup> (table 1).

### Impact of interventions on IYCF practices in Ethiopia

#### early initiation of breast feeding

Tables 1 and 2 are presented to summarise evidence from eligible studies. Eight studies reported the effect of interventions to improve EIBF.<sup>76 77 79 80 85–87 91</sup> A health facility level intervention in the Afar region that integrated nutrition information into health professional guidelines and also provided family education and counselling booklets resulted in a significant improvement in EIBF in the experimental group compared with the control group (OR=1.70; 95% CI: 1.17 to 2.46; p=0.005).<sup>80</sup> Kim *et al*<sup>79</sup> showed that interventions delivered through advocacy and policy dialogues, interpersonal communication and community mobilisation, and mass communication improved EIBF. This study also showed that the association between exposure to two or more types of interventions and improvement in EIBF was stronger compared with exposure to a single type of intervention (OR=2.07; 95% CI: 1.09 to 3.91; p<0.05 for multiple intervention vs OR=1.88; 95% CI: 1.08 to 3.27; p<0.05 for single intervention).<sup>79</sup>

Karim *et al*<sup>86</sup> indicated that supporting community health workers decision-making using community health data improved EIBF (OR=1.27; 95% CI: 1.10 to 1.46; p=0.001). However, Wereta *et al*,<sup>87</sup> 2018 reported no significant effect of community-based maternal and

Table 1 Summary of eligible studies

Authors	Design	Participants	Region	Intervention components	Location of intervention delivery	Outcome
Abdulahi <i>et al</i> <sup>81</sup>	Cluster-randomised trial	Experimental group ▲ Before intervention=249 ▲ After intervention=212 Control group (routine care) ▲ Before intervention=219 ▲ After intervention=197	Oromia	Breastfeeding education and peer support ▲ Peer support to encourage mothers for health facility birthing ▲ Breastfeeding education including educational materials ▲ Practical demonstrations on proper positioning and latching	Community based	EIBF EBF
Abiyu and Belachew <sup>92</sup>	Cluster-randomised trial	Experimental group ▲ Before intervention=306 ▲ After intervention=272 Control group (routine care) ▲ Before intervention=306 ▲ After intervention=282	Amhara	Complementary feeding BCC ▲ Complementary feeding messages ▲ Group training of mothers ▲ Home visits (for counselling and support) ▲ Participatory family level discussion	Community based	MDD MMF MAD
Abiyu and Belachew <sup>93</sup>	Cluster-randomised trial	Experimental group ▲ Before intervention=306 ▲ After intervention=272 Control group (routine care) ▲ Before intervention=306 ▲ After intervention=282	Amhara	Complementary feeding BCC ▲ Complementary feeding messages ▲ Group training of mothers ▲ Home visits (for counselling and support) ▲ Participatory family level discussion	Community based	Timely initiation of complementary foods
Bahru <i>et al</i> <sup>84</sup>	Quasi-experimental	Experimental group ▲ Before intervention=482 ▲ After intervention=275 Control group (routine care) ▲ Before intervention=740 ▲ After intervention=882	Tigray Oromia Amhara SNNPR	Productive safety net programme (PSNP) ▲ Offers employment opportunities for households with able-bodied members to work on community asset building projects and earn a wage either in cash or in-kind (food) ▲ Direct support to households whose breadwinners are the elderly or disabled and hence could not take part in labour-intensive activities	Health facility and community based	Dietary diversity Meal frequency
Baxter <i>et al</i> <sup>74</sup>	Quasi-experimental	Experimental group: ▲ Before intervention=173 ▲ After intervention=269	Oromia	EBF promotion strategies including ▲ Home visits, ▲ Educational materials, and ▲ Training of influential community and family members	Health facility and community based	EBF
Berti <i>et al</i> <sup>75</sup>	Quasi-experimental	No information	No information	▲ Breastfeeding communication through community-based interventions for behaviour change	Community based	EBF

Continued

Table 1 Continued

Authors	Design	Participants	Region	Intervention components	Location of intervention delivery	Outcome measures
Buchanan and Pose <sup>76</sup>	Quasi-experimental	No information	No information	<ul style="list-style-type: none"> <li>▲ Behavioural change communication</li> <li>▲ Community mobilisation</li> <li>▲ Capacity building</li> </ul>	Health facility based and community based	EIBF EBF Introduction of complementary foods
Callaghan-Koru <i>et al</i> <sup>77</sup>	Quasi-experimental	Experimental group: ▲ Before intervention=218 ▲ After intervention=215	Tigray Oromia Amhara SNNPR	<ul style="list-style-type: none"> <li>▲ An integrated package of facility-based kangaroo mother care</li> <li>▲ Community-based promotion of EBF</li> </ul>	Health facility and community based	EIBF EBF
Carnell <i>et al</i> <sup>78</sup>	Quasi-experimental	Experimental group: ▲ Before intervention=1016 ▲ After intervention=911 Control group: ▲ Before intervention=1074 ▲ After intervention=903	Oromia Amhara SNNPR	<ul style="list-style-type: none"> <li>▲ Strengthen the health system</li> <li>▲ Improve health workers' performance</li> <li>▲ Engage the community</li> </ul>	Health facility and community based	EBF
Kang <i>et al</i> <sup>88</sup>	Cluster-randomised trial	Experimental group: 570 Control group: 629	Oromia	<ul style="list-style-type: none"> <li>▲ Community-based participatory nutrition promotion programme</li> <li>▲ Daily group nutrition sessions</li> <li>▲ Follow-up visits</li> </ul>	Community based	Meal frequency Dietary diversity Dietary adequacy
Karim <i>et al</i> <sup>85</sup>	Quasi-experimental	Experimental group: ▲ Before intervention=1481 ▲ After intervention=1494	Tigray Oromia Amhara SNNPR	Supporting Ethiopian health extension programme in: <ul style="list-style-type: none"> <li>▲ Health education and demonstration for families on hygiene and environmental sanitation</li> <li>▲ Family health (maternal and child health, reproductive health, immunisation and nutrition) services</li> </ul>	Community based	EIBF EBF at 1 month

Continued

Table 1 Continued

Authors	Design	Participants	Region	Intervention components	Location of intervention delivery	Outcome measures
Karim <i>et al</i> <sup>86</sup>	Quasi-experimental	Experimental group: ▲ Before intervention=2124 ▲ After intervention=2113	Tigray Oromia Amhara SNNPR	Supporting Ethiopian health extension programme using community-based data for decision-making ▲ Family conversation, a forum conducted at the household of the pregnant women ▲ Birth notification to ensure early postnatal care ▲ Establish household level surveillance system ▲ Identify and address barriers to access maternal and newborn health services using generated data	Health facility and community based	EIBF within 30min of childbirth
Kim <i>et al</i> <sup>79</sup>	Quasi-experimental	Experimental group: ▲ Before intervention=1404 ▲ After intervention=1404	SNNPR Tigray	BCC strategies including: ▲ Advocacy and policy dialogues ▲ Interpersonal communication and community mobilisation ▲ Mass communication	Community based	EIBF EBF Introduction of complementary foods MDD MMF MAD
Kim <i>et al</i> <sup>89</sup>	Cluster-randomised trial	Experimental group: ▲ Before intervention=1328 ▲ After intervention=1360 Control group: ▲ Before intervention=1318 ▲ After intervention=1360	Amhara	BCC strategies including: ▲ Interpersonal communication ▲ Nutrition-sensitive agricultural activities ▲ Community mobilisation ▲ Mass communication	Community based	Introduction of complementary foods MDD MMF
Kung'u <i>et al</i> <sup>80</sup>	Quasi-experimental	Experimental group: ▲ Before intervention=2570 ▲ After intervention=2905 Control group: ▲ Before intervention=1670 ▲ After intervention=1620	Afar	Behaviour change interventions ▲ Integrating nutrition to the frontline workers' guideline ▲ Family education and counselling booklet	Health facility	EIBF EBF at 6 months
Mulualem <i>et al</i> <sup>81</sup>	Quasi-experimental	Experimental group: ▲ Before intervention=80 ▲ After intervention=80 Control group: ▲ Before intervention=80 ▲ After intervention=80	SNNPR	Nutrition education based on the HBM model ▲ Individual and group sessions, and ▲ Recipe demonstration	Community based	Meal frequency

Continued



Table 1 Continued

Authors	Design	Participants	Region	Intervention components	Location of intervention delivery	Outcome measures
Muluje <i>et al</i> <sup>84</sup>	Cluster randomised control trial	Experimental group: ▲ Before intervention=100 ▲ After intervention=100 Control group: ▲ Before intervention=100 ▲ After intervention=100	SNNPR	Education and practical demonstration on complementary food recipes and preparation ▲ Amount and frequency of feeding ▲ Personal hygiene and sanitation ▲ Dietary diversification	Facility based	MDD
Negash <i>et al</i> <sup>82</sup>	Quasi-experimental	Experimental group: ▲ Before intervention=100 ▲ After intervention=81 Control group: ▲ Before intervention=92 ▲ After intervention=76	SNNPR	▲ Nutrition education using visual materials ▲ Demonstration of food preparation	Community based	Dietary diversity Meal frequency
Passarelli <i>et al</i> <sup>95</sup>	Cluster-randomised trial	ACGG intervention group: ▲ Before intervention=255 ▲ After intervention=255 ACGG/ATONU intervention group: ▲ Before intervention=263 ▲ After intervention=265 Control group: ▲ Before intervention=311 ▲ After intervention=311	Tigray Oromia Amhara SNNPR	ACGG ▲ Each farmer received 25 vaccinated chicks that were ~6 weeks old ▲ Farmers implemented chicken husbandry according to their individual preferences ACGG/ATONU ▲ Additional nutrition-sensitive intervention such as promotion of home gardening, provision of fruit and vegetable seeds for the gardens, and behavioural change communication	Community based	Dietary diversity (7 days)
Teshome <i>et al</i> <sup>96</sup>	Cluster-randomised trial	Experimental group: ▲ Before intervention=386 ▲ After intervention=307 Control group: ▲ Before intervention=386 ▲ After intervention=314	SNNPR	▲ Nutritional education and counselling on balanced diet, and food groups and benefits of pulse ▲ Recipe demonstrations on preparation of porridge for complementary feeding	Community based	MDD
Tariku <i>et al</i> <sup>90</sup>	Cluster-randomised trial <sup>91-93</sup>	HBM intervention group: ▲ Before intervention=60 ▲ After intervention=54 Traditional nutrition education group: ▲ Before intervention=60 ▲ After intervention=56 Control group: ▲ Before intervention=60 ▲ After intervention=56	SNNPR	▲ Complementary feeding messages using the HBM model	Community based	Continued breast feeding MDD MMF

Continued

Table 1 Continued

Authors	Design	Participants	Region	Intervention components	Location of intervention delivery	Outcome measures
Villadsen <i>et al</i> <sup>83</sup>	Quasi-experimental	Experimental group: ▲ Before intervention=775 ▲ After intervention=1434 Control group: ▲ Before intervention=350 ▲ After intervention=422	Oromia	▲ Training of health professionals ▲ Health education materials ▲ Supervisions of ANC providers	Health facility	EBF at 1 month
Wereta <i>et al</i> <sup>87</sup>	Quasi-experimental	Experimental group ▲ Before intervention=408 ▲ After intervention=990 Control group (routine care) ▲ Before intervention=408 ▲ After intervention=990	Tigray Oromia Amhara SNNPR	▲ Increase access and quality of ANC, delivery and perinatal outcomes ▲ Community engagement in planning (eg, joint action plan to address these barriers and gaps) and implementation ▲ Enhance interactions between the communities, HEWs, healthcare providers and local health officials	Health facility and community based	EIBF

ACGG, African Chicken Genetic Gains; ANC, Antenatal Care; ATONU, Agriculture to Nutrition; BCC, behaviour change communication; EBF, exclusive breast feeding; EIBF, early initiation of breast feeding; HBM, health belief model; HEW, Health Extension Worker; MAD, minimum acceptable diet; MDD, minimum dietary diversity; MMF, minimum meal frequency; SNNPR, Southern Nations Nationalities and Peoples Region.

child health service quality improvement project on EIBF (average treatment effect (ATE)=2.8; 95% CI: -4.7 to 10.6;  $p=0.468$ ).

Buchanan and Pose,<sup>76</sup> Callaghan-Koru *et al*<sup>77</sup> and Karim *et al*<sup>85</sup> found an increase in the proportions of EIBF (from 31.0% to 77.0%, 51.4% to 67.9%, and 46.0% to 54.2%, respectively), following the implementation of BCC and community-level health programmes including breast-feeding promotions and family health services.

#### Exclusive breast feeding

Ten studies reported the effect of interventions on EBF in Ethiopia.<sup>74–80 83 85 91</sup> Of these, eight studies measured EBF for up to 6 months,<sup>74–80 91</sup> while two studies measured EBF for up to 1 month.<sup>83 85</sup> Villadsen *et al*<sup>83</sup> found that antenatal care strengthening for pregnant women significantly improved EBF in health facilities under intervention compared with health facilities without intervention (OR=2.30; 95% CI: 1.40 to 3.60;  $p=0.005$ ). Integrating nutrition into the health workers' guidelines, and providing family education and counselling booklet (OR=2.62; 95% CI: 0.95 to 7.21;  $p=0.062$ ),<sup>80</sup> and exposure to BCC intervention (ie, advocacy and policy dialogues, interpersonal communication and community mobilisation and mass communication) (OR=1.51; 95% CI: 0.95 to 2.40;  $p>0.05$ )<sup>79</sup> did not affect EBF behaviours.

Seven studies showed that there were increases in EBF during the intervention period,<sup>74–78 85 91</sup> but out of these studies, two indicated that improvements in EBF were not statistically significant.<sup>74 78</sup> Abdulahi *et al*<sup>91</sup> reported a significant difference in the proportion of EBF between the intervention (68.3%) and control groups (54.8%) ( $p<0.001$ ), following the interventions of peer support, breastfeeding education and practical demonstration sessions on positioning and attachment. Studies by Callaghan-Koru *et al* ( $p<0.010$ )<sup>77</sup> and Karim *et al* ( $p<0.001$ )<sup>85</sup> documented that implementing community-based and health facility interventions improved EBF, but the remaining two studies on EBF did not report the statistical test of significance.<sup>74 78</sup>

#### Introduction of solid, semi-solid and soft foods

Four studies reported the effect of different types of BCC interventions on the introduction of complementary foods.<sup>76 79 89 93</sup> BCC interventions using complementary feeding messages, training of mothers in groups, counselling and support at home level and facilitating participatory family discussion were effective in improving the timely initiation of complementary foods (RR=2.60; 95% CI: 1.78 to 5.86;  $p=0.002$ ).<sup>93</sup> Kim *et al*<sup>79</sup> investigated the effect of exposure to BCC interventions (advocacy and policy dialogues, interpersonal communication and community mobilisation and mass communication) on the introduction of solid, semi-solid and soft foods in two separate arms. The first arm of the study found an increase in the proportion of infants who were introduced to solid, semi-solid and soft foods (from 37.4% to 59.7%,  $p<0.001$ ). In contrast, the second arm of the study

**Table 2** Summary of evidence from reviewed studies

IYCF outcomes	Studies by authors	Statistical analysis	Results	
EIBF	Abdulahi <i>et al</i> <sup>61</sup>	Per cent change in proportion	▲ EIBF was 72.7% in intervention group and 40.6% in control group (p<0.001)	
	Buchanan and Pose <sup>76</sup>	Per cent change in proportion	▲ EIBF increased from 31.0% to 77.0%	
	Callaghan-Koru <i>et al</i> <sup>77</sup>	Per cent change in proportion	▲ EIBF significantly increased from 51.4% to 67.9% (p<0.010)	
	Karim <i>et al</i> <sup>85</sup>	Per cent change in proportion	▲ EIBF increased from 46.0% to 54.2% (p<0.001)	
	Karim <i>et al</i> <sup>86</sup>	Fixed-effect logistic regression	▲ EIBF at 30min (OR=1.27; 95% CI: 1.10 to 1.46; p=0.001)	
	Kim <i>et al</i> <sup>79</sup>	Fixed-effect logistic regression	▲ Single type of intervention: EIBF (OR=1.88; 95% CI: 1.08 to 3.27; p<0.050)	
			▲ Two types of interventions: EIBF (OR=2.07; 95% CI: 1.09 to 3.91; p<0.050)	
			▲ Four or more interventions: EIBF (OR=2.48; 95% CI: 1.09 to 5.64; p<0.050)	
	Kung'u <i>et al</i> <sup>80</sup>	Fixed-effect logistic regression	▲ EIBF (OR=1.70; 95% CI: 1.17 to 2.46; p=0.005)	
	Wereta <i>et al</i> <sup>87</sup>	Propensity score matching	▲ EIBF (ATE=2.8; 95% CI: -4.7 to 10.6; p=0.468)	
	EBF	Abdulahi <i>et al</i> <sup>61</sup>	Per cent change in proportion	▲ EBF was 68.3% in intervention group and 54.8% in control group (p<0.001)
		Baxter <i>et al</i> <sup>74</sup>	Per cent change in proportion	▲ EBF increased from 69.4% to 75.1%, but not statistically significant
		Berti <i>et al</i> <sup>75</sup>	Per cent change in proportion	▲ Higher improvement in exclusive breast feeding
Buchanan and Pose <sup>76</sup>		Per cent change in proportion	▲ EBF increased from 73.0% to 95.0%	
Callaghan-Koru <i>et al</i> <sup>77</sup>		Per cent change in proportion	▲ EBF increased from 86.0% to 95.8% (p<0.010)	
Carnell <i>et al</i> <sup>78</sup>		Difference-in-difference	▲ No significant difference in the improvement of EBF was observed	
Karim <i>et al</i> <sup>85</sup>		Per cent change in proportion	▲ EBF at 1 month increased from 82.4% to 95.3% (p<0.001)	
Kim <i>et al</i> <sup>79</sup>		Fixed-effect logistic regression	▲ Single type of intervention: EBF (OR=1.51; 95% CI: 0.95 to 2.40; p>0.050)	
			▲ Two types of interventions: EBF (OR=1.39; 95% CI: 0.96 to 2.01; p>0.050)	
			▲ Four or more interventions: EBF (OR=0.93; 95% CI: 0.86 to 1.01; p>0.050)	
Kung'u <i>et al</i> <sup>80</sup>		Fixed-effect logistic regression	▲ EBF at 6 months (OR=2.62; 95% CI: 0.95 to 7.21; p=0.062)	
Villadsen <i>et al</i> <sup>83</sup>		Fixed-effect logistic regression	▲ EBF at 1 month (OR=2.30; 95% CI: 1.40 to 3.60; p=0.001)	
Introduction of complementary foods		Abiyu and Belachew <sup>88</sup>	Generalised estimating equations (GEE) regression	▲ Timely initiation of complementary foods (RR=2.60; 95% CI: 1.78 to 5.86; p=0.002)
	Buchanan and Pose <sup>76</sup>	Per cent change in proportion	▲ Introduction of complementary foods increased from 38.0% to 98.0%	
	Kim <i>et al</i> <sup>79</sup>	Per cent change in proportion	▲ Introduction of complementary foods increased from 37.4% to 59.7% (p<0.001)	
Continued breast feeding at 1 year	Kim <i>et al</i> <sup>89</sup>	Per cent change in proportion	▲ Introduction of complementary foods did not show any improvement	
	Tariku <i>et al</i> <sup>90</sup>	ANOVA and Kruskal-Wallis test	▲ No significant difference in the improvement of continued breast feeding	

Continued

Table 2 Continued

IYCF outcomes	Studies by authors	Statistical analysis	Results
Dietary diversity	Abiyu and Belachew <sup>92</sup>	GEE regression	▲ MDD (RR=3.00; 95% CI: 1.34 to 7.39; p=0.012)
	Bahru et al <sup>84</sup>	Marginal structural model	▲ No significant difference in dietary diversity score ( $\beta = -0.18$ ; 95% CI: -0.41 to 0.05)
	Kang et al <sup>88</sup>	Mixed-effect logistic regression	▲ No significant difference in mean score between intervention and control group (mean difference=-0.38; 95% CI: -0.22 to 0.97; p=0.220)
	Kim et al <sup>79</sup>	Fixed-effect logistic regression	▲ Single type of intervention: MDD (OR=6.15; 95% CI: 0.80 to 47.10; p>0.050)
			▲ Two types of interventions: MDD (OR=6.87; 95% CI: 1.27 to 37.14; p<0.050)
	Kim et al <sup>89</sup>	Fixed-effect logistic regression	▲ Four or more interventions: MDD (OR=18.75; 95% CI: 2.32 to 151.52; p<0.010)
			▲ Single type intervention: MDD (OR=1.05; 95% CI: 0.74 to 1.48; p>0.050)
			▲ Two types of interventions: MDD (OR=1.82; 95% CI: 1.14 to 2.89; p<0.050)
			▲ Four or more interventions: MDD (OR=3.15; 95% CI: 2.18 to 4.57; p<0.001)
	Muluye et al <sup>94</sup>	Independent Student's t-test	▲ Baseline: no significant difference between intervention and control group (23.0% vs 26.0%, p=0.519)
		▲ End line: there was significant difference between intervention and control group (67.0% vs 33.0%, p=0.034)	
Meal frequency	Negash et al <sup>82</sup>	Independent sample t-test	▲ Dietary diversity increased over the intervention period (p>0.050)
	Passarelli et al <sup>85</sup>	Ordinary least square regression	▲ There was no significant difference between intervention and control groups
	Tariku et al <sup>90</sup>	ANOVA and Kruskal-Wallis test	▲ Intervention group showed significant improvement in MDD (p<0.001)
	Teshome et al <sup>96</sup>	Per cent change in proportion	▲ Baseline: no significant difference between intervention and control group (7.5% vs 3.8%)
			▲ End line: there was significant difference between intervention and control group (51.5% vs 43.3%; p=0.001)
			▲ MMF (RR=2.40; 95% CI: 1.37 to 4.29; p=0.003)
Meal frequency	Abiyu and Belachew <sup>92</sup>	GEE regression	▲ No significant effect on meal frequency ( $\beta=0.31$ ; 95% CI: -0.07 to 0.54)
	Bahru et al <sup>84</sup>	Marginal structural model	▲ Significant difference in mean score between intervention and control group (mean difference=1.04; 95% CI: 0.35 to 1.73; p=0.003)
	Kang et al <sup>88</sup>	Mixed-effect logistic regression	▲ Single type of intervention: MMF (OR=1.06; 95% CI: 0.99 to 1.13; p>0.050)
	Kim et al <sup>79</sup>	Fixed-effect logistic regression	▲ Two types of interventions: MMF (OR=1.31; 95% CI: 0.97 to 1.77; p>0.050)
			▲ Four or more interventions: MMF (OR=2.04; 95% CI: 0.92 to 4.54; p<0.010)
	Kim et al <sup>89</sup>	Fixed-effect logistic regression	▲ Single type of intervention: MMF (OR=1.05; 95% CI: 0.90 to 1.23; p>0.050)
			▲ Two types of interventions: MMF (OR=1.69; 95% CI: 1.13 to 2.52; p<0.010)
			▲ Four or more interventions: MMF (OR=1.93; 95% CI: 1.44 to 2.57; p<0.001)
	Mulualem et al <sup>81</sup>	ANOVA	▲ MMF frequency decreased in both experimental and control groups
	Negash et al <sup>82</sup>	Independent sample t-test	▲ Meal frequency increased over the intervention period (p>0.050)
Tariku et al <sup>90</sup>	ANOVA and Kruskal-Wallis test	▲ No significance effect on MMF	

Continued

Table 2 Continued

IYCF outcomes	Studies by authors	Statistical analysis	Results
Minimum acceptable diet	Abiyu and Belachew <sup>92</sup> Kang <i>et al</i> <sup>88</sup> Kim <i>et al</i> <sup>89</sup>	GEE regression Mixed-effect logistic regression Fixed-effect logistic regression	<ul style="list-style-type: none"> <li>▲ MAD (RR=2.70; 95% CI: 1.13 to 7.23; p=0.036)</li> <li>▲ Significant effect on composite feeding index of dietary diversity and meal frequency (mean difference=1.40; 95% CI: 0.49 to 2.32; p=0.003)</li> <li>▲ Single type of intervention: MAD (OR=5.20; 95% CI: 0.82 to 32.99; p&gt;0.050)</li> <li>▲ Two types of interventions: MAD (OR=5.82; 95% CI: 0.81 to 41.90; p&gt;0.050)</li> <li>▲ Four or more interventions: MAD (OR=14.29; 95% CI: 2.23 to 90.28; p&lt;0.010)</li> </ul>

EBF, exclusive breast feeding; EIBF, early initiation of breast feeding; IYCF, infant and young child feeding; MAD, minimum acceptable diet; MDD, minimum dietary diversity; MMF, minimum meal frequency.

did not find a significant improvement (from 58.7% to 61.3%,  $p>0.05$ ).<sup>89</sup> The remaining study by Buchanan and Pose<sup>76</sup> showed improvement in proportion, but no test of significance was reported.

#### Continued breast feeding at 1 year

Only one study measured the impact of interventions on continued breast feeding at 1 year. Tariku *et al*<sup>90</sup> showed that IYCF messages using the HBM did not impact the continued breastfeeding rate at 1 year.

#### Minimum dietary diversity

Ten studies reported the effect of interventions on MDD.<sup>79 82 84 88–90 92 94–96</sup> Of these, six were measured according to the WHO definition for MDD,<sup>79 89 90 92 94 96</sup> while three studies used any four food groups as a cut-off point to measure MDD.<sup>82 84 88</sup> A study by Abiyu and Belachew<sup>92</sup> using BCC interventions including complementary feeding messages, mothers group training, home-based counselling and support, and participatory family discussion improved MDD for infants and young children (RR=3.00; 95% CI: 1.34 to 7.39;  $p=0.012$ ). Two studies by Kim *et al*<sup>79 89</sup> revealed the significant impacts of exposure to more than one type of BCC intervention (advocacy and policy dialogues, interpersonal communication and community mobilisation and mass communication) on MDD, but these studies showed that exposure to a single type of intervention did not have an impact on MDD. Tariku *et al*<sup>90</sup> showed interventions involving complementary feeding messages using the HBM model significantly increased the proportion of MDD (from 37.5% to 67.9%;  $p<0.05$ ).

End line survey results following the intervention of nutritional education and counselling, and recipe demonstrations by Muluye *et al* (67.0% vs 33.0%,  $p=0.034$ )<sup>94</sup> and Teshome *et al* (51.5% vs 43.3%;  $p=0.001$ )<sup>96</sup> showed significant differences in the proportion of MDD between intervention and control groups. The remaining four studies indicated that the proportion of MDD increased over the intervention period, but the effect was not significant.<sup>82 84 88 95</sup>

#### Minimum meal frequency

MMF was included as an outcome variable in eight interventional studies.<sup>79 81 82 84 88–90 92</sup> Four studies used the WHO definition for assessing MMF.<sup>79 89 90 92</sup> Complementary feeding BCC interventions using nutritional education and counselling, and recipe demonstration sessions improved MMF practice of mothers (RR=2.40; 95% CI: 1.37 to 4.29;  $p=0.003$ ).<sup>92</sup> Kim *et al*<sup>89</sup> indicated that exposure to two types of BCC interventions (advocacy and policy dialogues, interpersonal communication and community mobilisation, and mass communication) had a significant effect on MMF of infants and young children compared with those who did not expose to intervention (OR=1.69; 95% CI: 1.13 to 2.52;  $p<0.010$ ). Kang *et al*<sup>88</sup> found that interventions using a community-based participatory nutrition programme had significant impact on



the mean score of MMF (mean difference=1.04; 95% CI: 0.35 to 1.73;  $p=0.003$ ). Except for one study, which did not do a test for significance,<sup>82</sup> the remaining four studies did not show significant improvements in MMF.<sup>79 81 84 90</sup>

### Minimum acceptable diet

Out of three studies that measured MAD as an outcome, two studies used the WHO definition for assessing MAD,<sup>79 92</sup> while the remaining study calculated dietary adequacy indicator using a composite dietary diversity and meal frequency scores.<sup>88</sup> Abiyu and Belachew<sup>92</sup> implemented BCC interventions (including nutritional education and counselling, and recipe demonstration) to improve MAD. The result from this study showed the significant effect of interventions on MAD (RR=2.70; 95% CI: 1.13 to 7.23;  $p=0.036$ ). Community-based participatory nutrition programme by Kang *et al*<sup>88</sup> reported significant effect of interventions on the dietary adequacy score (mean difference=1.40; 95% CI: 0.49 to 2.32;  $p=0.003$ ). However, a study by Kim *et al*<sup>79</sup> documented that implementing four or more type BCC interventions (advocacy and policy dialogues, interpersonal communication and community mobilisation, and mass communication) improved MAD (OR=14.29; 95% CI: 2.23 to 90.28;  $p<0.010$  for 4+interventions).

## DISCUSSION

A total of 23 studies were included, and of these, 14 were quasi-experimental studies,<sup>74–87</sup> and 9 were cluster randomised trials.<sup>88–96</sup> Four studies for EBF<sup>77 83 85 91</sup> and six studies for EIBF<sup>77 79 80 85 86 91</sup> showed that community-based and facility-based interventions delivered in the form of BCC (such as policy advocacy, interpersonal communication, community mobilisation and mass media campaigns) and health service strengthening had an impact on infants. Two studies for the introduction of complementary foods,<sup>79 93</sup> six studies for MDD<sup>79 89 90 92 94 96</sup> and three studies for MMF<sup>88 89 92</sup> indicated significant effects of BCC on infants and young children. Two eligible studies showed that combined interventions delivered in the form of interpersonal communication, nutrition-sensitive agricultural activities, community mobilisation and mass media campaigns had more impacts on EIBF, MDD, and MMF.<sup>79 89</sup>

Global evidence indicates that BCC interventions (including policy advocacy, interpersonal communication, community mobilisation and mass media campaigns) are essential in promoting IYCF practices. These initiatives also create a supportive environment that helps mothers to adopt and sustain positive child feeding behaviours.<sup>11 97</sup> The main goals of BCC intervention include improving behaviours of facility-level and community-level health workers, mothers and other caregivers, and members of their households.<sup>11 97</sup> Our review showed that BCC interventions in the form of policy advocacy, interpersonal communication, community mobilisation and mass media campaigns improved EIBF,

MDD and MMF. Our finding is consistent with systematic reviews from lower-income and middle-income countries (LMICs), which indicated that group nutritional education and counselling, family or social support, integrated mass media coverage and community mobilisation were effective in improving IYCF practices.<sup>5 11</sup>

Although BCC interventions promote skills and knowledge that are necessary for improving IYCF practices, studies from LMICs indicated that achieving the intended target is often challenging without complementary interventions that provide or facilitate material inputs.<sup>97–100</sup> This could be due to the fact that child feeding decisions not only depend on the knowledge and perception of the mother but also are influenced by a complex interplay of factors, including available resources, partner support, mother's time and close family support.<sup>97–101</sup> Affleck and Pelto<sup>99</sup> reported that a lack of money to provide diversified diet for infants and young children was a major barrier to improve appropriate IYCF behaviours among Bangladeshi women. Thus, promoting material inputs (such as cash transfer and provision of food materials) and/or non-material inputs (skills and knowledge) are required in achieving appropriate and sustained IYCF behaviours.

Research has shown that exposure to more than one IYCF intervention, delivered through different platforms (eg, community or facility based), was more successful in improving IYCF outcomes compared with a single form of intervention delivered at a single setting.<sup>5</sup> Our review indicated that exposure to more than two types of interventions was associated with improvement in EIBF, MDD and MMF.<sup>79 89</sup> This result due to interventions delivered through multiple settings may have an increased intensity that can be translated to behavioural changes due to repeated contacts and adequate coverage of interventions.<sup>102</sup> Our review suggests that interventions that aim to improve IYCF behaviours in Ethiopia should be delivered through different and specific types of contexts (including household, health facility and community) and should be provided along the continuum of care from conception until a child's second birthday.

In the past two decades, the Ethiopian government's commitment to improving IYCF has been consistent, and this started with the development of the National Strategy for IYCF in 2004 and followed by National Strategy for Nutrition in 2008,<sup>24 103</sup> in line with the WHO/UNICEF IYCF strategy.<sup>104</sup> In 2015, the Ethiopian government launched the Health Sector Transformation Plan to improve health outcomes, including IYCF practices.<sup>25</sup> Based on this initiative, many facility-based and community-based interventions have been implemented to protect, promote and support appropriate IYCF behaviours.<sup>10 11</sup> Nevertheless, our review found that there has been no formal IYCF intervention conducted in Addis Ababa and Dire Dawa city administrations, and Harari, Benishangul, Gambella and Somali regions. Our review suggests an expansion of additional experimental studies from successful subnational interventions

implemented in Amhara,<sup>89 92 93</sup> Oromia<sup>83 88 91</sup> and SNNP<sup>94 96</sup> regions, to maximise the opportunities for the prevention of IYCF-related morbidity and mortality in those regions.

Additionally, our review did not find any studies which incorporated the use of mobile health (mHealth) as part of an intervention package for improving IYCF.<sup>105</sup> Future experimental studies that consider the use of mHealth techniques are required, especially that previously published studies have shown the positive impacts of interventions (in the form of voice messages, SMS and phone calls) on IYCF practices.<sup>106–108</sup> Finally, interventional studies that consider the role of fathers/partners as well as grandmothers in improving IYCF behaviours may be warranted in Ethiopia.<sup>101 109 110</sup>

The present systematic review of IYCF outcomes from community-based and facility-based interventions (eg, BCC, health service strengthening, community mobilisations and nutrition-sensitive agricultural activities) has strengths and limitations. First, a meta-analysis was not conducted due to the wide heterogeneity of the design and outcome measures. Second, this review was limited by the incompleteness of information from the individual studies. Nevertheless, the study authors were contacted for information when it is necessary. Third, our search was limited to published studies in English, which exclude studies published with other languages. Fourth, lack of evidence and under-representation of some regions may limit the generalisability of our review. However, evidence from this review is potentially relevant for IYCF policy efforts in Ethiopia. Despite the above limitations, the application of multiple search strategies in consultation with the medical librarian and registration of the systematic review protocol can be considered as strengths of this review. Furthermore, future studies that consider the assessment of the full set of the updated IYCF indicators for all Ethiopian children would be warranted.<sup>111</sup> This approach would ensure that both subnational and national and IYCF estimates are accurate and reliable and ensure that interventions and policy decisions in resource allocation are targeted at the most at-risk population. It would also ensure that IYCF programme monitoring and evaluation are consistent across all levels of government.<sup>111</sup>

## CONCLUSION

Our systematic review showed that 12 out of 21 eligible studies that implemented interventions in the form of policy advocacy, health service strengthening, interpersonal communication, community mobilisation and mass media campaigns reported improved EIBF, EBF and/or MDD in Ethiopia. The impacts of current and/or future interventions on IYCF practices in Ethiopia will be greater when interventions are combined, introduced and implemented along the continuum of care from conception until a child's second birthday.

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