

## Effectiveness of Health Education in Increasing the Duration of Exclusive Breastfeeding in Low Income Countries: A Systematic Review

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### Abstract

**Background:** The protective effects of exclusive breastfeeding (EBF) to the health of infants and mothers alike have been well documented. The rates of EBF remain low in spite of the recognized benefits and the persistent global call for infants to be breastfed exclusively on breast milk for the first six months of life. Health education has been widely suggested as one of the key intervention strategies for increasing the duration of EBF in low income countries.

**Objective:** To conduct a systematic review to assess the effectiveness of health education interventions in increasing the duration of EBF in low income countries. A secondary objective of the review was to identify the theoretical bases of both effective/non-effective interventions and also to identify the educational methods that were utilized.

**Methods:** Systematic review of experimental and quasi-experimental studies of health education interventions that evaluated exclusive breastfeeding outcome. Studies not published in English language and studies not reporting exclusive breastfeeding outcome were excluded. A narrative synthesis was used.

**Data Sources:** Studies dating from 1980 – 2013 in English language were searched in the following databases: Cochrane Central Register of Controlled Trials, MEDLINE, Academic Search Complete, ScienceDirect and Google Scholar search engine.

**Results:** Twelve (12) studies were identified. Five were randomized controlled trials and additional three were before-after studies with control groups. The remaining four were non-randomized controlled trial. Only one study applied a theoretical framework in developing and implementing the intervention. EBF rate was significantly higher in the intervention groups compared with the control groups in ten (10) of the studies. The remaining two (2) studies reported no difference in EBF rates between the intervention groups and the control groups. Most of the studies reviewed had important methodological limitations.

**Conclusion:** Because of the methodological limitations of most of the included studies, firm conclusion on the effectiveness of health education interventions in increasing the duration of exclusive breastfeeding in low income countries cannot be made. Nonetheless there is a potential for this to be achieved if more methodologically rigorous health education interventions are developed and evaluated in low income countries.

**Keywords:** Health education; Community health; Breast milk and healthcare systems

### Introduction

The protective health effects and other benefits of exclusive breastfeeding both for infants and mothers in developed and developing countries alike is well established [1-5]. As a global public health strategy, the World Health Organization recommends that infants should be breastfed exclusively on breast milk for the first six months of age to achieve optimal growth, development and health, with continued breastfeeding up to two years of age and beyond [6]. Exclusive breastfeeding is associated with reduction in infant morbidity and mortality as well as improved growth [7]. Specifically, exclusive breastfeeding has been found to reduce the incidence of

infectious diseases such as diarrhea, respiratory tract infection and gastrointestinal infection during the first year of life [1,4,7]. Similarly, exclusive breastfeeding has the advantage of augmenting rapid maternal weight loss and delaying the onset of menstrual period among lactating mothers [4]. Moreover, exclusive breastfeeding has also been shown to be an economically advantageous health practice as it directly leads to reduced hospital visit and buying of infant formula in the first six months of life [8].

Despite the short-term and long-term benefits of exclusive breastfeeding, many women decide not to breastfeed and introduce weaning food very early contrary to the recommended practice. The percentage of infants under the age of six months receiving the full benefits of exclusive breastfeeding is less than 50 per cent in developing countries [9]. Further, WHO has estimated that only 35%

of children between birth and their fifth month are breastfed exclusively in the world and Senareth et al. have also reported that some member countries in East and South Asia have EBF rates of 30% - 40% in infants younger than age six months [10,11]. Similar rates have been reported in most Latin American and African countries - 35.6% in children less than 4 months in Brazil and 23.5% in Cameroon [12,13].

Estimate suggests that sub-optimal breastfeeding (non-adherence to the recommended guidelines), especially non-exclusive breastfeeding in the first six months of life, results in 1.4 million deaths and 10% of the disease burden in children younger than 5 years [5]. In view of the low rates of exclusive breastfeeding in both developed and developing countries, the promotion of exclusive breastfeeding has become a major public health objective for many healthcare systems.

The promotion of EBF as a child survival intervention is commonplace, yet much is not known regarding which interventions are the most effective [14]. Health education has long been regarded as a key intervention strategy for achieving the goals of health promotion. Indeed the World Health Organization in its Alma-Ata declaration identified health education as the first of eight essential activities needed for successful primary health care programs in developing countries, of which the promotion of proper nutrition and education concerning maternal and child health care were essential components [15,16]. The potential of health education to also develop the knowledge, values and skills required for individual decision-making has also been acknowledged [17].

It is therefore imperative that the effectiveness of health education as an intervention strategy is systematically evaluated. A preliminary search carried out by authors in the Cochrane Central Register Controlled Trials and Database of Abstracts of Reviews of Effects revealed that no attempt has been made to specifically assess the effectiveness of health education interventions in increasing the duration of exclusive breastfeeding in low income countries. Previous reviews have largely focused on developed countries or have not specifically assessed the effectiveness health education as an intervention strategy on EBF outcomes in low income countries [18,19]. The study also sought to identify the educational methods and the theoretical bases of both effective and non-effective interventions.

## Methods

### Definitions of key terms

#### Health education

Health education is defined in this review as any planned opportunities for people to learn about health and make changes in their health behavior. This must have involved one or more of the following: provision of factual information, encouraging target audience to adopt healthy practices and the learning of specific skills to make the necessary changes.

#### Exclusive breastfeeding

Exclusive breastfeeding is defined as the situation where the infant has only received breast milk from his/her mother or a wet nurse, or expressed breast milk, and no other liquids or solids with the exception of drops or syrups consisting of vitamins, mineral supplements or medicines.

### Low income country

Low income country in this review refers to countries that were classified as low income countries in the World Economic Outlook report published by the International Monetary Fund in 2012 [20]. Most of these countries were in Africa, Asia and Latin America. Few of these countries were in Europe.

### Search procedure

Studies were identified from searches carried out in Cochrane Central Register of Controlled Trials, MEDLINE, Academic Search Complete, ScienceDirect, and Google Scholar. The following search terms were used; "health education", "health promotion", "antenatal education", "postnatal education", "exclusive breastfeeding", "breastfeeding", "breastfeeding education", "infant breastfeeding", "lactating mothers", "pregnant women", "breastfeeding intervention" and "health education interventions". The aforementioned terms were combined using Boolean Operators "AND" and "OR".

### Inclusion/exclusion criteria

The inclusion criteria for the review were: Studies published in English language from 1980 to 2013 undertaken in low income countries; the main outcome measure was exclusive breastfeeding; type of participants considered were pregnant women and or lactating mothers with infants less than six (6) months of age; the type of intervention included in this review was strictly health education intervention as defined in this review delivered face to face either to individuals or groups (thus, peer education interventions were excluded); randomized controlled trials and quasi-experimental study designs; setting considered for this review were health facility and the community. Studies were excluded if the duration of exclusive breastfeeding was not reported; the intervention was not described as health education; and the interventions involved other family members of the study participants.

### Data extraction

The data extraction process sifted relevant information about the study population, intervention, study design and the outcome. The Centre for Reviews and Dissemination has suggested that data extraction requirement varies from one review to the other and therefore forms should be tailored to the specific needs of the review [21]. In order to ensure consistency in the data extraction process, a standardized tool developed by the Centre for Reviews and Dissemination was adapted for this study. This tool has proven to be valid and reliable, as it has been widely used in a significant number of systematic reviews and meta-analyses [21].

A standardized data extraction form was developed to aid the data extraction. The key information extracted included Population/ participants characteristics, characteristics of intervention, study design and the outcomes reported by the included studies. Data was independently extracted by the first author and verified by the second author independently. Discussions were held among the authors to ensure reliability and agreement in the data extraction process.

### Quality assessment of included studies

The Quality Assessment Tool developed by Effective Public Health Practice Project, Canada for Quantitative studies was used to evaluate the methodological strength of the studies. The validity of this tool has been established and has been recommended for randomized

controlled trials, quasi-experimental and uncontrolled studies [22]. The Assessment Tool uses the following criteria; selection bias, study design, confounders, blinding, data collection methods, and withdrawals and dropouts. Based on these criteria, an overall methodological rating of the included studies was ranked as:

**Strong:** Studies were rated as methodologically strong if all the six components (selection bias, study design, confounders, blinding, data collection methods and withdrawals/dropouts) had no weak ratings

**Moderate:** Studies were adjudged to be moderate methodologically if there was only one weak rating in any of the six components (selection bias, study design, confounders, blinding, data collection methods and withdrawals/dropouts)

**Weak:** Weak rating was given to any study that had two or more weak ratings in any of the six components. For instance, the selection of study participants was deemed as weak if the study participants were not likely to be representative of the target population or there was less than 60% participation or selection process and the level of participation was not described.

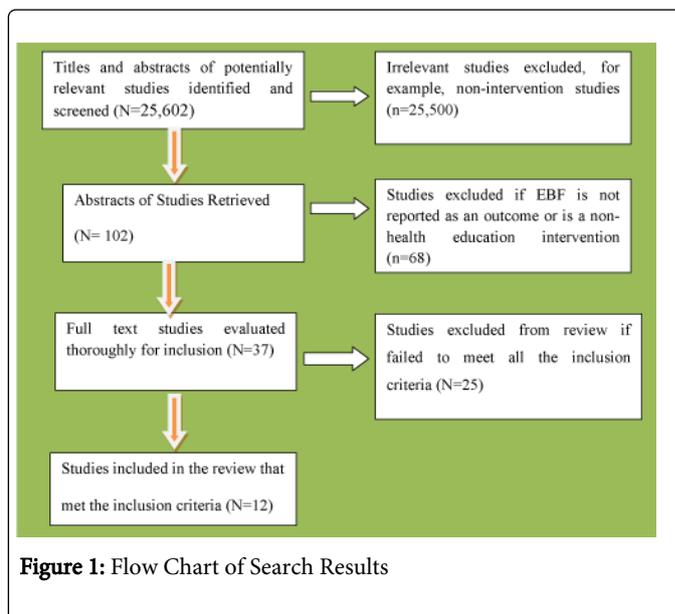
**Data handling and synthesis**

The titles and abstracts of all identified studies were thoroughly screened for relevance by the reviewers. Studies that were not carried out in a low income country as defined in this review were excluded on the basis of the title and/or abstract. Data was extracted separately for each study to ensure consistency in the process. In adherence to best practice, the data extraction form was piloted on a sample of the included studies to ensure consistency as well as making sure all relevant information had been extracted. Due to the differences in the study designs, sample sizes and mode of intervention delivery, a narrative synthesis was used in preference to a meta-analysis. Thus a textual approach was used to provide a synthesis of the results of the review instead of a meta-analysis.

**Results**

We identified twelve (12) studies that met the selection criteria. The initial search produced 25, 602 results. These numbers were screened for relevance based on titles and/or abstracts. We subsequently

retrieved 102 abstracts for further evaluation. This process resulted in the retrieval of 37 full text articles for thorough examination for inclusion after screening by the reviewers. Twelve (12) studies were included in the final analysis. Studies included in this study were agreed on by the reviewers. Figure 1 presents a flow chart of the search process and outcome.



**Figure 1:** Flow Chart of Search Results

**Description of the included studies**

As indicated above, twelve (12) original studies met the inclusion criteria. Of these, five (5) were randomized controlled trial [23-26], and four (4) of the eight (8) remaining studies were determined to be non-randomized controlled trial [7,27-29]. The remaining three (3) were before and after studies with control group [30-33]. Table 1 provides details of the study design, sample size and the nature of interventions. Table 2 provides information on other key aspects of the intervention and the outcome measures of the studies and Table 3 presents a summary of the methodological assessment of the studies.

Study	Study Design	Study Location	Sample Size	Timing/Dose of Intervention	Type of Educational Strategies Used	Person delivering intervention
Hardy <i>et al.</i> [27]	Non-randomised controlled trial	Brazil	N = 400; Study group = 200; Control group =200	15min. presentation from Monday-Friday. Duration was unclear	Slide presentation Tape recording Group discussion	Nurses and auxiliary nurses
Benitez <i>et al.</i> [28]	Non-randomised controlled trial	Philippines	N=200; Study group=100; Control group=100	One individual/group session per month; Later two individual sessions each month. Duration was unclear	Lectures Pictorials Games	Nurse Psychologist
Aidam, Perez-Escamilla & Lartey [30]	Randomised controlled trial	Ghana	N=136; Study group=87; Control group=49	Two educational sessions before delivery; 9 home follow-up visits.	Specific educational strategy not unclear.	Nurse Nutritionist
Akram, Agboatwalla, & Shamshad, [31]	Before –after study with control group	Pakistan	N=140; Study group=78; Control group=62	Once a week a month before delivery and twice a week from one month after delivery to 6 months	Pictorial flip charts Photographs Lecture; discussion Group	Health visitors

Bolam <i>et al.</i> [23]	Randomised controlled trial	Nepal	N=540 Study group=405; Control group=135	20min. session given after birth and at 3 months	Flip chart Discussion	Health educator Midwife Community health worker
Froozani <i>et al.</i> [7]	Non-randomised controlled trial	Iran	N= 120; Study group = 59; Control group =61	Education given 24hrs after delivery and follow – up visits at, 10,15 and 30 days and monthly to 4th month	No specific educational strategy mentioned	Nutritionist
Jakobsen <i>et al.</i> [24]	Cluster randomised controlled trial	Guinea-Bissau	N=1250 Study group=659; Control group=591	Sessions lasted approximately 10mins. Frequency is unclear	Oral communication	Health workers
Ahmed [29]	Non-randomised controlled trial	Egypt	N=60; Study group=30; Control group=30	Five individual educational sessions	Demonstration Discussion Booklet	Researcher
Khayyati and Mansouri, [25]	Randomised controlled trial	Iran	N=244; Study group=122; Control group=122	Training movie shown at least 3 times. Duration was unclear	Training movie Face to face training	Health workers
Turan and Say [32]	Before - after study with control group	Turkey	N=257; Study group=100; Control group=157	2hr session twice a week for a period of 1 month	No specific strategy mentioned	Nurse Facilitator Trained community member
Nwosu and Eke [33]	Before - after study with control group	Nigeria	N=400; Study group =203; Control group=197	Teaching took 30-60 min. Frequency was unclear	Teaching Demonstration	Unclear
Thakur <i>et al.</i> [26]	Randomised controlled trial	Bangladesh	N=184; Study group=92; Control group=92	Session given twice a month for 2 months after delivery	No specific strategy mentioned	Unclear

**Table 1:** Study Design, Sample Size and Nature of Intervention

Study	Intervention format and Setting	Outcome (s)	Percent of participants practising EBF/duration of EBF	P-value	Theoretical Framework
Hardy <i>et al.</i> [27]	- Group format - Health facility	- EBF - Mixed feeding	EBF at 1, 4, & 6 months - Study group = 68%, 34% & 23%; Control group = 50%, 16% & 15%)	P ≤ 0.001	None reported
Benitez <i>et al.</i> [28]	- One –on-one - Group format - Health facility - Community	- EBF - Use of food supplements, bottles, pacifiers, night feeding; postpartum amenorrhoea	Duration of exclusive reported at 5, 10, 15, 20, 25 and 30 weeks postpartum. The percentage for study and control groups is presented in an ambiguous format.	P = 0.008	None reported
Aidam, Perez-Escamilla and Lartey, [30]	- Group format - Health facility - Community	- EBF	EBF at 6 month in the Study group = 39.5% and Control group = 19.6%	P = 0.02	None reported
Akram, Agboatwalla, and Shamshad, [31]	- One-on-one - Group format - Community	- EBF - Changes in knowledge	EBF at 4 month, Study group = 94%; Control group = 7%	P-value reported	not
Bolam <i>et al.</i> [23]	- One - on- one - Health facility	- EBF - Appropriate immunization of infants - Knowledge on oral rehydration; need to breastfeed	- EBF at 4 months; Study group = 59%; Control group = 59%	P = 1.00	None reported

		in diarrhoea, signs of pneumonia, uptake of family planning			
Froozani <i>et al.</i> [7]	- One - on - one - Health facility	- EBF - Age of introduction of supplements - Number of days of diarrhoea or respiratory illness - Weight, length and head circumference of infants	EBF at 4 months, Study group =54.0; Control group =6.5%	P = 0.01	None reported
Jakobsen <i>et al.</i> [24]	- One-on-one - Health facility	- EBF - Use of family planning - Introduction of weaning food	EBF at 4 months; Study group = 4.1%; Control group = 3.7%	Risk ratio =1.08	None reported
Ahmed, [29]	- One – on - one - Health facility - Community	- EBF - Breastfeeding knowledge - Breastfeeding practices (i.e. breast massage, hand expression and breastfeeding technique	EBF at 2 & 3 months; Study group = 66.7% and 40%; Control group = 30% and 13%.	P = 0.000	- Social cognitive theory - PRECEDE - PROCEED
Khayyati and Mansouri [25]	- Group format	- EBF - Overnight breastfeeding - Use of pacifiers and glassier nipples	EBF at 6 months; Study group= 51.2%; Control group = 49.1%	P = 0.05	None reported
Turan and Say, [32]	- Group format - Health facility - Community	- EBF - Birth type - Postnatal check-up - Usage of contraceptive	EBF at 3 months; Study group = 29.0%; Control group =17.8%	P <0.05; odds ratio =1.88	None reported
Nwosu and Eke, [33]	- Format unclear - Community	- EBF - Knowledge on EBF	EBF at 3 months: Study group = 80%; Control group = 11%	McNemar test statistic 1.05 & 118	None reported
Thakur <i>et al.</i> [26]	- Format unclear - Health facility	- EBF - Infant body weight and length - Initiation of breastfeeding - Respiratory & Diarrhoea illness	EBF at 2 months - Study group = 59.8%; Control group= 37%	P = 0.003	None reported

**Table 2:** Key Features of Interventions and the Outcome Measures

Study	Baseline assessment	Sampling strategy	Randomisation and blinding	Methods of data collection	Statistical software and analysis methods	Participants included in the analysis/Attrition
Hardy <i>et al.</i> [27]	Yes	Not reported	No randomisation and blinding	Structured interview	Life table techniques and Chi-square	293 participants were included in the analysis. 107 participants withdrew/dropped - out
Benitez <i>et al.</i> [28]	Yes	Not reported	Participants were randomly assigned to both groups. There was no blinding.	Interview, Diary charts	Regression, Mantel Haenzel chi-square, Life table technique, Correlation	174 participants were included in the analysis. 26 participants withdrew or dropped - out
Aidam, Perez-Escamilla and Lartey, [30]	Yes	Not reported	Participants were randomly assigned. Blinding was not reported	Questionnaires	SPSS (Version 6.0 & 11.5); Chi-square and ANOVA.	13 participants dropped out

Akram, Agboatwalla, and Shamshad, [31]	Yes	Not reported	There was no indication of randomisation and blinding	Questionnaire	Epi-info 5; Chi-square	120 participants were included in the analysis. 20 participants dropped - out
Bolam <i>et al.</i> [23]	Yes	Not reported	Participants were randomly assigned. Single blind of outcome assessors but not participants	Questionnaire	Statview 4.0; Stata 5.0; Mantel-haenzel, ANOVA	393 participants included in the analysis. 147 participants withdrawn
Froozani <i>et al.</i> [7]	Yes	Not reported	Participants were randomly assigned. There was no blinding	Not reported	Epi info, PE2; Harvard Graphics Software; Student's t-test, Z-score, Log rank test	120 participants were included in the analysis. Originally, 134 were selected but 14 failed/refused to participate in the study
Jakobsen <i>et al.</i> [24]	Yes	Not reported	Participants were randomly assigned. There was no blinding	Questionnaire; Interview	Mantel-haenzel test, Kaplan Meier estimates, Cox proportional hazard regression, Poissons regression, Kruskal-Wallis two sample test, Fisher's exact test	1098 included in the analysis. 152 participants dropped out. The numbers could be more but data is unclear
Ahmed, [29]	Yes	Convenience sampling	Participants were randomly assigned. There was no blinding	Questionnaire, observation checklist, breastfeeding diary	SPSS. ANOVA, Chi-square, Regression	No withdrawal/drop - out
Khayyati and Mansouri, [25]	Unclear	Random sampling	Participants were randomly assigned. Investigator was blinded.	Interviews	SPSS 16; Student's t-test; Fisher's exact test	235 included in the analysis. 9 participants dropped - out
Turan and Say, [32]	Yes	Not reported	There was no randomisation and blinding	Interviews; Questionnaire	Epi Info 6.04; SPSS 8.0; Odds ratio, Chi-square, Logistic Regression	257 participants included in the analysis. No drop-outs/ withdrawal reported
Nwosu and Eke, [33]	Yes	Multi-stage sampling	There was no randomisation and blinding	Questionnaire	McNemar statistic and Chi-square	400 participants included in the analysis. No withdrawal/ drop - out
Thakur <i>et al.</i> [26]	Yes	Not reported	Participants were randomly assigned. There was no blinding	Interview; Salter scale	SPSS 12; Student's t-test; Chi-square	184 participants included in the analysis. No withdrawal/ drop - out

**Table 3:** Methodological Assessment of Included Studies

## Key Findings

### Effective interventions vs Non-effective interventions

The primary aim of this review was to assess the effectiveness of health education interventions in increasing the duration of exclusive breastfeeding. The effectiveness of an intervention is assessed as to the extent to which it achieves its pre-determined objectives [31]. The findings indicated that only three out of the five randomized controlled trials reported a significant difference in the duration of EBF between the intervention group and the control group [24,26,30]. The remaining two randomized controlled trials did not find any significant difference in the duration of EBF rates between the intervention group and the control group [23,25].

Furthermore, all the four non-randomized controlled trial studies reported a significantly higher rate in the duration of EBF between the intervention groups compared with the control groups [7,27-29]. In other words, the health education intervention was effective in significantly increasing the duration of EBF in the study group compared with the control group. Regarding the before - after studies, the findings revealed that all the three studies reported a significantly higher rate of difference in the duration of exclusive breastfeeding between the intervention group and the control group [31-33]. Overall, ten (10) of the studies reported a significantly higher rate of exclusive breastfeeding in the intervention group compared with the control group. These ten (10) studies were therefore effective in significantly increasing the rates of EBF in the intervention group compared with the control group.

### Theory based Vs Non-theory based interventions

One of the prerequisites to ensuring intervention effectiveness is developing the intervention based on relevant theories or models and wherever possible prior research [34,35]. The rationale is that models and theories provide structure, organization and direction to the programme development and implementation. In the light of this, one of the secondary objectives of this review was to identify the theories/models that informed the development and implementation of the health education interventions reported by the included studies.

The findings revealed that only one of these studies explicitly applied social cognitive theory and PRECEDE model to the development and implementation of the health education intervention [29]. The other eleven studies did not explicitly report developing and implementing their interventions based on any specific theory or model. Since the aforementioned study and the additional eleven studies that did not employ any specific model/theory were effective, it precludes any firm statement whether the theory/model is an explanatory factor in the effectiveness or otherwise of the study.

### Health education methods

Health education relies on several methods such as lectures, posters, discussions in the dissemination of information to target audience. It has been established that the choice of specific educational methods for different groups is dependent on such factors such as demographic characteristics, educational level, background and nature of job [36]. The studies examined in this review employed various educational methods in communicating health messages to the study participants. It was also found that five of the studies that reported a significantly higher rate of EBF in the intervention group relied on multiple and audio-visual methods in communicating health messages to the study participants [27-29,31,33]. Discussion and lecture methods appeared to be common in many of the studies. Information on the specific methods employed in four of the studies was not provided [7,26,30,32].

### Quality assessment of the studies

Assessment of the methodological strengths and weaknesses of studies in a systematic review is an integral part of the overall process. The methodological deficiencies have the potential to influence the outcome of the intervention and therefore assessing the methodological rigor provides an indication of the strength and robustness of the evidence presented to inform decision making [21]. In view of this, the quality assessment tool developed by the Effective Public Health Practice Project was used to evaluate the methodological quality or validity of the studies. This process was independently undertaken by both the first and the second author. At the end of this process, none of the twelve studies were rated as methodologically strong based on the six key components outlined in the methods section (selection bias, study design, confounders, blinding, data collection method and withdrawals and dropouts). Four of the studies were rated as moderate because they achieved one weak rating in one of the six components [7,23,25,26]. The remaining eight papers had two or more weak ratings in their components and therefore were rated as methodologically weak [24,27-33]. Figure 2 depicts the component ratings for all the included studies.

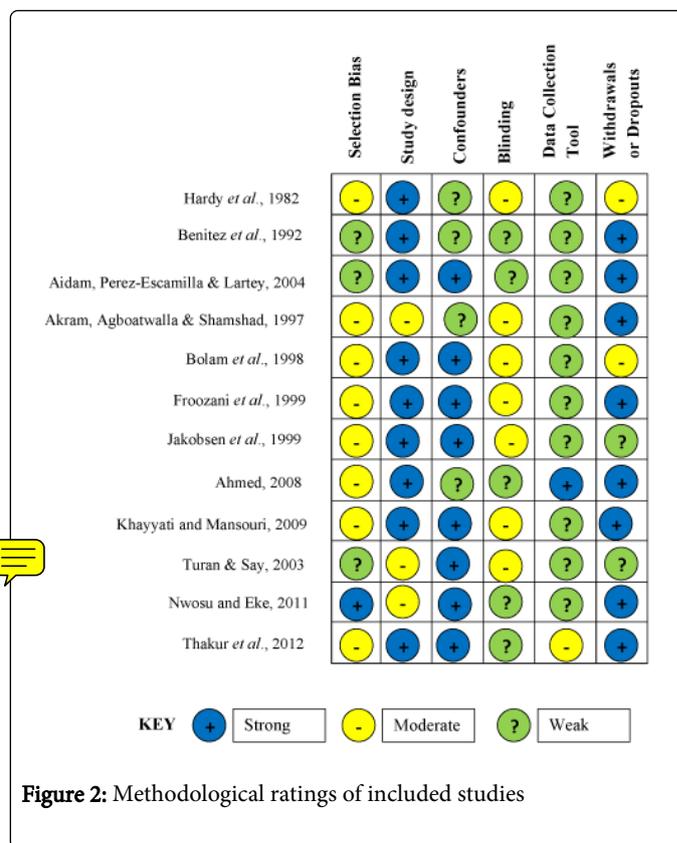


Figure 2: Methodological ratings of included studies

### Discussion and Conclusion

We found twelve studies that assessed the effectiveness of health education interventions in increasing the duration of exclusive breastfeeding. The findings revealed that health education interventions may have the potential to be an effective strategy in promoting the practice of EBF in low income countries. However, this finding is seriously hampered by the methodological deficiencies in the studies reviewed. Ten of the studies that met the selection criteria reported a significantly higher rate of EBF in the intervention group compared with the control group. However, because of the methodological limitations of the studies, the evidence should be interpreted in view of those limitations. For instance, some of the included studies used very small sample size, lacked proper randomization procedures and in some cases the validity and reliability of the data collection instruments were unproven.

Health education is still regarded as an essential component of health promotion and is widely promoted as a means of changing health-related behavior. There is evidence to the effect that health education interventions can lead to changes in behavior and health status if messages are repeatedly frequently, and when the education is given on one to one basis and when controlled designs are used [15,22,35]. Further, health education as intervention strategy has been found to be effective in the domain of accident prevention, sexual health and breastfeeding initiation rates [34,37]. Although two (2) of the studies found no difference in the practice of EBF between the study group that received the intervention and the control group that did not receive the health education interventions, a higher proportion of the studies reviewed reported significant differences in the EBF rates between the intervention group and the control group.

## Generalizability and limitations of the study

Caution should always be exercised in generalizing one study findings to other contexts. Generalizability should be contingent upon detailed information about the design and development of the intervention, information about the characteristics of the participants and the context/setting in which the intervention is implemented [38]. Since all the studies were carried out in low income countries, the findings may be applicable to other low income countries that share similar socio-cultural characteristics with these countries from which the studies were undertaken.

The review was limited to studies published in the English language only and therefore potentially relevant studies may have been missed. This therefore represents a key limitation to this review.

## Implications for health promotion practice

This review shows that health education as an intervention strategy may potentially be an effective strategy in the promotion of EBF behavior among lactating mothers. Most of the interventions resulted in increasing the proportion of women practicing EBF significantly compared with the control groups that did not receive the health education intervention. However, this evidence is seriously hampered by the methodological limitations of the studies reviewed. Rigorous evidence is clearly needed to demonstrate unequivocally the effectiveness of health education as an intervention strategy in low income countries.

The review also shows the absence of explicit application of theory and models in the development and implementation of health education interventions. This is contrary to the recognition that explicit use of theory and models can enhance intervention effectiveness [19,31]. The review does not lead to a firm conclusion regarding the effectiveness of health education interventions in light of the deficits in the methodology of the studies reviewed. Nonetheless, the potential for effectiveness of health education interventions in promoting EBF is evident.

## Conclusion

The benefits of EBF to the health of infants and mothers alike are very well documented. In spite of this, the prevailing practice of EBF globally falls short of the current recommendation by the WHO of up to six months of life and even beyond. This review sought to assess the effectiveness of health education interventions in promoting the duration of EBF in low income countries. Twelve (12) studies were identified that met the selection criteria. Of these, ten (10) were adjudged to be effective while the other two interventions were identified as ineffective. However, this finding is seriously hampered by the methodological deficiencies in the studies reviewed. Only one of the studies explicitly applied a theory/model in the development and implementations of the intervention.

The evidence from this review suggests more methodologically rigorous studies evaluating health education as an intervention strategy in the promotion of EBF in low income countries is needed. In light of this, health education as an intervention strategy only retains the potential to be effective strategy in the promotion of EBF in low income countries. More methodologically rigorous health education interventions need to be developed and evaluated in low income countries. Thus, the effectiveness of 10 of the 12 included

studies should be interpreted in the light of the limitations identified in the methodologies that were employed.

## References

1. Khadivzadeh T, Parsa S (2004) Effect of exclusive breastfeeding and complementary feeding on infant growth and morbidity. *Eastern Mediterranean Health Journal* 10: 289-294.
2. Lutter CK, Perez-Escamilla R, Segall A, Sanghvi T, Teruya K, et al. (1997) The effectiveness of a hospital-based programme to promote exclusive breast-feeding among low-income women in Brazil. *Am J Public Health* 87: 659-663.
3. Hoddinot P, Tappin D, Wright C (2008) Breastfeeding. *British Medical Journal* 336: 881-887.
4. Kramer MS, Kakuma R (2002) Optimal duration of exclusive breastfeeding (Review) *Cochrane Database of Systematic Reviews* 1: 1-106.
5. World Health Organisation (2009) Infant and young child feeding: model chapter for textbooks for medical students and allied health professionals. Geneva, WHO.
6. Booth I (2003) Does the duration of breast feeding matter?. *British Medical Journal* 322: 625-625.
7. Froozani MD, Permezhadeh K, Dorosty Motlagh AR, Golestan B (1997) Effect of breastfeeding education on the feeding pattern and health infants in their first 4 months in the Islamic Republic of Iran. *Bulletin of the World Health Organization* 77: 381-385.
8. Weimer JP (2001) The economic benefits of breastfeeding: a review and analysis. *Economic Research Service, US Department of Agriculture. Food Assistant and Nutrition Research* 13: 1-11.
9. Childinfo (2013) Statistics by Area/Child Nutrition.
10. Peters E, Wehkamp KH, Felberbaum RE, Kruger D, Linder R (2005) Breastfeeding duration is determined by only a few factors. *European Journal of Public Health* 16: 162-167.
11. Senarath U, Dibley MJ, Agho KE (2010) Factors associated with nonexclusive breastfeeding in 5 East and Southeast Asian countries: a multilevel analysis. *J Hum Lact* 26: 248-257.
12. Cordova do Espirito Santo L, Dias de Oliveira L, Giugliani ERJ (2007) Factors Associated with Low Incidence of Exclusive Breastfeeding for the First 6 Months. *Birth* 34: 212-219.
13. Agho KE, Dibley MJ, Odiase JI, Ogbonmwan SM (2011) Determinants of exclusive breastfeeding in Nigeria. *BMC Pregnancy and Childbirth* 11: 1-8.
14. Coutinho SB, Cabral de Lira PI, Lima MC, Ashworth A (2005) Comparison of the effect of two systems for the promotion of exclusive breastfeeding. *Lancet* 366: 1094-1100.
15. Loevinsohn BP (1990) Health education interventions in developing countries: a methodological review of published articles. *International Journal of Epidemiology* 19: 788-794.
16. World Health Organisation (2008) Report on the Review of Primary Health Care in the African Region. Brazzaville, WHO Regional Office for Africa.
17. Green J, Tones K (2010) *Health Promotion: planning and strategies*. London, Sage.
18. Lumbiganon P, Laopaiboon M, Festin MR, Ho JJ, Hakimi M (2011) Antenatal breastfeeding education for increasing breastfeeding duration (Review). *Cochrane Database of Systematic Review* 12.
19. Imdad A, Yakoob MY, Bhutta ZA (2011) Effect of breastfeeding promotion interventions on breastfeeding rates, with special focus on developing countries. *BMC Public Health* 11.
20. International Monetary Fund (2012) *World economic outlook April 2012: growth resuming, dangers remain*. Washington, IMF.
21. Centre for Reviews and Dissemination (2009) *Systematic reviews: CRD's guidance for undertaking reviews in health care*. York, CRD.

22. Jackson N, Waters E (2005) Criteria for the systematic review of health promotion and public health interventions. *Health Promotion International* 20: 367-374.
23. Bolam A, Manandhar DS, Shrestha P, Ellis M, M de L Costello A (1998) The effect of postnatal health education for mothers in infant care and family planning practices in Nepal: a randomised controlled trial. *BMJ* 316: 805-811.
24. Jakobsen MS, Sodemann M, Molbak K, Alvarenga I, Aaby P (1999) Promoting breastfeeding through health education at the time of immunization: a randomized trial from Guinea Bissau. *Acta Paediatrica* 88: 741-747.
25. Khayyati F, Mansouri M (2009) The effect of training movies on exclusive breastfeeding. *Journal of Pakistan Medical Association* 25: 434-438.
26. Thakur SK, Roy SK, Paul K, Khanam K, Khatun W, et al. (2012) Effect of nutrition education on exclusive breastfeeding for nutritional outcome of low birth weight babies. *Eur J Clin Nutr* 66: 376-381.
27. Hardy EE, Vichi AM, Sarmento RC, Moreira LE, Bosqueiro CM (1982) Breastfeeding promotion: effect of an educational program in Brazil. *Stud Fam Plann* 13: 79-86.
28. Benitez I, De La Cruz J, Suplido A, Oblepias V, Kennedy K, et al. (1992) Extending lactational amenorrhoea in Manila: a successful breast-feeding education programme. *Journal of Biosocial Science* 24: 211-231.
29. Ahmed AH (2008) Breastfeeding preterm infants: an educational programme to support mothers of preterm infants in Cairo Egypt. *Pediatr Nurs* 34: 125-130.
30. Aidam BA, Perez-Escamilla R, Lartey A (2005) Lactation counselling increases exclusive breastfeeding rates in Ghana. *J Nutr* 135: 1691-1695.
31. Akram DS, Agboatwalla D, Shamshad S (1997) Effect of intervention on the promotion of exclusive breast feeding. *J Pak Med Assoc* 47: 46-48.
32. Turan JM, Say L (2003) Community-based antenatal education in Istanbul, Turkey: effects on health behaviours. *Health Policy Plan* 18: 391-398.
33. Nwosu UM, Eke RA (2011) Knowledge and practice of exclusive breastfeeding: effects of health promotion intervention in Nigeria. *TAF Preventive Medicine Bulletin* 10: 657-664.
34. Tones K (1997) Health education: evidence of effectiveness. *Archives of Disease in Childhood* 77: 189-191.
35. McKenzie JF, Smeltzer JL (1996) Planning, implementing, and evaluating health promotion programs: A primer. New York, Allyn & Bacon.
36. Mahajan BK, Gupta MC (1995) Textbook of Preventive and Social Medicine. Jaypee, New Delhi.
37. Fairbank L, O'Meara S, Renfrew MJ, Woolridge M, Sowden AJ, et al. (2003) A systematic review to evaluate the effectiveness of interventions to promote the initiation of breastfeeding. *Health Technol Assess* 4: 1-171.
38. Rychetnick L, Fromeer M, Hawe P, Shiel A (2002) Criteria for evaluating evidence on public health interventions. *J Epidemiol Community Health* 56: 119-127.