Mal J Nutr 32 (3): 300- 315, 2026

Enablers and barriers to utilisation of DOST-FNRI developed IEC materials among health and nutrition workers in the Philippines

Idelia G. Glorioso*, Shannen Faye Q. Arevalo & Christelle Lois T. Bayalas

Food and Nutrition Research Institute, Department of Science and Technology, DOST Compound, General Santos Avenue, Bicutan, Taguig City, Philippines

ABSTRACT

Introduction: Information, education, and communication (IEC) materials are essential for delivering accurate food and nutrition information, improving knowledge, and promoting positive dietary behaviours. The Department of Science and Technology – Food and Nutrition Research Institute (DOST-FNRI) develops evidence-based IEC materials to address the Philippines' nutrition challenges. This study explored enablers and barriers to the use of DOST-FNRI IEC materials among health and nutrition workers in the Philippines. **Methods:** A descriptive qualitative study was conducted from October 2024 to February 2025 among existing users of DOST-FNRI IEC materials. Data were collected through key informant interviews (KIIs) and focus group discussions (FGDs) using semi-structured interview guides. Fifteen registered nutritionist-dietitians and municipal nutrition action officers participated in KIIs, while 72 Barangay Nutrition Scholars, Child Development Workers, daycare workers, and daycare teachers participated in FGDs. Audio-recorded interviews were transcribed, translated, and analysed using thematic analysis. **Results:** Participants considered both print and non-print IEC materials valuable for nutrition education. Enablers included clear messages, appealing visuals, culturally appropriate language, relevant nutrition content, and engaging formats. For video-based materials, good audio quality and interactive features further enhanced engagement. Barriers included limited accessibility, language mismatches, inadequate digital literacy, cost constraints, and lack of awareness about available resources. Print materials were generally preferred because of their accessibility and suitability in low-resource settings, whereas non-print materials offered greater engagement but required adequate digital infrastructure. **Conclusion:** Findings highlighted the importance of improving accessibility, cultural relevance, and integration of IEC materials into routine nutrition education activities to strengthen community-based nutrition interventions.

Keywords: barriers, enablers, IEC materials, nutrition education

*Corresponding author:
Idelia G Glorioso
Food and Nutrition Research Institute
Department of Science and Technology
DOST Compound, Bicutan, Taguig City, Philippines
Tel: (63) 837-20-71 local 2287; Fax: (63) 8372934;
E-mail: maideliag@yahoo.com or maideliaglorioso@gmail.com
doi: https://doi.org/10.31246/mjn-2026-0062

INTRODUCTION

Effective nutrition communication is an essential component of public health interventions. Providing appropriate food and nutrition information using information, education, and communication (IEC) materials is essential for improving public knowledge of health and nutrition. These materials aim to improve nutrition knowledge, foster positive attitudes, and encourage healthier food and nutrition practices among Filipinos. They translate scientific evidence into clear, culturally appropriate, and actionable information that can be readily understood and applied. They are critical tools in health promotion and nutrition education, enabling health workers to effectively convey essential messages to their target populations. Health and nutrition communicators must be supported by health learning materials, such as print, audio, and audiovisual materials, to achieve desired positive behavioural changes within the communities (Glanz, Rimer & Viswanath, 2015; Galmarini, Marciano & Schulz, 2024).

In the Philippines, DOST-FNRI develops evidence-based IEC materials addressing key nutrition concerns, including stunting, wasting, micronutrient deficiencies, overweight, and obesity for different population groups, including women of reproductive age (WRA), parents and caregivers, school-aged children, adolescents, and community health workers. These materials include printed formats such as posters, leaflets, flyers, comics, activity books, colouring books, puzzles, calendars, and big books, as well as digital and multimedia resources such as nutrition-related cartoon videos, jingles, recipe videos, puppet videos, and school nutrition videos. They promote healthy nutrition practices and are widely utilised in nutrition education and health promotion activities nationwide. Health and nutrition workers, teachers, and local government personnel use them in mothers' classes, counselling, school activities, and community outreach. DOST-FNRI also conducts training and capacity-building activities to strengthen their effective use, in line with the DOST's Community Empowerment through Science and Technology (CEST) programme.

Despite the extensive development and dissemination of DOST-FNRI's IEC materials, their effectiveness ultimately depends not only on their quality but also on how they are adopted and utilised by health and nutrition workers in routine practice. The successful use of IEC materials among health workers is influenced by various enablers and barriers. Enablers, such as resource availability, adequate training, institutional support, and cultural relevance, can facilitate effective use (Kesse-Tachi, Asmah & Agbozo, 2019). Conversely, barriers including limited access, lack of time, low motivation, language mismatches, and insufficient skills in using IEC tools can impede their application in community and clinical settings (Geleta & Deriba, 2022).

While these IEC materials support nutrition education and healthy behaviours, little is known about the factors that facilitate or hinder their effective use in community settings. Understanding the enablers and barriers is essential for improving the design, dissemination, and implementation of future nutrition education programmes. This knowledge gap motivated the study, which aimed to explore the enablers and barriers to the use of DOST-FNRI's IEC materials among health and nutrition workers in the Philippines.

METHODOLOGY

A qualitative descriptive design was employed to obtain a comprehensive and practical description of the enablers and barriers influencing the use of the materials among health and nutrition workers. This approach was considered to generate findings that could directly inform the development, dissemination, and improvement of IEC materials and related programmes.

This qualitative descriptive study was conducted from October 2024 to February 2025 among health and nutrition workers from Luzon, Visayas, and Mindanao. Participants were purposively selected from existing users of DOST-FNRI IEC materials to capture diverse insights, experiences, and perspectives. Since participants were exclusively current users of DOST-FNRI IEC materials, the findings may not fully reflect the experiences and barriers of non-users and should therefore be interpreted within the context of the study population.

Prior to study commencement, formal coordination was established with participating institutions following approval from the FNRI-Institutional Ethics Review Committee (FIERC) with protocol code FIERC-2024-005. Participants were contacted through official emails. Before each online key informant interview (KII) and focus group discussion (FGD), the interviewer and/or researcher introduced themselves and explained the study objectives, procedures, participation guidelines, and informed consent process, including voluntary participation, confidentiality, audio and video recording, and participants' rights.

KIIs and FGDs were conducted online via the Zoom platform, facilitated by registered nutritionist-dietitians (RNDs). Each KII session lasted approximately 45 minutes, while each FGD lasted about 1.5 hours.

The inclusion criteria for both the KIIs and FGDs were: (1) male or female participants aged 19 to 59 years old; (2) ability to use the Zoom application; (3) a stable internet connection; (4) individuals working as RNDs, barangay health workers (BHW), barangay nutrition scholars (BNS), child development workers (CDWs), municipal nutrition action officers (MNAO), day care workers or teachers; and (5) individuals who had purchased or used any DOST-FNRI IEC materials.

The exclusion criteria included: (1) individuals with poor or no internet connection that would hinder participation in the online sessions; and (2) individuals who declined or refused to provide a completed informed consent form before participation. No participants withdrew from the study. Although some participants experienced temporary internet connectivity issues, they were able to rejoin the sessions after a few minutes. The interviews involved only the researcher and the participants. No repeat interviews were conducted.

A semi-structured interview guide aligned with the study objectives was used and pilot-tested among RNDs and BHWs. The study involved 15 RNDs and MNAOs as interview participants, while the 72 FGD participants were BNS, CDWs, daycare workers or teachers, drawn from existing users of DOST-FNRI IEC materials. Each FGD comprised six to eight individuals.

The KIIs and FGDs were audio-recorded, transcribed verbatim in Filipino, and translated into English by the research team. The transcripts were reviewed for accuracy and completeness prior to analysis. Four (4) trained data encoders conducted a manual thematic analysis without the use of software. The transcripts were read repeatedly for familiarisation, followed by coding of meaningful text segments. The resulting themes were analysed to identify key enablers and barriers, and findings were presented narratively. To ensure the credibility of the findings, the research team independently reviewed and coded the transcripts.

Coding discrepancies were discussed and resolved through consensus. Findings from the KIIs and FGDs were compared to identify consistent patterns across data sources. Detailed documentation of coding decisions and theme development was maintained as an audit trail to enhance the dependability of the analysis.

The second and third authors, who conducted the KIIs and FGDs, were female RNDs and science research specialists, with experience in thematic analysis and writing qualitative research. All authors have attended training in qualitative research and published in journals featuring qualitative research. The transcriptions and results were not returned to the participants unless requested.

A sample size of 15 KIIs is generally considered adequate for a focused qualitative study. Previous studies have shown that thematic saturation is often achieved within 9-17 interviews, particularly when participants possess relevant expertise, and the study scope is well-defined (Hennink & Kaiser, 2022; Wutich, Beresford & Bernard, 2024). The concept of information power also supports smaller samples when participants are information-rich and the study has a focused aim and high-quality data (Malterud, Siersma & Guassora, 2016). The inclusion of 72 FGD participants further enhanced data richness and supported the identification of converging findings across methods.

RESULTS

Sociodemographic characteristics

For FGD, 72 participants were predominantly female (94%), with only 6% male. Most were aged 41–50 years (36%) and 51–59 years (29%), indicating older health and nutrition workers, and from urban areas (63%; rural: 37%). Most were CDWs (40%), followed by daycare teachers (21%), BNS and daycare workers (18% each), and teachers (3%). They worked in district/city/provincial health offices (40%), daycare centres (39%), health centres (18%), and schools/universities (3%).

For KII, participants were predominantly female (93%), with one male (7%). Most were aged 31–50 years (54%), followed by 51–59 years (33%) and 21–30 years (13%). Almost all were from urban areas (93%), with one from the rural area. Most were college graduates (67%), followed by college-level (20%) and master's degree holders (13%). Nearly half were CDWs (47%), RNDs (27%), teachers (13%), and MNAOs (13%). They worked in government offices and child development centres (33% each), schools/universities (20%), daycare centres (7%), and district/city/provincial health offices (7%).

Use of DOST-FNRI-developed materials

Table 1 shows that among KII participants, the most available DOST-FNRI IEC materials were the Pinggang Pinoy poster (*n*=12), Pinggang Pinoy puzzles (*n*=9), and big book (*n*=6). The most commonly used were the Pinggang Pinoy poster (*n*=8), big book (*n*=4), comics (*n*=4), and nutrition puzzles (*n*=3). These materials centred on Pinggang Pinoy®, a simple food guide showing recommended food group proportions. These were mainly used among school children (*n*=9), followed by parents or caregivers and pregnant and lactating women (*n*=4 each). Use was largely event-based (*n*=9), with minimal routine use.

Among FGD participants (healthcare and daycare workers), the most available materials were the Pinggang Pinoy poster (*n*=49), big book (*n*=45), and Pinggang Pinoy puzzles (*n*=33), along with nutrition puzzles (*n*=20), healthy lifestyle flyers (*n*=21), and comics (*n*=21). These were primarily used among parents or caregivers

and daycare children (*n*=33 each), school children (*n*=28), and pregnant and lactating women (*n*=11). Similar to KII findings, use was mostly event-based (*n*=31), suggesting that DOST-FNRI IEC materials were often used during specific programmes, trainings, or campaigns rather than for routine or daily education (Table 1).

This analysis indicated a strong reliance on a few key materials (notably *Pinggang Pinoy* tools), with use centred on specific populations like children, parents, and caregivers.

Table 1. Available and commonly used DOST-FNRI information, education, and communication (IEC) materials among healthcare and daycare workers in the Philippines

List of DOST-FNRI IEC Materials	*Available*		*Commonly used*	
	KII (n)	*FGD (n)*	*KII (n)*	*FGD (n)*
Pinggang Pinoy Poster	12	49	8	36
Big Book (Lilay)	6	45	4	34
Pinggang Pinoy Puzzles	9	33	3	8
Nutrition Puzzles	4	20	3	8
Comics	5	21	4	8
Lutong FNRI: Recipes for Supplementary Feeding Programme	5	11	2	9
Healthy Lifestyle Flyers	3	21	3	8
Colouring Book (Lilay)	2	12	1	3
Smarter Living, Smarter Eating Recipe Booklet	2	9	1	1
CD	2	4	1	4
Nutrition Videos Flash Drive Card	2	0	1	0
Nutrition Cartoon Flash Drive Card	1	0	0	0
Nutrition Snakes and Ladders	1	0	0	0
Nutrition Maze	1	0	0	0
Nutrition Alphabet Flashcard	0	0	0	0
Nutrition Alphabet Workbook	0	0	0	0

DOST-FNRI: The Department of Science and Technology – Food and Nutrition Research Institute; KII: Key informant interview; FGD: Focus group discussion

Perceived enablers for use of print and non-print DOST-IEC materials

As shown in Table 2, the enablers for use of DOST-FNRI print and non-print IEC materials were grouped into several themes. For print materials, FGD and KII participants identified ease of understanding, visual appeal, nutrition information, message and content, language used, and engagement as enablers. Simple terms, concise information, colourful and eye-catching visuals, and well-designed layouts improved understanding, retention, and practical use in nutrition education. Informative and timely content supported nutrition counselling and programme implementation, while the use of English and Filipino made the materials easily understandable, particularly to children and young audiences.

Table 2. Perceived enablers for use of print and non-print DOST-FNRI information, education and communication (IEC) materials

Theme	*Sub-theme (KII and FGD)* *Print IEC materials*	*Sub-theme (KII and FGD)* *Non-print IEC materials*
Ease of understanding	• Terminologies are just right • Encouraging to use and put into practice • Visuals are easy to understand • Understands the importance of nutrition materials *"…mas ma-eencourage sila na gamitin 'yon 'pag mas naiintindihan nila yung kanilang binabasa."* (…they will be more encouraged to use it if they understand what they are reading.)	• Understandable to children and young audiences • Information is concise • Easier to explain and understand if with audio and visual presentation "*Through audio mas madaling maintindihan ng mga bata ang mga ganun.*" (Through audio, it's easier for children to understand things.)
Visual appeal	• Materials are colourful, nicely presented and encouraging to read • Colours are attractive and eye-catching • Vibrant colours and it helps – visuals for easy recall • Use of graphics and text is engaging • Large and understandable illustrations "…*mas maganda po yung may visual aids po habang pinapakita po, narerecall ng parents kung ano po yung mga nandun po talaga.*" (…it's better to have visual aids while presenting so parents can recall the information."	• Animated and colourful visuals catch attention • Clear and visible illustrations • Realistic and encouraging visuals to children • Pleasing sounds and graphics *"…mas gusto ng bata yung mga gumagalaw tsaka yung mga sound effects."* (…children prefer things that move and have sound effects.)
Nutrition information, message and content	• Timely, accurate, and relevant information • Complete and updated information • Interesting and engaging content • Story-based content (e.g., Lilay, Big Book) • Useful in feeding programmes (e.g., recipe books) "*Pati yung nutrition information and message madali lang pong maintindihan ng mga bata lalo na kung susundan natin ng explanation sa kanila.*" (Even the nutrition information and message are easy for children to understand, especially if we provide explanations right after.)	• Updated and interesting content • Additional content for nutrition education sessions • Not repetitive • Useful in consultations "*Itong mga nutrition videos pwede siya mai-play sa daycare center or mothers' class. Maganda yung content at updated po siya.*" (These nutrition videos can be played at daycare centres or mothers' classes. The content is good and updated.)

(To be continued)

Table 2. Perceived enablers for use of print and non-print DOST-FNRI information, education and communication (IEC) materials *(Continued)*

Theme	*Sub-theme (KII and FGD) Print IEC materials*	*Sub-theme (KII and FGD) Non-print IEC materials*
Language used	• Simple words • Use of Filipino and English • Easy for children to understand • Relatable among children • Can be easily translated "*Yung mga terminologies na ginamit ay hindi naman ganon kalalim o kababaw, so tama lang.*" (The terminologies used are not that deep or superficial, so it's just right.)	• Understandable language for children • Concise information "*…hindi ganoon kahaba pero concise ang information sa video.*" (…it's not that long and the information in the video is concise.)
Engagement	• Use of visuals encourages both parents and children • Helps recall information "*Naiapply nila yung lesson naming about colors and shapes, nakikita nila sa mga puzzles, posters, lalo yung kwentong si Lilay ay Batang Matamlay.*" (They (children) are applying our lesson about colours and shapes, they see it in puzzles, posters, especially the story of Lilay.)	• Interactive and engaging formats • Encouraging and realistic visuals to children "*If you hear the sound that is pleasing with your ears and see that is pleasing your eyes also that's one factors na maghihikayat or maa-attach ka doon sa isang video na pinapanood mo.*" (If you hear the sound that is pleasing with your ears and see that is pleasing with your eyes also that's one factors that will encourage, or you will be attached to the video you are watching.)
Audio features		• Clear and audible sounds • Entertaining music and sound effects • Helps understanding and maintains children's interest "*…kapag mayroon tayong mga audio at video sa mga center napakadali lang ipaliwanag at madaling intindihin.*" (…when we have audio and video in the centres it is very easy to explain and easy to understand.)
Format/ Technology support		• Use of USB instead of CD • Compatible with anydevice/ platform "*…hindi na uso ang CD kaya hindi na po naming na piplay wala na kaming mga player at sa internet na talaga.*" (..CDs are no longer in demand, so we don't use them anymore, we don't have (CD) players and use more of the internet.)

DOST-FNRI: The Department of Science and Technology – Food and Nutrition Research Institute; KII: Key informant interview; FGD: Focus group discussion

For non-print materials, participants highlighted pleasing sounds and colourful, animated, and realistic visuals that captured children's attention and supported learning. Updated, complete, and age-appropriate nutrition messages made the materials useful supplements for nutrition education. For ease of understanding, messages were age-appropriate, engaging and presented in child-friendly language. Compatibility with various devices further improved usability in digitally equipped settings.

Perceived barriers for use of print and non-print DOST-IEC materials

The perceived barriers to using DOST-FNRI IEC materials were grouped into comprehensibility, availability, affordability, accessibility, content quality, language used, and technical skills or support, with distinct challenges for print and non-print formats.

For print materials, participants cited cost, physical availability, and content accessibility as the main barriers. Some materials were considered costly or not a funding priority, prompting health workers to use personal funds. Other barriers included the use of English and unfamiliar content, damaged or outdated copies, small and unclear visuals, and difficulty sourcing copies, which further impeded their use.

For non-print materials, barriers were mainly related to digital access and literacy, including poor internet connectivity, lack of appropriate gadgets, and limited skills in using digital tools. Limited or outdated content, unengaging materials, and unfamiliar language also reduced their practicality and appeal (Table 3).

Perceived effectiveness of nutrition education materials

Findings from KIIs and FGDs showed clear preferences for nutrition education materials. Print materials were the most preferred and widely used, identified as effective by 47% of KII and 54% of FGD participants. They were valued for being engaging, visually appealing, easy to understand and recall, accessible without electricity, practical to distribute, and useful for interactive activities such as storytelling (Table 4).

Non-print materials were less frequently cited (20% in KIIs and 4% in FGDs), mainly due to unfamiliarity and higher costs, despite their visual and auditory appeal. Meanwhile, 33% of KII and 42% of FGD participants preferred combining print and non-print materials. This blended approach was viewed as more accessible, engaging, inclusive, and adaptable to different learning preferences, while providing a backup when equipment is unavailable (Table 4).

Overall, print materials remain the most practical choice, but integrating print and non-print formats can enhance the effectiveness of nutrition education.

DISCUSSION

This study explored the enablers and barriers to the utilisation of DOST-FNRI IEC materials among health and nutrition workers in the Philippines. The findings highlight the important role that print and non-print materials play in nutrition education in facilitating knowledge dissemination and behaviour change in diverse settings. Enablers for both formats include ease of understanding, visual appeal, nutrition information, message and content, language, and engaging formats. Additional enablers for non-print materials or videos include audio features, technology format, and support.

Table 3. Perceived barriers for use of print and non-print DOST-FNRI information, education and communication (IEC) materials

Theme/ Category	*Sub-theme (KII and FGDs) Barriers Print IEC materials*	*Sub-theme (KII and FGDs) Barriers Non-print IEC materials*
Comprehensibility	• Not easy to understand • Content not applicable to needs of users • Topic did not pique interest "*Hindi sila interesado sa mga bagay na nakikita nila kapag po hindi po siya talaga applicable sa gusto nilang makita.*" (They are not interested if the things they see are not applicable to them.)	• Not easy to understand • Unfamiliar content *"Hindi nagloloading ng tama or hindi maintindihan yung salita nung andun sa video, that is one factor that could affect the presentation itself."* (If the video doesn't load properly or the words are not clear, that's one factor that could affect the presentation itself.)
Visual appeal	• Small and unclear illustrations • Not visually appealing "*yung mga dati bukod sa luma na ay yung kulay niya parang nababawasan na rin hindi na siya ganon ka-attractive.*" (Besides being old, the colour seems to be fading, it's not attractive anymore.)	• Not visually appealing "*…kung hindi agad maganda yung napapanood nila, hindi na makukuha yung attention nila."* (…if what they watch isn't appealing to them, you won't get their attention.)
Language use	• Difficulty with English; Filipino preferred • May affect understanding "*…dapat nasa Filipino lang hindi po sa English kasi pag Tagalog po kasi mas madali po nilang maintindihan.*" (…it should be in Filipino, not in English because it would be easier for them to understand Tagalog.)	• Language used "*…may mga kadalasan na po ngayon is mga English na po yung mga ano (language used) ng mga bata. Kaya parang kailangan may translation na may Tagalog, may English…*" (…there are times when the language used by children is English. So it seems like there needs to be a translation, some Tagalog, some English…)
Availability	• Limited supply • No copy • Lack of budget to purchase • Materials may be damaged (old, wet) *"So yung mga materyales ay luma na, nabasa , kaya wala kaming materials ngayon."* (So the materials are old, they've gotten wet, so we don't have any materials (to use) now.)	• IEC materials unavailable "*..kulang din po ang materials ko at nanghihiram lang din po sa BNS naming.*" (…I also lack the materials and I'm just borrowing from our BNS.)

(To be continued)

Table 3. Perceived barriers for use of print and non-print DOST-FNRI information, education and communication (IEC) materials *(Continued)*

Theme/ Category	*Sub-theme (KII and FGDs) Barriers Print IEC materials*	*Sub-theme (KII and FGDs) Barriers Non-print IEC materials*
Affordability	• Slightly costly • Use of own funds to buy the IEC materials • Not a budget priority • Limited stocks due to lack of funds "*Number one kasi dyan yung price talaga, pag unaffordable o mataas masyado yung presyo ng materials, may possibility talaga na hindi ma-afford.*" (Number one is the price, if the price of the materials is unaffordable or too high, there is possibility that won't be able to afford buying it.)	• Unaffordable *"Yun lang po ang magiging problema kagaya po ng TV, ng CD, may cost po yan, budget ng materials na gagamitin."* (The problem would probably be like for TVs and CDs, there's a cost, a budget for the materials to be used.)
Accessibility	• Unaware where to purchase • Various format preferences (e.g. social media) • Limited resources "*Hindi po siya libre kaya po limitado lang ang naibibigay sa aming participants. Sana available na siya online at accessible po sa amin.*" (It's not free, so only a limited amount is given to our participants. I hope it will be available online and accessible to us.)	• Not accessible • Lack of gadgets/devices (TV, monitor) • Internet connectivity issues "*…yung pupuntahan naming kung hindi accessible sa kanila or may problem na wala silang necessary resources like (CD) players.*" (…if it's not accessible on their location or there's a problem where they don't have the necessary resources like (CD) players."
Technical skills/support	• Lack of skills to use IEC "*Kapag may bago din po kaming miyembro hindi maintindihan.*" (It's hard to understand especially for new members.)	• Lack of skills to use IEC *"..kahit gustuhin gamitin kung kulang naman sa kaalaman."* (…even if you want to use it but you still lack the knowledge.)
Content quality	• Not updated content • Limited content *"…sometimes many end users na mas gusto ang information presented in the web or social media."* (…sometimes many end users prefer information presented on the web or social media.)	• Limited content • Not updated content • Lack of interesting content "*…ano pa ba yung iba pang maio-offer na information na mas maganda pa, na panibago naman na mapakinig naming sa aming community.*" (…what other information can be offered that is even better, something new that we can share in our community.)

(To be continued)

Table 3. Perceived barriers for use of print and non-print DOST-FNRI information, education and communication (IEC) materials *(Continued)*

Theme/ Category	*Sub-theme (KII and FGDs) Barriers Print IEC materials*	*Sub-theme (KII and FGDs) Barriers Non-print IEC materials*
Format/ medium issues	-	• Distracting sounds • Use of CD instead of USB *"…kung magulo, kung hindi mo maintindihan yung content or yung sounds."* (…if it's confusing, if you don't understand the content or the sounds.)
Suggestions for improvement	-	• Addition of stories (beyond Lilay) • Affordable recipes for children and pregnant women *"…suggestion ko lang mas affordable na recipe for children and pregnant women."* (…I suggest a more affordable recipe for children and pregnant women.)

DOST-FNRI: The Department of Science and Technology – Food and Nutrition Research Institute; KII: Key informant interview; FGD: Focus group discussion

Participants emphasised that print materials are more effective when visually appealing, particularly through vibrant colours, large illustrations, and well-designed graphics. This aligns with Lorts *et al.* (2022), who identified visual appeal as a key enabler of print and non-print educational materials. Well-designed nutrition education materials are also perceived as more credible and trustworthy (Lorts *et al.*, 2022), while simple visuals, such as icons with minimal text, appear most effective (Schubbe *et al.*, 2020). Clear, appealing, realistic, and culturally appropriate graphics, together with a coherent format and relevant, clear, and sensitive messages can improve suitability, understanding, and consistent use (Sage *et al.*, 2025; Gonella *et al.*, 2024; Laninhun & Oyeleye, 2021; Buller *et al.*, 2015). Overall, the study reinforces the importance of combining visually appealing design with clear, relevant content to optimise the impact of nutrition education materials.

The present study highlighted the strengths of DOST-FNRI IEC materials that may explain their widespread use and acceptance among health and nutrition workers. Participants cited the Pinggang Pinoy® posters, puzzles, and big book as useful because of their colourful illustrations, simple presentation, and age-appropriate messages. These materials were easy to explain to children, parents, and caregivers while supporting recall and engagement.

DOST-FNRI IEC materials were also valued for their use of Filipino and English, culturally relevant content and local examples, and practical nutrition messages, which enhanced their use in community-based nutrition education. This aligns with Lambert *et al.* (2025) and Laninhun & Oyeleye (2021), who emphasised the importance of using local plain language, positive messaging, focused key points, and culturally appropriate, actionable information. Thus, these materials are visually appealing, contextually relevant, and user-friendly, helping workers communicate nutrition concepts effectively across diverse groups.

In this study, non-print materials included nutrition cartoons, jingles,

Table 4. Perceived effectiveness of nutrition education materials and reasons for using print and non-print materials

Type of materials	*Effectiveness*				*Reasons for using this type of material*
	n (KII)	*% (KII)*	*n (FGD)*	*% (FGD)*	
Print	7	47	39	54	• Catches attention • Activation through seatwork • Tangible engagement • Ease in visualisation and recall • Physical copy/on-hand materials • Interactive and easy to disseminate • Visually appealing (illustrations, readable text) • Understandable language • Accessibility, usable during power outages • Sparks creativity (e.g., storytelling) • Easy to present • Easy to understand
Non-print	3	20	3	4	• Easy to understand • Auditory appeal • Visual appeal • Not familiar with non-print materials
Both (print and non-print)	5	33	30	42	• Combined accessibility • Multisensory learning • Provides knowledge through both formats • Caters to learner preferences • Backup if equipment is unavailable • Utilises multiple senses in learning • Enhances learning and engagement • Easy to explain and disseminate • Piques interest and enjoyable • Adaptable for various audiences • Introduces new methods • Consistent integration
Total	15	100	72	100	

KII: Key informant interview; FGD: Focus group discussion

Table 5. Distribution of information, education and communication (IEC) beneficiaries based on key informant interviews (KIIs) and focus group discussions (FGDs)

IEC beneficiaries	*KII (n)*	*FGD (n)*
School children	9	28
Parents and caregivers	4	33
Daycare children	-	33
Pregnant and lactating women	4	11
Elderly	2	5
Teenagers	2	6
Community members	2	-
Malnourished children	-	8
Persons with disabilities	-	1
Pre-schoolers/Kinder	-	4
Patient	1	-
Institution staff and visitors	1	-
General Public	1	-
Adults	0	-

Nutrisyon is Kool, FNRI Kusina, and puppet videos on USBs and CDs. Enablers for use included pleasing audio and colourful, animated, realistic visuals that captured children's attention and supported comprehension. Entertaining songs, background music, and sound effects also sustained interest and improved understanding of nutrition messages. Consistent with prior research, engaging, interactive, and visually-rich videos facilitate understanding and retention of key concepts (Asmi *et al.*, 2024). Video-based education improves balanced nutrition knowledge while promoting learners' interest and confidence (Asmi *et al.*, 2024; Johnston *et al.*, 2025).

Interestingly, participants identified comprehensibility, visual appeal, and language as both enablers and barriers to the utilisation of DOST-FNRI materials. Differences in literacy, education, and preferences may explain this. For some participants, materials that were clearly written, visually engaging, and presented in familiar language enhanced understanding and encouraged use. However, for others, technical terms, dense text, unfamiliar language, or overly complex visuals may have reduced clarity and interest, making the same materials difficult to use. This highlights the need to tailor materials to diverse literacy and cultural contexts (Lahinhun & Oyeleye, 2021).

In this study, comprehensibility was a significant barrier due to the use of English and unfamiliar content, thus limiting the materials' relevance and practical application. Similarly, Geleta & Deriba (2022) found that IEC materials developed in federal or international languages rather than local dialects often lacked cultural adaptation, reducing their relevance and usability. Difficult vocabulary and long, complex sentences in patient information leaflets also reportedly hinder effective communication (Denniss *et al.,* 2025; Jolayemi & Idegbekwe, 2019).

Another barrier identified was limited access to nutrition education resources, particularly participants' lack of awareness of where to obtain reliable nutrition-related IEC materials. To address this, DOST-FNRI makes evidence-based IEC materials available during its Annual Seminar Series and Nutrition Month Celebration every July. These national events bring together nutrition and health professionals and workers, researchers, educators, local government personnel, and other stakeholders, increasing awareness and encouraging wider community use of these resources. DOST-FNRI also accepts IEC material orders through its official Facebook page, using a billing and courier system to serve health and nutrition workers in geographically isolated and disadvantaged areas. Although these initiatives address geographical barriers, greater awareness of these distribution mechanisms is still needed. Partnerships with local government units, regional health offices, and digital platforms may further improve the reach and use of DOST-FNRI resources among frontline workers in underserved communities.

Despite these benefits, video-based educational materials were used less frequently due to unfamiliarity and higher costs. Although videos may improve comprehension compared with traditional approaches, they may offer no additional benefit beyond physician-led oral discussions (Galmarini, Marciano & Schulz, 2024). Future research should assess whether combining videos with oral discussions is more effective than using videos alone.

The findings showed that DOST-FNRI educational materials were mainly used among children and their caregivers. This aligns with Mulat, Kamaruddin & Nordianiwati (2025), who highlighted that interactive approaches, such as educational games and picture stories, promote children's participation, while guidance from parents or teachers supports the long-term adoption of healthy

practices. Effective health and nutrition communication requires tailoring messages to specific audiences (Denniss *et al.*, 2025).

The study highlighted the reliance on a limited set of DOST-FNRI IEC materials, particularly the *Pinggang Pinoy*® tools, which are widely available, frequently used, and well-understood by KII and FGD participants. These materials are mainly used among children, parents or caregivers, and pregnant or lactating women during organised events rather than routine nutrition education.

Despite these limitations, the study acknowledged the complementary benefits of integrating print and video formats in nutrition education. Participants viewed that combining the two formats can enhance learning, engagement, and adaptability to diverse learner preferences. This aligns with Loh & Sun (2019), who found that print and digital materials are complementary, with technology extending reading opportunities, while print remains a primary medium for sustained and motivated reading among adolescents.

Both print and non-print IEC materials were perceived to be effective when they used simple, age-appropriate language, engaging visuals, and relevant nutrition content. However, print materials faced cost, availability, durability, and language barriers, while non-print materials were limited by gadget access, poor internet connectivity, outdated content, and insufficient digital skills. Participants valued combining both formats to enhance inclusivity, engagement, and learning across diverse settings.

This study has several limitations. Firstly, participants were purposively selected from existing users of DOST-FNRI IEC materials; therefore, the findings may not fully reflect the experiences and perspectives of non-users who may face different barriers to adoption. Secondly, most participants were female health, nutrition, and childcare workers, which may limit the transferability of findings to other professional groups. Thirdly, the findings provide in-depth insights but are not intended to be statistically generalisable to all health and nutrition workers in the Philippines. Future studies may include non-users and employ mixed-method approaches to further examine the reach, effectiveness, and utilisation of DOST-FNRI IEC materials.

CONCLUSION

This study showed that DOST-FNRI IEC materials, particularly print-based Pinggang Pinoy® tools, were widely available and valued by health, nutrition, and childcare workers for their clear language, engaging visuals, and audience relevance. However, their use remained mostly event-based rather than integrated into routine nutrition education. Print materials were preferred for their accessibility, especially in low-resource settings, while non-print formats were limited by device, connectivity, and technical constraints.

The findings support combining print and non-print materials to improve engagement, inclusivity, reach, and sustainability. Future research should examine their integration into routine education, adaptation for diverse and underserved groups, combined delivery approaches, use of local language and culturally appropriate content, and the potential use of artificial intelligence in IEC development and delivery.

Acknowledgement

The authors gratefully acknowledge the study participants for generously sharing their experiences and perspectives, which were essential to the successful completion of this study. The authors extend

their sincere appreciation to Ciara Claire SB. Kahanap for her invaluable assistance in drafting the questionnaire, facilitating data gathering, and coordinating with participants during the KIIs and FGDs. Special thanks extended also to Mary Baby Joy A. Ricalde, Erika Niña C. Bacolod, and Dexter Y. De Leon for their assistance during data gathering, and John Mark M. Villanueva for his assistance as a recorder in some FGDs. The authors likewise acknowledge Jun Laurice L. Cuerdo and Aleona G. Marmita for conducting some KIIs and their support in the transcription and coding of the research data. Finally, the authors express their heartfelt gratitude to Milflor S. Gonzales, Ph.D. for her valuable technical comments and insightful guidance that greatly contributed to the improvement of the manuscript.

Authors' contributions

Glorioso IG, principal investigator, conceptualised and designed the study, prepared KII questionnaire and FGD guide questions, served as moderator during the FGD, reviewed the transcription and coding of the gathered data, prepared the drafts and final manuscript, reviewed the final draft before submission; Arevalo SFQ, co-investigator, assisted in conceptualising and designing the study, prepared the KII questionnaire and FGD guide questions, served as moderator during the FGD, served as interviewer during the KII, reviewed the transcription, edited the thematic analysis of the gathered data, assisted in the preparation of draft and final manuscript, assisted in reviewing the final manuscript before submission; Bayalas CLT, co-investigator, served as moderator during the FGD, served as interviewer during the KII, assisted in the thematic analysis of the gathered data, prepared the participant profile, assisted in the preparation of draft manuscript, and assisted in reviewing the final manuscript before submission.

Conflict of interest

The authors declare no potential conflicts of interest with respect to the research, authorship, and or publication of this article.

References

Asmi AS, Tyarini IA, Saputra MKF, Putra JA & Son HK (2024). Video media is more effective to improve balanced nutrition knowledge. *J Ilm Kesehat Sandi Husada* 13(2):242-249.

Buller MK, Bettinghaus E, Buller DB, Liu X & Fluharty L (2015). Perceived availability of culturally and demographically diverse photographs for health education materials, Colorado, 2010. *Prev Chronic Dis* 12:E24.

Denniss E, McNaughton SA, Russell GG, Khandpur N & Machado PP (2025). Best practice recommendations for constructing educative and persuasive health and nutrition messages: a rapid review. *Proc Nutr Soc* 84(OCE1):E143.

Galmarini E, Marciano L & Schulz PJ (2024). The effectiveness of visual-based interventions on health literacy in health care: A systematic review and meta-analysis. *BMC Health Serv Res* 24(1):718.

Geleta TA & Deriba BS (2022). Exploring enablers and barriers to utilize printed information, education, and communication materials among healthcare providers of North Shoa zone, Oromia, Ethiopia. *Risk Manag and Health Policy* 15:1303-1313.

Glanz K, Rimer BK & Viswanath K (2015). *Health Behavior: theory, research, and practice*. 5th ed. Jossey-Bass, San Francisco.

Gonella S, Di Giulio P, Brofferio L, Riva-Rovedda F, Cotogni P & Dimonte V (2024). Stakeholders' perspective on the key features of printed educational resources to improve the quality of clinical communication. *Healthcare (Basel)*12(3):398.

Hennink MM, & Kaiser BN (2022). Sample sizes for saturation in qualitative research: A systematic review of empirical tests. *Soc Sci Med* 292: 114523.

Johnston A, Voulo M, D'Souza GC, Lawler O, Flanagan M, Kris-Etherton PM & Masterson TD (2025). Nutrition education in primary care: Comparing video vs handout interventions. *J Nutr Educ Behav* 57(2):141-147.

Jolayemi D & Idegbekwe D (2019). Effective communication of patient information leaflets in selected malaria drugs in Nigeria. *Cross Cul Commun*15(3):26-32.

Kesse-Tachi A, Asmah AE & Agbozo E (2019). Factors influencing adoption of eHealth technologies in Ghana. *Digit Health* 5:2055207619871425.

Lambert K, Bernes S, Buxton N, Gogebakan N, Hennen GT & Caswell GF (2025). Designing better resources: consumer experiences, priorities and preferences regarding contemporary nutrition education materials. *J Hum Nutr Diet* 38(2):e70041.

Laninhun BA & Oyeleye SA (2021). Assessing the suitability of print IEC materials used in malaria prevention among rural dwellers in South-West Nigeria. *J Commun Media Res* 13(1):110-120.

Loh CE & Sun B (2019). "I'd still prefer to read the hard copy": Adolescents' print and digital reading habits. *J Adolesc Adult Lit* 62(6):663-672.

Lorts C, Adams M, Roberto AJ & Ohri-Vachaspati P (2022). What influences the credibility of printed nutrition education materials? *Am J Health Behav* 46(1):3-11.

Malterud K, Siersma VD & Guassora AD (2016). Sample size in qualitative interview studies: guided by information power. *Qual Health Res* 26(13):1753-1760.

Mbatha B (2024). Diffusion of innovations: how adoption of new technology spreads in society. In: *Information, knowledge, and technology for teaching and research in Africa: Human machine interaction and user interfaces*, pp. 1-18. Springer Nature Switzerland, Cham.

Mulat TC, Kamaruddin MI & Nordianiwati N (2025). Education on healthy living culture to increase children's awareness from an early age. *J Pengabdi Masy Eduk Indones* 2(1):25-31.

Sage O, Wang F, DiAngelo C, Marsden S, Faustini C, Grant S & Cohen TR (2025). Enhancing nutrition education resources through the development and refinement of a checklist using the suitability assessment of materials (SAM). *Nutr Health* 32(1):31-40.

Schubbe D, Scalia P, Yen RW, Saunders CH, Cohen S, Elwyn G & Durand MA (2020). Using pictures to convey health information: a systematic review and meta-analysis of the effects on patient and consumer health behaviors and outcomes. *Patient Educ Couns* 103(10):1935-1960.

Wutich A, Beresford M & Bernard H (2024). Sample sizes for 10 types of qualitative data analysis: an integrative review, empirical guidance, and next steps. *Int J Qual Methods* 23(4):1-14.