Global Journal of Medicine & Public Health

Efficacy, Lacunae and Strengthening of Home-Based Care Programs in India

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ABSTRACT

Infant and child health improvement through home visits, have been started in early 1980-90s. Home visits through Community health workers got recognition only after Gadchiroli study (1993-98) and thereafter many studies was conducted to check the efficiency of this intervention, Based on the success of these studies, Govt. of India started Home Based Newborn Care (HBNC) program in 2011 and Home Based Care for Young child program (HBYC) in 2018. HBNC improves the neonatal and infant mortality to significant extent, but many studies shows inefficiency in the working of frontline community health workers that inhibits the program to reaching to its full potential. However very few studies are present that shows the efficacy and lacunae in the HBYC program, but their components like adequate complementary feeding shows very poor improvement across India. Community based intervention given directly to the mothers shows improvement in HBNC and HBYC components and combination of behaviour change models in Nutrition Education Intervention could produce more desired results.

Keywords: HBNC, HBYC, ASHA, Nutrition Education Intervention

GJMEDPH 2024; Vol. 13, issue 2 | OPEN ACCESS

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Conflict of Interest—none | Funding—none

INTRODUCTION

Newborn care initiatives such as visiting homes after discharge from tertiary care hospitals or home births, had been started since the 1980s and early 1990s, where improvements had taken place in Neonatal mortality in rural areas of India [1]. Along with these initiatives, emergence of National neonatal forum (NNF) and accreditation norms for facility based newborn care that opened under Child Survival and Safe motherhood program (CSSM) provide basis for good institutional care of newborns [2], Major breakthrough on home based care occurred in Gadchiroli district of Maharashtra, where quasi experimental studies were undertaken in two phases i.e. baseline study between 1993-1995 and interventional study between 1995-1998. In this study, 39 intervention and 47 control villages were selected in which Village health workers (VFW's) was trained to provide neonatal care and making home visits to take care of birth asphyxia, premature birth or low birthweight, hypothermia and breast-feeding problems and especially they diagnosed and treated neonatal sepsis, which was one of the main reasons of neonatal mortality[3].Result shows that Neonatal mortality rate (NMR) is significantly reduced by 62%, while infant mortality rate and perinatal mortality rate are decreased by 46 % and 71% by the third year and drastic reduction in case fatality rates from 16.6% to 2.8% in neonates suffered from neonatal sepsis[3]. In order to verify and support the results of the above Gadchiroli model, an "ANKUR Project " was conducted in 2001 to replicate the study in Maharashtra [4]. Findings show similar results (51% reduction in NMR) as compared to Gadchiroli model [4]. The present review is an attempt to outline the efficacy, lacunae and possible strengthening methods in the working of HBNC & HBYC programmes, which is very important for child welfare.

Home Based Newborn Care Program (HBNC) – A Review

Findings obtained from Gadchiroli and ANKUR study, confirms its applicability to other parts of India and after some improvements and modifications, there was an introduction of Home-Based Newborn care (HBNC) Program in 2011, throughout the country. This program aims at reducing neonatal mortality and morbidity through ensuring complete essential newborn care, identification of illness and prevention of complication in case of sick infants, detection and special care for preterm & low birth babies by Accredited Social Health Activists (ASHA) workers during their home visits [5]. A three-arm cluster randomized controlled trial study was conducted in 2020 to analyze the efficacy of HBNC program in five states of India [6]. Results shows that HBNC program with dedicated ASHA worker or Shishu Rakshak reduced the risk of neonatal mortality by 25% (adjusted OR 0.75, 95% CI 0.57 to 0.99) and the risk of early neonatal mortality, young infant mortality and infant mortality were lower by 32%, 27% and 33% respectively [6].Although, HBNC program is effective in reducing these mortality rates, but many studies[7-13] from different parts of India indicates the existence of inefficacy in the working of these ASHA workers. ASHA's do not follow complete HBNC formats and skipped assessment of most of the critical signs of diseases [7] and their knowledge was not satisfactory with respect to danger signs of chest indrawing, not taking feed, fast breathing, lethargy/unconsciousness, jaundice, pustule, flaring of nostrils and grunting [8] with very few mothers (< 33%) getting information about these danger signs from ASHA during home visits [9]. There is a wide gap between knowledge and practices of mothers counseled by ASHA [10]. Study [11] reported that most of the ASHAs conducting home visits with very casual attitude like giving few minutes, skipping protocols of HBNC guidelines in check-up and examination of infants, sometimes they avoid filling paper formats on the spot and filled it afterwards. Only 68.2% knew about birth preparedness and 54.5% had awareness about essential newborn care in a district of Assam [12]. In Uttarakhand, Doiwala district only 50% of ASHA's were aware of mandatory vaccines and infection care services for newborns and 70% of them were uninformed about the potential risk of hypothermia in neonates and also lacked knowledge regarding its preventive measures [13]. A cross country secondary analysis shows that the median full HBNC coverage by ASHA was less than one-fifth (< 20%) of the total reported live births in all the states of India [14].

Home Based Care for Young Child (HBYC): Present Status

Till 2017, HBNC program focused on taking care of infants up to their 42nd day of age. After this there is no connection between infant and infant's family with the Health System or any Community health workers for proper early childhood development. ASHA helps the infants in taking immunization and managing childhood illness and malnutrition, only when the parents approached them[15].To fill this gap and provide platform to improve the exclusive breastfeeding,complemantary,feeding, immunization, child development, WASH practices and reduce illnesses such as diarrhea and pneumonia, Home based care for young child (HBYC) program has been started in 2018[15].It consists of quarterly home visits (3rd, 6th, 9th, 12th and 15th months) by the ASHA workers[15]. Before the starting of this program, the Government of India tested its authenticity from 2013 to 2017 through a program named HBNC+, which was piloted in 13 districts in the four states of Bihar, Odisha, Madhya Pradesh and Rajasthan and results show no significant changes in the outcomes of the components of HBYC and identify incentives and demand-supply as the major factors for the poor working efficiency of ASHA workers[16].Thereafter, based on the recommendation of this pilot intervention, HBYC has been adapted with some important changes and scaled up throughout the country. Studies conducted to assess the HBYC program show mixed results. Study [17] reported in Jharkhand shows poor awareness of key components such as incentives, supervision mechanism, and monitoring indicators among frontline worker and Knowledge of community health workers (CHW's) was also insufficient for many components of HBYC except Oral Rehydration Salt (ORS) preparation (96%) and initiation of complementary feeding (97%). Supply of prophylaxis and equipment was very low among CHW's. Knowledge and practices of mothers were inadequate on all the indicators. Study conducted in Madhya Pradesh [18] shows that 79% of ASHAs made scheduled house visits. It was discovered that 82% and 77% of ASHAs ,had sufficient supplies of ORS and IFA syrups on hand, and 88% and 85% of them were correctly informed on the frequency and dosage of ORS and IFA supplementation. Only 34% of ASHAs were found to be knowledgeable about the proper frequency of meals per day, while roughly 85% of ASHAs were found to have acceptable knowledge regarding the commencement of supplemental feeding at six months of age. Merely 14% of ASHAs had sent unwell children to a healthcare institution in the previous three months, and less than half (47%) of ASHAs were aware of at least three warning indicators that need a child's referral. Study conducted in Chhattisgarh [19] shows 85.1% of children aged 7 to 36 months had at least one home visit from a CHW. By the time they were eight months old, 87% of infants had received complementary feeding, compared to 67% at the six-month mark. Less than one-third of the children received less than three meals every day. In children with respiratory infections, fever, and diarrhea, CHWs were contacted in 73%, 69%, and 61% of cases, respectively. 88% of people who saw a CHW for diarrhea were given oral rehydration. There is improvement in some indicators of HBYC in later two states but many indicators especially adequate complementary feeding status among infants are ranging between 30-40% in all three states. There is paucity of data from the rest of the country regarding efficiency of working of HBYC program.

Community Based Nutrition Education (NE) Intervention: A method to Strengthening Home Based Care Programs

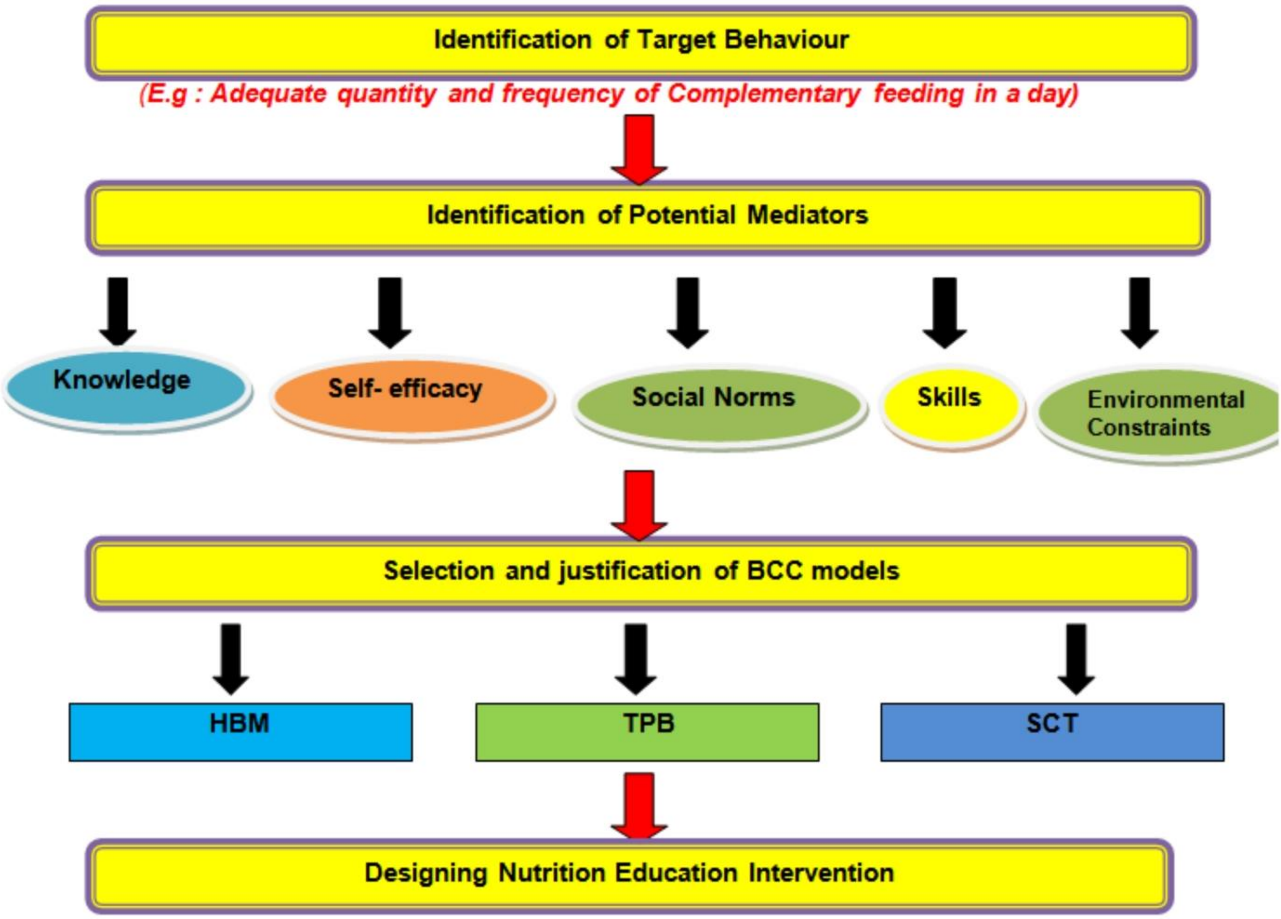
Community based Nutrition Education Intervention can be considered as possible methods to strengthen the components of both HBNC and HBYC programs. Nutrition Education (NE) is defined as a combination of educational strategies, accompanied by environmental supports, designed to facilitate voluntary adoption of food choices and other food and nutrition related behaviours conducive to health and well-being [20]. Activities involved in NE occur at the individual, community, and policy levels. [21]. Besides providing information, when NE include words like action, behavioural change, feedback and individualization, it is known as Nutrition communication [22]. Various studies in India and other poor developing countries

show positive results of community-based NE intervention given directly to the mothers of infants as compared to conventional health communication provided by Community health workers. A systematic review of 38 studies shows that there is a significant improvement in nutritional status of under 5 years age children in developing countries [23]. Study conducted in poor African countries like Ghana [24] and Uganda [25] also indicates that Nutrition Education intervention to the mothers of malnourished children improved the nutritional status of children (age 6-24 month) in former and knowledge, hygiene and complementary feeding practices in latter respectively. Community based Nutrition education intervention of mothers in India shows that there is significant improvement in the nutritional status and food intake of their malnourished children [26] and knowledge and attitude regarding diarrhoea [27]. Applied Nutrition education intervention includes training of raising horticulture gardens and backyard poultry, improving the KAP of mothers (having children of 6- 24 months age group) regarding child feeding practices in Andhra Pradesh, India [28]. A Quasi experimental study conducted at Chandigarh (India), to assess the effect of culturally appropriate nutritional educational intervention in improving growth and complementary feeding of infants shows that there is significant improvement in anthropometric measurements of malnourished infants and timing of initiating complementary foods to infants is better in intervention group (IG) than the control group (CG) (IG:72.6%, CG: 45.5%, $p<0.01$) [29].

Nutrition Education Intervention alone in the form of information dissemination or teaching skills, failed to meet the goals of behaviour change or adoption. Therefore, it includes models and theories from the multi-disciplinary sciences to identify and explain the causes influencing an individual's behavior [30]. Generally, three Behaviour Change Models (BCC) are used frequently for ensuring proper childhood development less than 1000 days of infant's age. First behaviour change model is "Health Belief Model" (HBM) which is one of the earliest models that links health related decisions with their behaviour. It has six constructs that influence a person's belief i.e. perceived susceptibility, severity, benefits, barriers, cues to action, and self-efficacy [31]. Behaviour of breastfeeding by mothers are influenced by Perceived susceptibility and Self efficacy constructs [32, 33]. Second model is "Theory of Planned Behaviour" (TPB), which suggests that behaviour of a person is influenced by his/her intention and intention is developed by the combination of three components i.e. attitude, Subjective norms and Perceived behavioural control, which are induced by beliefs [34]. Its constructs' behaviour intention influences the behaviour of breastfeeding initiation and their duration [35, 36]. Third model is known as "Social cognitive theory (SCT)", which depicts self-regulation or personal influence is the key to behaviour change and its constructs include outcome expectations (looking forward for the reward of behaviour change), self-efficacy, behavioral capability (knowledge and skills), self-regulation (self-monitoring, self-judgement, and self-evaluation), and environmental factors [37]. SCT constructs can also be used in designing interventions for children age less than 1000 days in increasing breastfeeding duration [38], avoiding introduction of complementary foods before 6 months [39], reducing intake of sweet snacks and drinks [40] and increasing intake of vegetables [41]. The necessary three steps for effective NE intervention are to first identify behavioral targets, Identification of mediating variables, selection of behavioral theories and models [42]. Figure 1 demonstrates the linking of these three steps with the possible improvement in one of the components of HBYC program i.e. adequate complementary feeding.

ISSN# 2277-9604

Figure 1:Theoretical model for effective nutrition education intervention



Here, if we can choose adequate frequency and quantity of complementary feeding among children as modifiable and actionable behaviour, then Knowledge, self-efficacy, social norms, skills and environmental constraints act as the mediating variables that can act as underlying determinants to execution of specific behaviour. Based on these variables, we can select combination of above three models HBM, TPB and SCT as a behavioural change model for designing a more efficient intervention program for behaviour change. Similarly other components of HBYC could be improved by this process and Nutrition education Intervention could be designed by using different constructs of these three behavioural change models along with their possible HBYC components as present in Table 1.

Table 1: Constructs of three BCC models and associated HBYC components

Behavioural model/theories	HBYC components for intervention
HBM's constructs	
Perceived Susceptibility (lack of knowledge regarding mental and physical Illness of child, infections)	Providing knowledge on Importance of Exclusive breastfeeding, WASH, Adequate complementary feeding, Pneumonia and Diarrhea

ISSN# 2277-9604

Perceived Severity (Severity of mental and physical illness of child and infections)	Providing knowledge/warning regarding avoiding Exclusive breastfeeding, WASH, Adequate complementary feeding, symptoms of Pneumonia and Diarrhea
Perceived benefits (perception of benefit from taking actions that reduce susceptibility and severity	Providing Knowledge of importance, benefits and warnings for not taking action on all the above components
Perceived barriers (lack of time, budget)	Providing knowledge on quick and easy to make receipes and proper budgeting
Cue to action (stimulus for initiating decision-making process to accept a recommended health action)	Provide warnings (not coercion) about extremely bad effects of not following recommended Health actions and easy ,quick and budget friendly receipes.
TPB's constructs	
Behaviour intention (Motivational factor for influencing the behaviour related to improvement in the child's health)	Providing knowledge in the form of colourful powerpoint slides and giving examples with workshop like mode, Interview with existing beneficiaries.
Self efficacy/perceived behavioural control (Perception of self-ability to take recommended health actions)	Points provided for doing a particular health related action along with easy method of receipe preparation improve the self- efficacy
SCT's constructs	
Behavioral capability (Actual capability of taking actions based on knowledge and skills)	For this, knowledge of components provided in easy to understand manner and step by step approach for taking particular action are also provided.
Observational learning (witnessing and observing other behaviour and actions influence their behaviour)	Interviewing with mothers obtaining good results, allow healthy competition among mothers helps in observational learning.

ISSN# 2277-9604

So, in Indian context, constructs of these models and theories could be incorporated in designing Nutrition education intervention for improving the components of HBNC and HBYC program as well.

CONCLUSION

The review suggests that there is lack of effective execution of HBNC at the field level by the frontline health workers in India. There is a need to improve the components of the HBYC program, which may lead to improvement in the child's health. Nutrition intervention provided directly to the mothers could further strengthen the components of HBYC program. When these interventions are designed utilizing combinations of different behaviour change models, it could enhance the efficiency of interventions.

ISSN# 2277-9604

REFERENCES

1. Neogi SB, Sharma J, Chauhan M, Khanna R, Chokshi M, Srivastava R, Prabhakar PK, Khera A, Kumar R, Zodpey S, Paul VK. Care of newborn in the community and at home. J Perinatol [Internet]. 2016 Dec [cited 2024 Jan 16];36(S3): S13—S17. Available from: https://doi.org/10.1038/jp.2016.185

2. Ramji S, Modi M, Gupta N. 50 years of neonatology in India: Progress and future. Indian Pediatr [Internet]. 2013 Jan [cited 2024 Jan 9];50(1):104-6. Available from: https://doi.org/10.1007/s13312-013-0023-2

3. Bang AT, Bang RA, Baitule SB, Reddy MH, Deshmukh MD. Effect of home-based neonatal care and management of sepsis on neonatal mortality: field trial in rural India. Lancet [Internet]. 1999 Dec [cited 2024 Jan 9];354(9194):1955-61. Available from: https://doi.org/10.1016/s0140-6736(99)03046-9

4. Mavalankar D, Raman P. ANKUR Project: A case study of replication of Home-Based Newborn Care. Centre for Management Health Services. IIM, Ahmedabad, India. [Internet]. [cited 2024 Jan 9]. Available from: https://searchforhealth.ngo/wp-content/uploads/2016/05/Ankur-IIM-Case-Study.pdf

5. MoHFW.Home Based Newborn Care Operational Guidelines (Revised). 2014. [cited 2024 Jan 9]. Available from: https://nhm.gov.in/ images/pdf/programmes/ child health/guidelines/Revised Home_ Based_New_Born_Care_ Operational_ Guidelines_2014.pdf

6. Rasaily R, Saxena N, Pandey S, Garg BS, Swain S, Iyengar SD, Das V, Sinha S, Gupta S, Sinha A, Kumar S, Pandey A, Pandey RM, Sachdev HS, Sankar MJ, Ramji S, Paul VK, Bang AT. Effect of home-based newborn care on neonatal and infant mortality: a cluster randomised trial in India. BMJ Glob Health [Internet]. 2020 Sep [cited 2024 Jan 9];5(9): e000680. Available from: https://doi.org /10. 1136/bmjgh-2017-000680

7. Das E, Panwar DS, Fischer EA, Bora G, Carlough MC. Performance of accredited social health activists to provide home-based newborn care: A situational analysis. Indian Pediatr [Internet]. 2014 Feb [cited 2024 Jan 9];51(2):142-4. Available from: https://doi.org/10.1007/s13312-014-0349-4

8. Chaudhary K, Chopra H, Bano T, Jain S, Singh G. Demand, Awareness and Implementation Gap of Home-Based Newborn Care in Rural Area of Meerut, UP. - IOSR Jour of Dental and Medical Sciences [Internet]. 2019, June [cited 2024 Jan 9]; 18(6): 43–49. Available from: https://doi.org/10.9790/0853-1806084349

9. Pathak P, Singh J, Agarwal, M, Singh V, Tripathi S. Study to assess the Home -based Newborn Care (HBNC) visit in rural area of Lucknow: A cross- sectional study. Jour of Family Med and Primary Care. [Internet]. 2021 [cited 2024 Jan 9] ;). 6(2), 169–170. Available from: https://doi.org/10.4103/jfmpc.jfmpc

10. Sinha LN, Kaur P, Gupta R, Dalpath S, Goyal V, Murhekar M. Newborn care practices and home-based postnatal newborn care programme – Mewat, Haryana, India, 2013. West Pac Surveill Response [Internet]. 2014 Aug 11 [cited 2024 Jan 9];5(3):22-9. Available from: https://doi.org/10.5365/wpsar. 2014.5.1. 006

11. Gogoi N, Nair P, Nair S. Critical Issues in Maternal and Child Health in India: A Compendium of Studies Conducted by the Population Research Centres 2015-16. 2017. [cited 2024 Jan 9]. Available from: https://hmis.nhp.gov.in/ download file ?filepath=publications/Compendium-of-Research-Studies-by-PRCs/2Critical Issues in Maternal and Child Health in India 2015-16.pdf

12. Mahanta TG, Islam S, Sudke AK, Kumari V, Gogoi P, Rane T, Mahanta BN. Effectiveness of introducing home-based newborn care (HBNC) voucher system in Golaghat District of Assam. Clin Epidemiology Glob Health [Internet]. 2016 Jun [cited 2024 Jan 9];4(2):69-75. Available from: https://doi.org/ 10.1016/j.cegh. 2015.08.002

13. Devi RS, Pugazhendi S, Juyal R, Gaur A, Singh SB. Evaluation of existing Home-Based Newborn Care (HBNC) services and training for improving performance of Accredited Social Health Activists (ASHA) in rural India: A multiple observation study. Midwifery [Internet]. 2022 Oct [cited 2024 Jan 9]:103514. Available from: https://doi.org/10.1016/j.midw.2022.103514

14. Hannah E, Dumka N, Ahmed T, Bhagat D, Kotwal A. Home-based newborn care (HBNC) under the national health mission in urban India – A cross country secondary analysis. J Fam Med Prim Care [Internet]. 2022 [cited 2024 Jan 9];11(8):4505. Available from: https://doi.org/10.4103/jfmpc.jfmpc_388_22

15. MoHFW; MoWCD. Home Based Care for Young Child (HBYC): Strengthening of Health & Nutrition through Home Visits (Operational Guidelines).2018. [cited 2024 Jan 9]. Available from: http://www.nhm.gov.in/images/pdf/programmes/HBYC/HBYC _Guidelines.pdf

16. Newton-Lewis T, Bahety G. Evaluating the effectiveness of Community Health Worker home visits on infant health: A quasi-experimental evaluation of Home-Based Newborn Care Plus in India. Jour of Glob Health 2021 Sep. 11. [cited 2024 Jan 9]. Available from: https://doi.org/10.7189/jogh.11.04060

17. Sarin E, Mohanty J, Prabhanjan A, Saboth P, Kumar H, Minz A, Chourasia S, Gupta S. Integrated approach for survival and development during first 1000 day of life: Assessing Health Systems Readiness in three Aspirational Districts of Jharkhand (India). Indian J Community Fam Med [Internet]. 2021 [cited 2024 Jan 9];7(2):105. Available from: https://doi.org/10.4103/ijcfm.ijcfm_81_20

18. Das P, Singh M, Sakalle SK, Bhargava S, Khanna R, Ganvir DR, Singh R, Goel N, Yadav V, Bhat AA. Assessment of Home-Based Care for Young Child (HBYC) Program in Aspirational Districts of Madhya Pradesh, India: A Cross-Sectional Study. Indian J Community Med [Internet]. 2023 [cited 2024 Jan 9];48(3):471-7. Available from: https://doi.org/10.4103 /ijcm. ijcm_782_22

19. Garg S, Dewangan M, Patel K, Krishnendhu C, Nanda P. Role of Mitanin community health workers in improving complementary feeding practices under scaled-up home-based care of young children in a rural region of India. BMC Pediatr [Internet]. 2023 Apr 13 [cited 2024 Jan 9];23(1). Available from: https://doi.org/10.1186/s12887-023-03993-4

20. Society for Nutrition Education and Behavior [Internet]; [cited 2024 Jan 9]. Available from: http://www.sneb.org

21. Contento I, Koch P. Nutrition Education: Linking Re-search, Theory, and Practice -4 edición. Jones and Bartlett Learning; 2020.

22. Gavaravarapu S. Nutrition communication - Rhetoric & reality. Indian J Med Res [Internet]. 2019 [cited 2024 Jan 9];149(3):333. Available from: https://doi.org/ 10.4103/ijmr.ijmr_1772_18

23. Majamanda J, Maureen D, Munkhondia TM, Carrier J. The effectiveness of community-based nutrition education on the nutrition status of under-five children in developing countries. A systematic review. Malawi Med Jour.2014. [cited 2024 Jan 9]; 26(4), 115–118. Available from: https://www.ajol.info/index.php/mmj/ article/view/111945

24. Awuuh VA, Appiah CA, Mensah FO. Impact of nutrition education intervention on nutritional status of undernourished children (6-24 months) in East Mamprusi district of Ghana. Nutr Amp Food Sci [Internet]. 2019 Mar 11 [cited 2024 Jan 9];49(2):262-72. Available from: https://doi.org/10.1108/nfs-05-2018-0134

25. Kajjura RB, Veldman FJ, Kassier SM. Effect of Nutrition Education on Knowledge, Complementary Feeding, and Hygiene Practices of Mothers with Moderate Acutely Malnourished Children in Uganda. Food Nutr Bull [Internet]. 2019 May 8 [cited 2024 Jan 9];40(2):221-30. Available from: https://doi.org/10.1177/0379572119840214

26. Kumar S, Pavithra G, Roy G. Effectiveness of a community-based intervention on nutrition education of mothers of malnourished children in a rural coastal area of South India. Indian J Public Health [Internet]. 2019 [cited 2024 Jan 9];63(1):4. Available from: https://doi.org/10.4103/ijph.ijph_383_17

27. Pahwa S, Kumar GT, Toteja G. Performance of a Community-based Health and Nutrition-education Intervention in the Management of Diarrhoea in a Slum of Delhi, India. J Health Popul Nutr [Internet]. 2010 Dec 1 [cited 2024 Jan 9];28(6). Available from: https://doi.org/10.3329/jhpn.v28i6.6603

28. Murty PV, Rao MV, Bamji MS. Impact of Enriching the Diet of Women and Children Through Health and Nutrition Education, Introduction of Homestead Gardens and Backyard Poultry in Rural India. Agric Res [Internet]. 2016 Mar 11 [cited 2024 Jan 9];5(2):210-7. Available from: https://doi.org/10.1007/s40003-016-0206-x

29. Sharma N, Gupta M, Aggarwal AK, Gorle M. Effectiveness of a culturally appropriate nutrition educational intervention delivered through health services to improve growth and complementary feeding of infants: A quasi-experimental study from Chandigarh, India. PLOS ONE [Internet]. 2020 Mar 17 [cited 2024 Jan 9];15(3): e0229755. Available from: https://doi.org/10.1371/journal.pone .0229 755

30. Baranowski T, Cerin E, Baranowski J. Steps in the design, development and formative evaluation of obesity prevention-related behavior change trials. Int J Behav Nutr Phys Act [Internet]. 2009 [cited 2024 Jan 9];6(1):6. Available from: https://doi.org/10.1186/1479-5868-6-6

31. Rosenstock IM. Historical Origins of the Health Belief Model. Health Educ Monogr [Internet]. 1974 Dec [cited 2024 Jan 9];2(4):328-35. Available from: https://doi.org/10.1177/109019817400200403

32. Brotanek JM, Schroer D, Valentyn L, Tomany-Korman S, Flores G. Reasons for Prolonged Bottle-Feeding and Iron Deficiency Among Mexican-American Toddlers: An Ethnographic Study. Acad Pediatr [Internet]. 2009 Jan [cited 2024 Jan 9];9(1):17-25. Available from: https://doi.org/10.1016/j.acap.2008.10.005

33. Gross RS, Mendelsohn AL, Fierman AH, Messito MJ. Maternal Controlling Feeding Styles During Early Infancy. Clin Pediatr [Internet]. 2011 Jul 14 [cited 2024 Jan 9];50(12):1125-33. Available from: https://doi.org/10.1177/000992 2811414287

34. Bosnjak M, Ajzen I, Schmidt P. The theory of planned behavior: Selected recent advances and applications. Eur S J Psychol [Internet]. 2020 Aug 31 [cited 2024 Jan 9];16(3):352-6. Available from: https://doi.org/10.5964/ejop.v16i3.3107

35. McMillan B, Conner M, Green J, Dyson L, Renfrew M, Woolridge M. Using an extended theory of planned behaviour to inform interventions aimed at increasing breastfeeding uptake in primiparas experiencing material deprivation. Br J Health Psychol [Internet]. 2009 May [cited 2024 Jan 9];14(2):379-403. Available from: https://doi.org/10.1348/135910708x336112

36. Vaughn LM, Ireton C, Geraghty SR, Diers T, Niño V, Falciglia GA, Valenzuela J, Mosbaugh C. Sociocultural Influences on the Determinants of Breast-feeding by Latina Mothers in the Cincinnati Area. Fam Amp Community Health [Internet]. 2010 [cited 2024 Jan 9];33(4):318-28. Available from: https://doi.org/10.1097/ fch.0b013e3181f3b2be

37. Bandura A. Social Cognitive Theory: An Agentic Perspective. Psychology [Internet]. 2020 Oct 15 [cited 2024 Jan 27];12(3):3133. Available from: http://doi.org/10.12681/psy_hps.239764

38. Cloutier MM, Wiley JF, Kuo CL, Cornelius T, Wang Z, Gorin AA. Outcomes of an early childhood obesity prevention program in a low-income community: a pilot, randomized trial. Pediatr Obes [Internet]. 2018 Aug 28 [cited 2024 Jan 9];13(11):677-85. Available from: https://doi.org/10.1111/ijpo.12458

39. Black MM, Siegel EH, Abel Y, Bentley ME. Home and Videotape Intervention Delays Early Complementary Feeding Among Adolescent Mothers. PEDIATRICS [Internet]. 2001 May 1 [cited 2024 Jan 9];107(5): e67-e67. Available from: https://doi.org/10.1542/peds.107.5.e67

40. Campbell KJ, Lioret S, McNaughton SA, Crawford DA, Salmon J, Ball K, McCallum Z, Gerner BE, Spence AC, Cameron AJ, Hnatiuk JA, Ukoumunne OC, Gold L, Abbott G, Hesketh KD. A Parent-Focused Intervention to Reduce Infant Obesity Risk Behaviors: A Randomized Trial. PEDIATRICS [Internet]. 2013 Mar 4 [cited 2024 Jan 9];131(4):652-60. Available from: https://doi.org/10.1542/ peds.2012-2576.

41. Wen LM, Baur LA, Simpson JM, Rissel C, Wardle K, Flood VM. Effectiveness of home-based early intervention on children's BMI at age 2: randomised controlled trial. BMJ [Internet]. 2012 Jun 26 [cited 2024 Jan 9];344(jun26 3): e3732-e3732. Available from: https://doi.org/10.1136/bmj.e3732

42. Dattilo AM, Saavedra JM. Nutrition Education: Application of Theory and Strategies during the First 1,000 Days for Healthy Growth. Nestle Nutr Inst Workshop Ser. 2019 Nov 28[cited 2024 Jan 9]; 92:1-18. Available from: 10.1159/000499544