

Evaluating the effectiveness of training on malnutrition for Anganwadi workers in Anekal Taluk, Bengaluru Urban District

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ABSTRACT

Background: Post COVID-19 pandemic, due to lack of access to nutritional services, malnutrition prevalence has exacerbated. The role of Anganwadi workers in provision of nutrition services is important in prevention of malnutrition in the community. **Aim:** We aimed to assess the effectiveness of training on malnutrition on the knowledge of malnutrition among Anganwadi workers in Anekal Taluk of Bengaluru Urban District, Karnataka. **Methods:** We conducted a cross-sectional before and after study among 381 Anganwadi workers on the knowledge of malnutrition. After 6 months of training, 303 among the 381 Anganwadi workers were reassessed for knowledge retainment. The tool used for the assessment of knowledge of malnutrition was a 10-item multiple choice questionnaire. Qualitative information regarding challenges of managing malnutrition was also collected during the training. **Results:** As compared to the pretest scores, 45.9% of the participants had an increase in knowledge of malnutrition immediately after the training and after 6 months. 19.81% of the participants had an increase in knowledge. During the discussion, participants shared issues of referral mechanism, anthropometry devices, complexity of the nature of malnutrition, Poshan tracker app use, and practical aspects of management of malnutrition. **Recommendations:** A standardized curriculum for malnutrition, improved teaching-learning methods, and assessment methods for use among community health workers and calibration and functioning anthropometry tools are essential for malnutrition training. In the community, a strong link between the primary health care system and integrated child development scheme and services is crucial in community-based management of severe and moderate acute malnutrition.

Keywords: Child health, malnutrition, stunting, training, wasting

Introduction

COVID-19 pandemic and the resultant social distancing measures impacted access to food for under-5 children negatively in resource-poor settings during the pandemic and the post pandemic period. In addition, disruption in access to health care and nutrition-related programs has affected their health and

development.^[1] Intersecting factors such as class, caste, migration, gender, and other factors of oppression and discrimination, along with systemic changes such as nonavailability of services, unemployment, and inflation, had negative impacts on the growth and development of children. As per the National Family Health Survey-5, the prevalence of stunting, wasting, and underweight in India is 35.5%, 19.3%, and 32.1%, respectively.^[2] The prevalence of severe acute malnutrition in the country is 7.7%.^[3] The prevalence of stunting in the state of Karnataka is 35%.^[4] The prevalence of underweight in Anekal Taluk of Bangalore Urban District is 38.9%.^[5]

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The Integrated Child Development Scheme and Services under Ministry of Women and Child Development, Government of India, provides supplementary nutrition, growth monitoring, and referral services to under-5 children in India.^[6] These services are provided in the community through “Anganwadi Centers” (AWCs), which are led by Anganwadi workers (AWWs), who are women from the community with a minimum of high school education. Together with the ASHA worker, ANM, Primary Health Centre Medical Officer, Community Health Officer, and Multipurpose health workers, AWWs form an integral part of the health system of the country. Capacity building of Anganwadi workers is achieved through strategies of Saksham Anganwadi and Poshan 2.0 through training centers. The initial training after appointment is for a duration of 30 days, followed by refresher trainings around once in 2 years.^[7] AWWs perform a wide variety of tasks and duties and may not be able to prioritize the assessment and community-based management of malnutrition. Among AWWs, 18.3% have insufficient knowledge regarding ICDS.^[8] They also have lack of knowledge regarding management of malnutrition.^[9] Around 66% of children are covered by nutritional services, and the rates vary from state to state.^[10] During COVID-19 pandemic, services of the Anganwadi were restricted due to lockdown measures. Pregnant women and children consumed a lower proportion of healthy foods, access to government welfare services were restricted, there was disruption of supplementary food availability, and poverty worsened.^[11] Considering the multifactorial causation of malnutrition, a single pronged approach to prevent malnutrition can fail due to complexity of reality in families of children with malnutrition. The role of AWW is crucial in the implementation of supplementary nutrition programs, referral mechanisms, and community-based management of malnutrition.^[12] Family medicine practitioners and primary care physicians who manage malnutrition depend on the community health workers to continue community-based nutritional rehabilitation, follow-up, and referral, and it is essential that physicians understand the importance of developing robust training programs on nutrition for these health workers.

Considering the burden of malnutrition and post-COVID changes in the system, it is necessary to strengthen the delivery of services through training. In this context, we aimed to assess the effectiveness of training on malnutrition on the knowledge of malnutrition among AWWs in Anekal Taluk, Bengaluru Urban District.

Materials and Methods

Study setting

This study was conducted in Anekal Taluk of Bengaluru Urban District, which has 230 villages and 403 AWCs. The area is well connected to Bengaluru metropolitan city. It has a Taluk Hospital at its headquarters. Modified Nutritional Rehabilitation Centre (NRC) was functional at the Taluk Hospital for the care of children with Severe Acute Malnutrition (SAM). For Moderate Acute Malnutrition (MAM), community-based management

was done by the AWWs. For SAM children with complications, referral was done to the nearest tertiary care center with NRC.

Areas covered by Anganwadi centers were divided into nine groups. In each group, a 1-day training program was conducted in a local Anganwadi Centre and invitation was sent to all the AWWs of that area. Due to feasibility issues, of the 403 AWCs in the study area, 381 AWWs could attend the training. Per group, 20–30 AWWs attended the training and the training was conducted by the study investigators.

Ethics

Institutional Ethics Committee approval was obtained from St. John's Medical College (31/2023). Permission to conduct the study was obtained from the Child Development Project Officer (CDPO) of Anekal Taluk. Written informed consent was obtained from all AWWs. The first part of the study was conducted in 2022, and post 6 months, assessment was conducted in early 2023.

Study design and participants

This was a mixed-methods study. A cross-sectional before and after study was conducted among Anganwadi workers of Anekal Taluk. A 10-item simple, understandable questionnaire was developed by the investigators and administered to the AWWs before, immediately after, and 6 months after the training. Immediately after the training, all the 381 AWWs could be interviewed for the post-test administration. However, after 6 months, we could interview only 303 of the trained AWWs since many AWWs were on leave or resigned the job. The qualitative methods adopted in this study were two Focus Group Discussions among AWWs on the challenges in preventing malnutrition in the community. Each Focus Group Discussion has totally ten participants.

Study tools

A training module on malnutrition was developed by the investigators with the following content: Introduction to malnutrition, types of malnutrition, web of causation of malnutrition, anthropometry measurement of children using stadiometer, infantometer, Salter Hanging scale and digital weighing scale, use of Shakir's tape and measuring tape for measurement of mid upper arm circumference, growth chart plotting, breastfeeding counseling, counseling for complementary feeding, demonstration of cooking high calorie recipes, and case discussions on scenarios of malnutrition such as stunting, wasting, and Severe and Moderate Acute Malnutrition referral mechanism to NRCs. Pre- and post-test questionnaires were developed. These questionnaires were face-validated. All the ten questions were multiple choice questions (MCQs), self-administered in local language, Kannada. The components covered under the questionnaire were anthropometry, diagnosis of SAM using growth chart, complementary feeding, breastfeeding, and use of Shakir's tape. The questions were pilot-tested among community health workers for understanding and local context.

A pretest questionnaire was administered before the training, and post-test administration was conducted immediately after training and then again 6 months after the training. During the trainings, adult methods of teaching–learning such as experiential learning, flexibility, collaboration, and clear goals of learning were followed. Using topic guides, focus group discussions were conducted.

The training was conducted by three trainers who were well versed in the modules, and inter-rater reliability was ensured through common practice training sessions prior to the intervention.

Statistical analysis

Data were entered in Microsoft Excel. Analysis was conducted using Statistical Product and Service Solutions (IBM SPSS Statistics 21.0). For the quantitative variables, the mean score with standard deviation was obtained. The *P* value of Shapiro–Wilk test for pretest, post-test, and 6 months post test scores were 0.49, 0.78 and 0.36, respectively, indicating the normality of the data. Paired *t*-test analysis was done to compare the pretraining knowledge with post-training and 6 months post training knowledge. A *P* value of <0.05 was considered as statistically significant to assess the difference in knowledge gained over the training.

Results

A total of 381 AWWs attended the training. Pretest and Immediate Post-test were administered for all. After 6 months, we could administer post-test to only 303 of the 381 trained AWWs. The areawise numbers are described in Table 1.

Mean scores of pretest and immediate post-test analysis of those areas of AWWs were compared using paired *t*-test analysis. In all trainings, there was an increase in post-test scores. However, statistically significant differences in mean scores were observed in four groups (45.9% of the trainees) [Table 2]. The median and interquartile range of the pretest scores were 6.3 (5.4–7.4), those of post-test scores were 6.9 (6.2–7.6), and those of 6 months post-test scores were 6.3 (6.1–6.7).

The pretest scores of the AWW groups were compared with the 6 months post test scores using paired *t*-test [Table 3]. In this

analysis, as compared to pretest, knowledge on malnutrition was gained among for groups of the AWWs; that is, a total of 177 AWWs (19.81%) had an increase in knowledge of malnutrition even after 6 months of training, as compared to pretraining. In the other groups, the knowledge had decreased. Among 66 AWWs, knowledge had decreased 6 months after training; however, this reduction was not statistically significant. Hence, it can be concluded that of 243 of the AWWs (80.19%) had neither increased or no significant reduction in knowledge even after 6 months of training.

Immediate post-test scores of the AWW groups and post-test scores after 6 months of training were compared using paired *t*-test. As compared to immediate post-test, after 6 months, all the groups of AWWs had reduced knowledge [Table 4]. This shows that retainment of knowledge on malnutrition is not maintained. This could also be due to the cognitive nature of the questionnaire, and also, a quantitative questionnaire cannot measure the practice part of malnutrition easily. In four groups, knowledge was decreased as compared to immediate post-test, but the decrease was not statistically significant. This observation is encouraging since a total of 123 AWWs (40.59%) of the 303 assessed after 6 months of training did not have statistically significant reduction in knowledge of malnutrition as compared to the post-test assessment.

Qualitative results of the study

The broad themes that were generated during the focus group discussion were importance of trainings and refreshers, infrastructure, technical and equipment and maintenance issues, and social and ethical issues while managing malnutrition in community.

With regard to attitude and practice regarding nutrition, during the training, AWWs mentioned that

“Through this training we understood the importance of use of correct anthropometric measurements to identify SAM and MAM”

Through the inputs from the Modified Nutritional Rehabilitation Centre Team in Anekal Taluk Hospital, we emphasized on the following during the training

Table 1: Areawise description of training and AWW details

| Date of Training (pre- and post-test assessment) | Areas of Anganwadi Centers covered | Total number of participants | Post 6 months assessment |
|--|------------------------------------|------------------------------|--------------------------|
| 16/08/22 | Mantapa and Mahatalingapura | 41 | 16 |
| 17/08/22 | Jigani and Haragadde | 48 | 34 |
| 18/08/22 | Hebbagodi and Huskur | 44 | 34 |
| 19/08/22 | Chandapura and Marasuru | 50 | 48 |
| 06/09/22 | Attibelle and Dommasandra | 47 | 31 |
| 07/09/22 | Bidaraguppe and Sarjapura | 43 | 33 |
| 09/09/22 | Samanthuru and Indlavadi | 45 | 42 |
| 13/09/22 | Balluru and Kasaba | 41 | 43 |
| 15/09/22 | Byagadadenahalli | 22 | 22 |
| Total Participants | | 381 | 303 |

Table 2: Analysis of pretest and immediate post-test results of the training

| Groups of Trainings | Mean Pretest score (n=381) | Mean Immediate Post Test score (n=381) | Mean difference | t test value | P |
|---------------------------|----------------------------|--|-----------------|--------------|--------|
| Mantapa Mahatalingapura | 6.65 (1.7) | 7.74 (1.4) | 1.08 | -3.7 | 0.001 |
| Jigani and Haragadde | 7.04 (1.2) | 7.78 (1.5) | 0.73 | -2.56 | 0.014 |
| Hebbagodi and Huskur | 7.11 (1.7) | 7.77 (1.3) | 0.659 | -1.89 | 0.065 |
| Chandapura and Marasuru | 7.31 (1.4) | 7.80 (1.3) | 0.49 | -1.62 | 0.11 |
| Attibelle and Dommasandra | 7.4 (1.4) | 7.44 (1.1) | 0.04 | -0.15 | 0.88 |
| Bidaraguppe and Sarjapura | 6.88 (1.4) | 7.58 (1.4) | 0.69 | -3.25 | 0.002 |
| Samanthuru and Indlavadi | 6.77 (1.4) | 7.18 (1.3) | 0.41 | -1.6 | 0.118 |
| Balluru and Kasaba | 6.66 (1.4) | 7.54 (1.6) | 0.87 | -3.44 | 0.001 |
| Byagadadenahalli | 7 (1.6) | 7.86 (1.7) | 0.86 | -1.87 | 0.076 |
| Overall (all AWWs) | 6.2 (0.5) | 6.8 (0.3) | 0.55 | 4.3 | <0.001 |

Table 3: Analysis of pretest and post 6 months test results of the training among AWW groups

| Place | Mean Pretest score (n=381) | Mean Post 6 months Test score (n=303) | Mean difference | t test value | P |
|---------------------------|----------------------------|---------------------------------------|-----------------|--------------|--------|
| Mantapa Mahatalingapura | 6.65 (1.7) | 7.29 (1.0) | 0.64 | -2.6 | 0.022 |
| Jigani and Haragadde | 7.04 (1.2) | 7.41 (1.1) | 0.37 | 1.4 | 0.160 |
| Hebbagodi and Huskur | 7.11 (1.7) | 6.38 (1.6) | 0.73 | -1.4 | 0.177 |
| Chandapura and Marasuru | 7.31 (1.4) | 6.28 (1.5) | 1.03 | 3.8 | 0.001 |
| Attibelle and Dommasandra | 7.4 (1.4) | 5.25 (1.4) | 2.15 | -4.5 | <0.001 |
| Bidaraguppe and Sarjapura | 6.88 (1.4) | 6.45 (1.3) | 0.45 | 1.6 | 0.13 |
| Samanthuru and Indlavadi | 6.77 (1.4) | 7.02 (1.4) | 0.25 | 0.3 | 0.43 |
| Balluru and Kasaba | 6.66 (1.4) | 7.09 (1.4) | 0.43 | -2.0 | 0.048 |
| Byagadadenahalli | 7 (1.6) | 7.8 (1.6) | 0.8 | -2.0 | 0.052 |
| Overall (all AWWs) | 6.2 (0.5) | 6.3 (0.3) | 0.06 | 0.2 | 0.884 |

Table 4: Analysis of immediate post-test and post 6 months test results of the training

| Place | Mean Immediate Post-test score (n=381) | Mean Post 6 months Test score (n=303) | Mean difference | t test value | P |
|---------------------------|--|---------------------------------------|-----------------|--------------|--------|
| Mantapa Mahatalingapura | 7.74 (1.4) | 7.29 (1.0) | 0.45 | 0.0 | 1.00 |
| Jigani and Haragadde | 7.78 (1.5) | 7.41 (1.1) | 0.37 | 2.3 | 0.029 |
| Hebbagodi and Huskur | 7.77 (1.3) | 6.38 (1.6) | 1.39 | 3.6 | 0.001 |
| Chandapura and Marasuru | 7.80 (1.3) | 6.28 (1.5) | 1.42 | 4.4 | <0.001 |
| Attibelle and Dommasandra | 7.44 (1.1) | 5.25 (1.4) | 2.19 | -6.7 | <0.001 |
| Bidaraguppe and Sarjapura | 7.58 (1.4) | 6.45 (1.3) | 1.13 | 2.7 | 0.009 |
| Samanthuru and Indlavadi | 7.18 (1.3) | 7.02 (1.4) | 0.16 | 7.02 | 0.716 |
| Balluru and Kasaba | 7.54 (1.6) | 7.09 (1.4) | 0.45 | -1.75 | 0.089 |
| Byagadadenahalli | 7.86 (1.7) | 7.8 (1.6) | 0.06 | 0.37 | 0.711 |
| Overall (all AWWs) | 6.8 (0.3) | 6.3 (0.3) | 0.5 | 5.2 | 0.035 |

- Height measurement using stadiometer
- Always use WFH charts in growth monitoring
- Refer all cases of SAM to the m-NRC in Taluk Hospital.

Regarding referral, AWWs mentioned “*we take so much difficulty in escorting SAM cases to Hospitals but after going there doctor says everything is alright*”. Here, we clarified that assessment of anthropometry is again done at NRCs to reassess nutritional status and if SAM is not present and child does not have any complications, community-based management is advised along with District Early Intervention Centre referral. So that visit in NRC should not be considered as wasted. This was encouraging for the AWWs.

One of the ethical dilemmas faced by AWWs was the management of very poor children at AWCs. The intersectionality of class and

caste was faced by them while enrolling these children. This could be understood by the following verbatim. “*Many poor families are hesitant to come to AWC since other parents don’t like to see their children playing with poor children in AWC*”. Here, we taught the skill of empathy and encouragement in AWWs so that they can promote attendance of poorer children and not just the privileged children in the community.

Some AWWs were frustrated with the management of SAM and MAM at the AWCs. “*Some children do not gain weight at all despite all measures*”. In these cases, we advised them to refer to NRCs to screen for TB, HIV, and micronutrient deficiencies after deworming, iron supplementation, and vitamin A supplementation. Also, we reiterated the multifactorial causation of malnutrition.

There was a general stigma around migrants among the local population. Also, the AWWs observed that *“Migrant children are mostly malnourished”*. The concept of social exclusion and its impact on nutrition and development of the child was explained. AWWs were advised to be more empathetic to such families and try to learn basics of migrant language so that simple communication on nutrition can be done and rapport can be built with migrant families. The AWWs gave feedback that *“Breastfeeding counselling and encouragement of mother was very useful for us”*. Lactation counseling support for the mother, cultural aspects of breastfeeding, positioning, and attachment were useful components of the training for them as their usual trainings only contain information such as early initiation and exclusive breastfeeding. In this training, we reinforced the fact that AWWs are the nearest lactation consultants a woman can access in the village, and they need to know the basics of breastfeeding counseling.

ICDS has introduced Poshan Tracker app, which is a tool under Saksham Anganwadi and Mission Poshan 2.0 to maintain data of stunting, wasting, underweight prevalence, and ensuring last mile delivery of nutrition services. However, appropriate tools such as right devices and Internet connect were an issue among the AWWs. *“Poshan tracker and the need to do data entry has complicated our lives”*. This complaint was informed to the Anganwadi Supervisors present in the training, and support on the use of the App was provided.

In our observation, during the trainings, we found that stadiometers are not functional in many AWCs, weighing scales are not calibrated, and AWWs do not receive support in the maintenance of these equipment. This issue has been discussed with the Anganwadi supervisors and CDPO of Anekal Taluk.

Discussion

Even though we could train 381 AWWs, in the 6 months post-test assessment, we could contact only 303 AWWs. Loss to follow-up was 20.5%, mainly due to other personal or official commitments of the AWWs. A few AWWs also had retired or resigned. The nature of occupation of AWWs, the informal conditions, remuneration in the form of honorariums rather than salary, and job satisfaction issues needs to be further studied since this occupation group impacts the health of children and is crucial for the development of the nation as well.^[7,13-15] Cluster meetings with Anganwadi supervisors and the support from CDPO, ASHA, ANM, and Primary Health Centre Medical Officer are important factors for the day-to-day functioning of the AWWs as per our observation in the field. The role of Rashtriya Bal Swasthya Karyakram (RBSK) team and the coordination between the AWW and RBSK team in identification of SAM children and referral to NRC and follow-up were also significant in the health outcomes of SAM children.

Our study used a simple 10-item questionnaire for the use of assessment of knowledge of malnutrition among AWWs

due to feasibility purposes. However, the authors recommend other evaluation methods in community-based trainings such as Objective Structured Clinical Examination in clinical case scenarios of SAM, videos of clinical scenario of SAM, Flashcards of growth charts, peer evaluation methods to assess knowledge, and attitude and skills gained during community-based training.^[16] During the conduct of such trainings of frontline workers, we emphasize the importance of informal interactions, understanding the challenges faced by health workers by exercising empathy, and respect the valuable experience of the health workers. Practical difficulties faced by them and the complexity of malnutrition are some of the greatest barriers to preventing malnutrition in the community among the most vulnerable families.

Of the nine groups in our study, four of them had significantly higher scores immediately after training as compared to pretest. There is sufficient evidence to prove that nutrition training improves the practices and competence of community health workers in undernutrition management practices.^[17] The difference in each group could have been observed due to different educational status of the AWWs, practical difficulties such as duration of training in certain sites affected due to other commitments, and different experience levels of AWWs; among the senior level AWWs, there were challenges in unlearning which could not be addressed in a group training. Certain groups such as AWWs from the tribal areas had challenges in being up-to-date about current guidelines as compared to AWWs from areas with better physical and virtual connectivity. The important factor in success of ICDS will be the link between the community-based management of malnutrition practices by the AWW and the health system. Direct and indirect costs associated with malnutrition care also can impede the care seeking by the families of children with malnutrition.^[18] In our interactions with AWWs, many of them mentioned that the system of payment of wage loss to parents only after 14 days of admission at the NRC prevents the parents from seeking care due to work-related and domestic commitments which cannot be set aside for 14 days. As per the statements of the AWWs, having siblings who attend school or young siblings requiring care also prevented parents from staying in NRC for long duration. We recommend high-quality trainings in regular frequency and regular calibration and maintenance of tools such as stadiometer, digital weighing scale, and provision of Shakir's tapes. While the capacity building of AWWs is a feasible, acceptable, and cost-effective intervention, scaling up to different districts and states needs elaborate planning and robust design.

Even though many of the AWWs knew that less than -3 Z score in the growth chart would indicate SAM and the child needs referral to NRC, they had some confusion regarding the type of growth chart to be used. In their standard register, weight-for-age charts were present; however, from ICDS, they were instructed to use weight-for-height charts. Most of the stadiometers were nonfunctional, in that the head plates were absent, not moving or broken. In cases where the stadiometers could not be used, wall

markings were used for height measurement. In these situations, MAM and SAM diagnosis will be compromised, resulting in overdiagnosis or underdiagnosis. The skill of measuring height using a stadiometer was also not uniform across AWWs. This has to be focused upon in the trainings of the AWWs. Also, scalability and sustainability of the use of stadiometers across AWWs in the country need to be assessed and feasible solutions should be arrived at. Experimenting with innovative, cost-effective, and digital methods of height assessment can be future research priorities.^[19] The observed issues with height measurement might have resulted in situations such as AWW identifying the child as SAM and then at the NRC later on the child being classified as MAM. Here, the role of RBSK team and PHC team is very important in the support of the AWW. However, the reality is that in many situations, the strong link between the PHC team, RBSK Team, and AWC team is not present. This has to be considered by family and primary care physicians for the management of malnutrition. Team building is essential for the success of care of malnutrition and holistic development of a child.

The growing evidence of uncomplicated SAM not requiring facility-based care is not familiar among the AWWs or the supervisor.^[20,21] This needs wider dissemination that uncomplicated SAM can be treated in outpatient basis in PHC and the role of AWW in this management is crucial in the success of the treatment. The first 1000 days of a child's life is a golden period of opportunity in physical and neurodevelopmental growth of the child.^[22] In any malnutrition training, the components of breastfeeding such as support for the mother, positioning, attachment, gendered aspects such as support from husband, mother-in-law, return to work after 6 months of exclusive breast feeding, expression and storage of breast milk, mother and baby bonding, and emotional wellbeing have to be included for discussion to be more practical. We also discussed the various psychological and physical factors affecting the joy of breastfeeding. Baseline knowledge of infant and young infant feeding is inadequate among community health workers,^[23] and this needs to be strengthened through practical skills-based training, with robust framework, standardized curriculum, training of trainers, and on-going support.^[24]

The post 6 months training scores of all groups were lower as compared to the immediate scores; this is acceptable due to knowledge retainment issues. The practical implications of this finding are that the frequency of regular trainings for AWWs can be increased. The scalability of the same can be ensured to methods such as peer-based trainings, video or mobile app-based online trainings, and regular sharing of evidence-based latest information on malnutrition through whatsapp and social media.^[25] Any teaching-learning method should have an appropriate evaluation method to ensure that the skills and knowledge have been imparted appropriately. The success of the interventions of a community health workers training can be sustained only if regular grievance redressal mechanisms are in place and issues such as salary, increment, permanent nature of employment, and challenges in use of Poshan tracker app

can be shared without hesitation. This has to be given priority to avoid situations such as protests which impede the provision of services at AWC.^[26]

In conclusion, training during induction and refresher trainings conducted for AWWs should focus on practical, skill-based training on malnutrition with assessment and feedback. Retainment of knowledge, attitude, and skills gained during the training could be achieved through innovative, user-friendly, peer-based, and digital teaching-learning methods. A uniform malnutrition curriculum training should be developed, and provision of calibrated, functional instruments for the anthropometry measurement and ongoing support should be provided. The success of prevention of SAM and MAM in the community is dependent on the link between AWW, RBSK, and PHC teams.

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Conflicts of interest

There are no conflicts of interest.

References

1. Zhu PH, Mhango SN, Vinnakota A, Mansour M, Coss-Bu JA. Effects of COVID-19 pandemic on nutritional status, feeding practices, and access to food among infants and children in lower and middle-income countries: A narrative review. *Curr Trop Med Rep* 2022;9:197-206.
2. Malnutrition-Free India. Available from: [https://pib.gov.in/PressReleasePage.aspx?PRID=1781673#:~:text=Malnourishment%20in%20children%20\(stunting%2C%20wasting,from%2022.9%25%20to%2018.7%25..](https://pib.gov.in/PressReleasePage.aspx?PRID=1781673#:~:text=Malnourishment%20in%20children%20(stunting%2C%20wasting,from%2022.9%25%20to%2018.7%25..) [Last accessed on 2024 Jul 08].
3. Ulahannan SK, Wilson A, Chhetri D, Soman B, Prashanth N. Alarming level of severe acute malnutrition in Indian districts. *BMJ Glob Health* 2022;7:e007798.
4. State Nutritional Profile_Karnataka_draft_20210922_SG_v2_JAG_46.pdf. Available from: https://www.niti.gov.in/sites/default/files/2023-02/SNP_Karnataka_draft_20210922_SG_v2_JAG_46.pdf. [Last accessed on 2024 Jul 08].
5. Karnataka Malnutrition Dashboard | Karnataka Data Lake. Available from: <https://kdli.3it.in/karnataka-malnutrition-dashboard/>. [Last accessed on 2024 Jul 08].
6. Sachdev Y, Dasgupta J. Integrated Child Development Services (ICDS) scheme. *Med J Armed Forces India* 2001;57:139-43.
7. Government of India incentivizes and encourages Anganwadi workers and Anganwadi helpers, through various initiatives. Available from: <https://pib.gov.in/PressReleaseframePage.aspx?PRID=2003433>. [Last accessed on 2024 Jul 08].
8. Bhattarai P, Walvekar PR, Narasannavar A. Knowledge of Anganwadi workers regarding different components

- provided by integrated child development scheme: A cross-sectional study. *Indian J Health Sci Biomed Res Kleu* 2017;10:241.
9. Kar M, Das S, Sahoo S, Patro SK, Palai S, Mishra B, *et al.* Perception and knowledge regarding under-nutrition in children among anganwadi workers: A qualitative study in Berhampur of Ganjam district, Odisha. 2019. Available from: <http://imsear.searo.who.int/handle/123456789/201540>. [Last accessed on 2024 Jul 08].
 10. Chudasama RK, Patel UV, Kadri AM, Mitra A, Thakkar D, Oza J. Evaluation of integrated child development services program in Gujarat, India for the Years 2012 to 2015. *Indian J Public Health* 2016;60:124.
 11. Khandelwal S, Mehra M, Singh A. Impact on public health nutrition services due to COVID-19 pandemic in India: A scoping review of primary studies on health and social security determinants affecting the first 1000 days of life. *Int J Environ Res Public Health* 2022;19:13973.
 12. Manivannan MM, Vaz M, Swaminathan S. Perceptions of healthcare providers and mothers on management and care of severely wasted children: A qualitative study in Karnataka, India. *BMJ Open* 2023;13:e067592.
 13. Anganwadi, Asha workers across Karnataka in limbo. Available from: <https://www.deccanherald.com/india/karnataka/anganwadi-asha-workers-across-karnataka-in-limbo-1225819.html>. [Last accessed on 2024 Jul 11].
 14. Sajan S, Navya CJ. IJCM_89A: Job satisfaction of Anganwadi workers in Thrissur district. *Indian J Community Med* 2024;49(Suppl 1):S26.
 15. Pavar VT. Sociological study of Anganwadi workers in Karnataka: A review. *Int J Innov Res Technol* 2023;10:425-9.
 16. Yeung DL, Alvarez KS, Quinones ME, Clark CA, Oliver GH, Alvarez CA, *et al.* Low-health literacy flashcards and mobile video reinforcement to improve medication adherence in patients on oral diabetes, heart failure, and hypertension medications. *J Am Pharm Assoc* 2017;57:30-7.
 17. Sunguya BF, Poudel KC, Mlunde LB, Urassa DP, Yasuoka J, Jimba M. Nutrition training improves health workers' nutrition knowledge and competence to manage child undernutrition: A systematic review. *Front Public Health* 2013;1:37.
 18. Bridge R, Lin T. Evidence on the impact of community health workers in the prevention, identification, and management of undernutrition amongst children under the age of five in conflict-affected or fragile settings: A systematic literature review. *Confl Health* 2024;18:16.
 19. Bonaldo S, Dal Lago F, Putoto G, Dal Lago L, Griggio E, Paccagnella A. Portable digital stadiometer for assessing the degree of childhood malnutrition in low-income countries. United Kingdom: 2021 IEEE International Humanitarian Technology Conference (IHTC); 2021. p. 1-8.
 20. Kumar P, Sinha RK, Daniel A, Shah H, Sriswan R, Kokane A, *et al.* Effectiveness of community-based treatment programs for treatment of uncomplicated severe acute malnourished children aged 6-59 months using locally produced nutrient dense foods: Protocol for a multicentric longitudinal quasi-experimental study. *BMC Nutr* 2021;7:85.
 21. Burza S, Mahajan R, Marino E, Sunyoto T, Shandilya C, Tabrez M, *et al.* Community-based management of severe acute malnutrition in India: New evidence from Bihar. *Am J Clin Nutr* 2015;101:847-59.
 22. The First 1000 Days: Window of Opportunity for Child Health and Development | Frontiers Research Topic. Available from: <https://www.frontiersin.org/research-topics/61356/the-first-1000-days-window-of-opportunity-for-child-health-and-development>. [Last accessed on 2024 Jul 11].
 23. Ojha S, B K, yopadhyay, Patankar F, Rathod U. Effectiveness of training programme on infant and young child feeding practices for accredited social health activist (ASHAs) and ANMs working in Health Department of Panvel Municipal Corporation in Maharashtra, India. Available from: <https://www.ijmrhs.com/medical-research/effectiveness-of-training-programme-on-infant-and-young-child-feeding-practices-for-accredited-social-health-activist-ashas-and-an-90958.html>. [Last accessed on 2024 Jul 11].
 24. Mulcahy H, Philpott LF, O'Driscoll M, Bradley R, Leahy-Warren P. Breastfeeding skills training for health care professionals: A systematic review. *Heliyon* 2022;8:e11747.
 25. Greuel M, Sy F, Bärnighausen T, Adam M, Vandormael A, Gates J, *et al.* Community health worker use of smart devices for health promotion: Scoping review. *JMIR MHealth UHealth* 2023;11:e42023.
 26. Bureau TH. Anganwadi workers stage protest. *The Hindu*. 2023 Sep 15. Available from: <https://www.thehindu.com/news/national/karnataka/anganwadi-workers-stage-protest/article67311895.ece>. [Last accessed on 2024 Jul 11].