



Investigation of the Outreach or Counseling from the Village or Health Center on the Impact of Climate Change on Maternal and Child Health: A Qualitative Study Assessing the Need for Educational Media

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Abstract

Introduction: Pregnant women and children are among the vulnerable groups whose health is directly affected by climate change due to shifts in extreme weather patterns, high humidity, and temperature fluctuations, all of which can increase the risk of pregnancy-related complications. This study aimed to explore the need for educational materials on the impact of climate change on maternal and child health.

Methods: This formative qualitative study involved 33 participants (10 pregnant women, 10 toddler mothers, 10 health cadres, one midwife, one village leader, and one environmental health officer) in the coastal region of Lempasing, Pesawaran Regency, Lampung Province. The data collection used three focus group discussions (FGDs) and three in-depth interviews, which were analyzed thematically using open code 4.02.

Results: Findings from FGDs and interviews reveal two themes: community perceptions of the impact of climate change on health and educational media on climate change impacts.

Conclusion: The expected media indicate that videos and leaflets are required, and direct education is preferred.

Keywords: Climate change, Maternal health, Child health, Qualitative research

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Introduction

Indonesia is one of the regions in the world that is already affected by climate change. The impacts are extensive, ranging from floods, landslides, droughts, extreme heat, unpredictable weather shifts, and coastal erosion due to rising sea levels (1). Additionally, climate change and hydro-meteorological events have also impacted human health. Health effects arise from soil degradation, crop failures, water scarcity, flooding, and shifts in disease vector patterns (2).

Evidence on the health impacts of climate change includes associative and causal findings. Such effects include fertility issues due to changes in global temperature cycles (3). Epidemiological evidence suggests that climate change is associated with poor pregnancy and fetal health outcomes (4–6). Extreme temperature shifts can lead to stress in pregnant women, prematurity, and low birth weight in infants (6). Excessive heat can disrupt

the body's ability to regulate temperature in pregnant women, particularly during labor, leading to dehydration, hormonal imbalances, and impaired placental function. These conditions may result in clinical complications such as hypertensive disorders, gestational diabetes, preterm delivery, and stillbirth (7).

Data on the impact of climate change in Indonesia are still limited, so its effect on maternal and child health has not been described and considered for intervention and policy. These limitations cause public awareness of climate change to be small. Public knowledge regarding the impact of climate change on maternal and child health is still lacking. Previous qualitative research showed that many people were unaware of climate change and its impact on maternal and child health (8), highlighting a critical gap in information and educational media. This study underscores the importance of thorough need analysis to explore the expected media in educating people about the



effects of climate change on maternal and child health. Understanding community preferences and knowledge gaps is essential to developing targeted and accessible materials that can effectively raise awareness and promote adaptive health behaviors in response to climate change.

Methods

Study Design

The study used formative research with a qualitative approach as preliminary research to create media to educate about the impact of climate change on maternal and child health. Formative research involves gathering data that helps develop and implement intervention programs. The study report followed the Consolidated Criteria for Reporting Qualitative Research (COREQ) guidelines (9).

Study Setting

This study involved 33 participants in Sukajaya Lempasing Village, Teluk Pandan District, Pesawaran Regency, Lampung, which was selected because climate change most affects coastal areas. The face-to-face FGDs and in-depth interview was held in the Posyandu (integrated service post) building. Most participants and research team members were women who had not previously met. No one else was present besides the participants and researchers.

Data Collection and Analysis

Data were collected in September 2024 using three focus group discussions (FGDs) (with ten pregnant women, 10 toddler mothers, and 10 health cadres), and three in-depth interviews (with a village midwife, an environmental health officer, and a community leader), and observation methods, all conducted in the Indonesian language. The average duration of each recording was 30–60 minutes. Trained healthcare professionals with expertise in qualitative research conducted FGDs and in-depth interviews after understanding this study's objectives and methodology.

The researchers utilized six instruments, each comprising an average of 9–12 items, supplemented by approximately 1–4 probing questions. The examples of key questions posed to pregnant woman participants:

- a. Have you received any specific information from healthcare providers regarding the impact of climate change on maternal health?
- b. What are your expectations regarding the type of educational media that should be used to convey information about the effects of climate change on mothers and children?

The village midwife selected the participants, and the researchers, with her assistance, extended the invitations. Since the village midwife has the most knowledge about the research area, coordination for participant recruitment and data collection timing will be more efficient. Participants were selected using purposive sampling based on the following inclusion criteria:

- a. Pregnant women: Women with a normal pregnancy at any trimester who are literate.
- b. Toddler mothers: Mothers with children aged 0–5 years who are literate and do not bring their children during data collection.
- c. Health cadres: Active community health cadres with literacy skills.
- d. Health workers: Village midwives and environmental health officers who work at public health centers in the study area.
- e. Community leader: A policymaker in the study area.

Data were analyzed thematically to determine the educational media needs. Two coders (SR and VNLD) generated code, and all authors participated in categorizing and identifying the theme. Preliminary results were used to retrieve subsequent data. Then, data were collected and examined under the same initial stages to produce data saturation. Qualitative research is considered trustworthy if it meets the following criteria: credibility, dependability, confirmability, and transferability (10). The researchers ensure trustworthiness by asking additional questions during interviews with participants to gather detailed information utilizing WhatsApp Messenger (credibility), having members verify the information in the results, conducting peer debriefing sessions with the research team, and providing a detailed account of the research procedure (dependability). Source triangulation was achieved by cross-checking the participants' answers against the literature and other answers to ensure the research data quality (confirmability).

Results

This stage of the research aims to explore participants' needs for educational media on the impact of climate change on maternal and child health. Data collection involved 10 pregnant women, 10 mothers of toddlers, and 10 health volunteers conducted through FGDs and interviews with a village midwife, an environmental health officer from the health center, and the village head. Based on Table 1, the characteristics of participants in the first (qualitative) stage of the study were predominantly female (96.97%), with an average age of 31.5 years, mostly educated to high school level (48.48%), and primarily homemakers (81.82%).

The interviews and FGDs generated two themes (Figure 1): community perceptions of the impact of climate change on health and educational media on climate change impacts.

Public Perception of the Climate Change Impact on Health

Awareness of Environmental and Weather Changes

The community experiences changes in weather and the environment, such as rising temperatures, stronger winds, and unpredictable weather patterns.

"Sometimes the weather in the dry season suddenly becomes the rainy season, it is not determined. Sometimes the drought is very long, and as a result, there

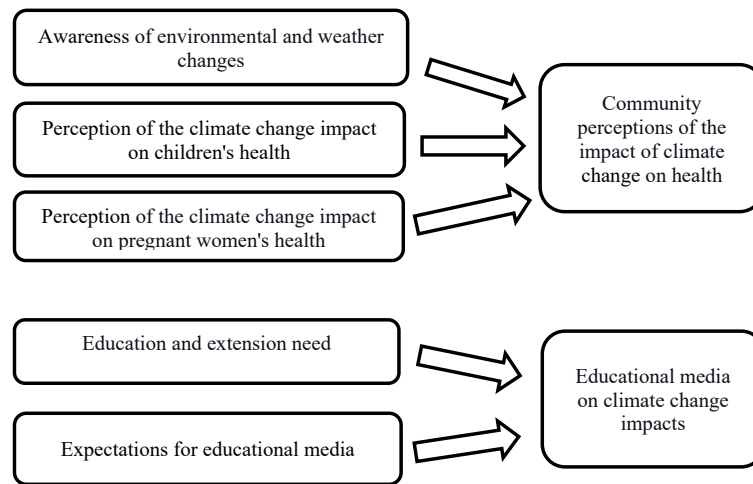


Figure 1. Participants' perceptions and needs about educational media on the impact of climate change on maternal and child health

Table 1. Characteristics of qualitative data collection participants (FGDs and interviews)

Characteristics	n (33)	%
Age	Mean = 31.5 years old	
Sex		
Male	1	3.03
Female	32	96.97
Education		
Elementary school	5	15.15
Junior high school	10	30.30
Senior high School	16	48.48
Diploma/bachelor's degree	2	6.06
Occupation		
Housewives	27	81.82
Self employed	2	6.06
Private	1	3.03
Government employees	3	9.09

Source: Primary data, 2024.

is a lack of water here.” (Environmental health officer-in-depth interview)

“The heat is stronger now; from now on, it is hot. Starting this month, the heat is different... any disease exists.” (FGD with toddler mother)

“The wind is getting bigger with the waves; it seems like another big wave.” (Toddler mother-FGD)

Perception of the Climate Change Impact on Children's Health

The impact of climate change on children's health includes conditions such as coughs, colds, malaria, and hives.

“Many are sick, especially children. The children are easily sick, with fever. Sometimes when it rains hot, there are many mosquitoes, so many people get dengue.” (Pregnant woman-FGD)

“Riski, this prickly heat grows again when the weather is hot, if it is not the rainy season.” (Toddler mother-FGD)

“In these months, since the heat is different, my child often has red bumps, not healed.” (Toddler mother-FGD)

Perception of the Climate Change Impact on Pregnant Women's Health

Weather changes have been shown to impact the health of pregnant women, including weak immunity, nausea, and fatigue.

“It is hot, it is very hot. In the body, it is like suddenly hot and cold, the immunity goes up and down.” (Pregnant woman-FGD)

“The difference is that 10 years ago, now we are tired quickly. Anyway, the change is extraordinary from 10 years ago to this year.” (Pregnant woman-FGD)

“The first child is fit, if this is really tired, what do you want to do?” (Pregnant woman-FGD)

Education Media for Climate Change Impact

Education and Extension Need

Lack of specific counseling on the impacts of climate change and the need for adequate information for the community.

“There has never been counseling from villages or health centers about the impact of climate change on maternal and child health.” (Pregnant woman-FGD)

“If possible, there is spraying every month. At that time, I had talked to the head of the health center, but there was no response.” (Pregnant woman-FGD)

“If it's health information, it's seen almost every day, but for climate change, it's never seen.” (Pregnant woman-FGD)

Expectations for Educational Media

The public's preference for the desired type of educational media includes direct information or simple formats that are easily accessible. Most mothers feel that conveying information face-to-face is easier to understand. They feel comfortable if the educational program is held in the Posyandu (integrated health post) or health center, with a discussion session.

“It's nice to get together right away. If the video is sometimes just seen, if you hear it right away.” (Toddler mother-FGD)

“Cadres immediately come to the house or deliver at the

posyandu." (Toddler mother-FGD)

"The most helpful thing is if the doctor talks directly. Don't look at Google, because sometimes it just makes you panic." (Pregnant woman-FGD)

Participants mentioned that brochures or leaflets containing concise information can help them remember the crucial points. However, some people neglect print media, highlighting the need for an attractive design.

"I once shared leaflets with them or wrapped them in chili." (Environmental health officer-in-depth interview)

Some mothers said they rarely use mobile phones to find health information because they are busy taking care of children or are not usually used to it.

"Most of all, I just look at the health of pregnant women, but if it's climate change, I've never seen it." (Pregnant woman-FGD)

"I rarely see my cellphone, let alone busy taking care of my children." (Toddler mother-FGD)

"What WhatsApp only reads, rarely watches counseling videos." (Toddler mother-FGD)

In addition to gathering data through FGDs and interviews, the researcher conducted environmental observations at the study site. Sukajaya Lempasing, located along the eastern coast adjacent to Lampung Bay, is recognized as a malaria-endemic area.

The observations illustrated in Figure 2 depict a beach environment characterized by significant neglect and pollution. Plastic, organic debris, and other waste materials litter the shoreline and ship piers. A strong odor of garbage and fish permeates the air, reflecting the unsanitary conditions. The seawater appears turbid,

indicating pollution from waste materials that heavily contaminate this area. Figure 2a highlights wet, muddy soil with patches of green vegetation partially covering the ground. Meanwhile, Figure 2b displays several fishing boats docked near the shore, contributing to the beach's dynamic but polluted atmosphere. There was no sound of fishermen working or near their boats. About 20 meters from the beach, the sound of children playing and men talking, most of whom were shirtless or wearing only underwear. They explained that the intense heat inside their homes often drove them to gather and converse in the beach pavilions instead.

Figure 3a shows that residents' houses are about 20 meters from the beach. The alley showed poor sanitation, open sewage channels filled with dirt and stagnant water, scattered garbage, and simple structures with crumbling walls and makeshift materials. A group of children sat and played at the end of the alley. The overall environment appeared quiet and calm. Figure 3b illustrates the condition of a house situated directly on the beach. The interior appeared modest, with patches of faded paint on the walls. An old fan hung on one of the walls, and ventilation seemed inadequate. Clothes and miscellaneous items were hanging or stacked in various corners, with no wardrobe in sight. The ceramic flooring was clean, although it needed minor repairs in some areas. A toddler residing in the house appeared undernourished and somewhat irritable. She was dressed only in underwear and pants, likely due to the heat and being accustomed to such clothing. The house lacked digital media for accessing information, such as a television. The surrounding area



Figure 2. Beach observations



Figure 3. Observation results in residential housing

was notably quiet, with minimal activity, despite the proximity of neighboring houses.

Based on Figure 4, the participants' communication tools are smartphones. Almost all participants have used smartphones as a means of communication and devices to access information.

Discussion

This study found two themes regarding expected media on educating the effects of climate change on maternal and child health, including community perceptions of the impact of climate change on health and educational media on climate change impacts.

Community Perceptions of the Impact of Climate Change on Health

Sukajaya Lempasing, located along the eastern coast adjacent to Lampung Bay, is recognized as a malaria-endemic area. Coastal regions are particularly vulnerable to the impacts of climate change. Soil surface damage, crop failure, water scarcity, floods, and changes in disease vectors directly contribute to the health impacts of climate change (1,2).

The coastal area experienced worsening conditions due to extreme heat, dryness, and strong winds. These factors can significantly disrupt thermoregulation in pregnant women; potentially elevated ambient temperatures can exceed the ability of maternal thermoregulatory systems to effectively release heat during pregnancy and labor. Such disruptions increase the likelihood of adverse pregnancy outcomes, highlighting the urgent need for targeted interventions to address both environmental degradation and associated health risks (7). Effective climate change education strategies involve delivering personally relevant information, utilizing interactive and engaging teaching methods, fostering in-depth discussions, collaborating with scientists, addressing misconceptions, and implementing school- or community-based projects (11).

Pregnant women, new mothers, and young children are increasingly identified as some of the most vulnerable groups to the health impacts of climate change and extreme weather events, such as heat waves, wildfires, storms, and floods (6,7,12). There is a scientific consensus that climate change is a significant factor affecting

health and may threaten global health achievements, such as reducing maternal and child mortality rates (13). However, estimating the burden of morbidity and mortality due to climate change among pregnant women, new mothers, and children remains challenging due to the lack of clear attribution in standardized data format (14).

A study in the United States that analyzed 56 million births estimated that an average of 25,000 babies per year are born prematurely due to extreme heat exposure, resulting in the loss of 150,000 gestational days each year (15). This issue not only poses risks during pregnancy but also adds to the challenges mothers face in caring for their children. Mothers of premature infants often experience heightened discomfort, including declines in mental and physical well-being, disruptions in understanding and adapting to their circumstances, and a reduced sense of peace and comfort in life. These challenges are further compounded by increased physical and psychological tension and limitations in daily life (16). Changes in sea level also affect the salinity of drinking water in coastal areas, leading to increased pre-eclampsia and eclampsia. Changes in diseases caused by vectors cause an increase in maternal morbidity, which affects the quality of pregnancy. In addition, malnutrition can occur due to disease and also crop failure (17).

Malnutrition in pregnant women is a predisposition to iron deficiency anemia, which has an impact on maternal mortality rates in Indonesia (18). In low- and middle-income countries, sociocultural factors increasingly heighten pregnant women's vulnerability to climate hazards. They are often more likely to engage in outdoor work, such as farming and ranching, or physically demanding household activities during pregnancy or shortly after childbirth (6,19,20).

Educational Media on Climate Change Impacts

The study reveals that participants expressed a preference for video-based educational media. This preference aligns with the documented advantages of video as a tool for health education. Videos offer a standardized approach to delivering information, minimizing variations in the quality of education provided by individual facilitators. Videos can also reach broader audiences through digital formats and online platforms, making them particularly effective in resource-limited settings (21). Digital health literacy is beneficial even for individuals with low literacy levels, boosting self-efficacy and enhancing overall digital health literacy, which leads to immediate interactive outcomes (22).

Additionally, videos are highly effective in improving comprehension among low-literacy populations. A previous study highlighted that video enhances attention, understanding, and recall by activating visual and auditory learning channels. This dual-channel approach allows individuals with limited literacy to grasp complex concepts through dynamic imagery and simple narration (23). Furthermore, videos facilitate behavioral change through role modeling. Tuong et al. emphasize video



Figure 4. Information media observation result

modeling uses, where expected behaviors are visually demonstrated. This technique helps viewers replicate and adopt the behaviors depicted. In the context of climate change education, videos can simulate scenarios, such as implementing health precautions, enabling participants to visualize and practice real-world applications (21).

Videos combine engaging visuals and emotional elements to make educational content memorable and impactful. The pictorial superiority effect, which enhances recall and comprehension when combining visual and auditory inputs. However, for maximum effectiveness, video content must be tailored to the cultural and literacy levels of the target audience, ensuring that the message is both relevant and comprehensible (23). In addition, this study shows that another preferred medium is print media that can be taken home, such as a leaflet. It aligns with findings from previous research, which indicated that leaflet media can significantly improve respondents' knowledge (24,25). Other studies have shown that combining written materials with images can enhance patient awareness of their medical conditions and necessary lifestyle changes while empowering patients with low literacy levels (26,27).

Finally, educational media are essential in mitigating the adverse effects of environmental and climate change by enhancing public awareness and comprehension. It is an effective tool for conveying scientific information and the impacts of climate change, enabling individuals and communities to adapt and take appropriate action. By delivering timely and relevant information, the media can assist people in accessing crucial resources such as food, water, and shelter, as well as securing employment and ensuring safety (28). This study's limitation is that it was conducted in a coastal area within the Lampung region, focusing on a single village. Future studies should encompass a broader area impacted by climate change.

Conclusion

Through a qualitative approach involving communities, policymakers, and stakeholders, this research identified an urgent need for effective educational media regarding the impact of climate change on maternal and child health. The interviews and focus group discussions (FGDs) results indicated that community understanding of health risks associated with climate change is still limited. Developing educational media is crucial for raising awareness and advancing health adaptation efforts in coastal regions. Future research should focus on developing materials based on needs assessments to ensure they align with the target audience's preferences. It should also explore the effectiveness of various educational media formats in enhancing community awareness of climate change-related risks in maternal and child health.

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Competing Interests

None.

Ethical Approval

The study was approved by the research ethics committee at the Faculty of Health, Universitas Aisyah Pringsewu, Lampung, Indonesia (ethical code: 372/UAP.OT/KEP/EC/2024).

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References

1. United States Agency for International Development (USAID). Indonesia Climate Change Country Profile [Internet]. USAID; 2022.
2. Basri HH. Percepatan Eliminasi Malaria di Indonesia: Revisi Rencana Aksi dan Menjembatani Kesenjangan [Internet]. Indonesia; WHO; 2023.
3. Sellers S, Gray C. Climate shocks constrain human fertility in Indonesia. *World Dev* 2019;117:357-69. doi:10.1016/j.worlddev.2019.02.003
4. Beltran AJ, Wu J, Laurent O. Associations of meteorology with adverse pregnancy outcomes: a systematic review of preeclampsia, preterm birth and birth weight. *Int J Environ Res Public Health* 2013;11(1):91-172. doi:10.3390/ijerph110100091
5. Zhang Y, Yu C, Wang L. Temperature exposure during pregnancy and birth outcomes: an updated systematic review of epidemiological evidence. *Environ Pollut* 2017;225:700-12. doi:10.1016/j.envpol.2017.02.066
6. Chersich MF, Pham MD, Areal A, Mosalam Haghighi M, Manyuchi A, Swift CP, et al. Associations between high temperatures in pregnancy and risk of preterm birth, low birth weight, and stillbirths: systematic review and meta-analysis. *BMJ* 2020;371:m3811. doi:10.1136/bmj.m3811
7. Chersich MF, Scorgie F, Filippi V, Luchters S. Increasing global temperatures threaten gains in maternal and newborn health in Africa: a review of impacts and an adaptation framework. *Int J Gynaecol Obstet* 2023;160(2):421-9. doi:10.1002/ijgo.14381
8. Rahayu S, Dewi VNL, Nurdiana A. Educating Vulnerable Families to Reduce the Health Constraints of Karawang Regency. [Internet]. 2024.
9. Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *Int J Qual Health Care* 2007;19(6):349-57. doi:10.1093/intqhc/mzm042
10. Connelly LM. Trustworthiness in qualitative research. *Medsurg Nurs* 2016;25(6):435-6.
11. Monroe MC, Plate RR, Oxarart A, Bowers A, Chaves WA. Identifying effective climate change education strategies: a systematic review of the research. *Environ Educ Res*

- 2019;25(6):791-812. doi:[10.1080/13504622.2017.1360842](https://doi.org/10.1080/13504622.2017.1360842)
12. Roos N, Kovats S, Hajat S, Filippi V, Chersich M, Luchters S, et al. Maternal and newborn health risks of climate change: a call for awareness and global action. *Acta Obstet Gynecol Scand* 2021;100(4):566-70. doi:[10.1111/aogs.14124](https://doi.org/10.1111/aogs.14124)
13. Watts N, Adger WN, Agnolucci P, Blackstock J, Byass P, Cai W, et al. Health and climate change: policy responses to protect public health. *Lancet* 2015;386(10006):1861-914. doi:[10.1016/s0140-6736\(15\)60854-6](https://doi.org/10.1016/s0140-6736(15)60854-6)
14. Carlson CJ, Alam MS, North MA, Onyango E, Stewart-Ibarra AM. The health burden of climate change: a call for global scientific action. *PLOS Clim* 2023;2(1):e0000126. doi:[10.1371/journal.pclm.0000126](https://doi.org/10.1371/journal.pclm.0000126)
15. Barreca A, Schaller J. The impact of high ambient temperatures on delivery timing and gestational lengths. *Nat Clim Chang* 2020;10(1):77-82. doi:[10.1038/s41558-019-0632-4](https://doi.org/10.1038/s41558-019-0632-4)
16. Arzani A, Valizadeh L, Zamanzadeh V, Mohammadi E. Mothers' experiences of caring for prematurely born infants: growth sparks in the face of caregiver burden. *J Qual Res Health Sci* 2014;3(3):217-29.
17. Smith KR, Woodward A, Campbell-Lendrum D, Chadee DD, Honda Y, Liu Q, et al. Human health: impacts, adaptation, and co-benefits. In: Field CB, Barros V, Dokken DJ, eds. *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press; 2014. p. 709-54. Available from: https://www.ipcc.ch/site/assets/uploads/2018/02/WGIIAR5-Chap11_FINAL.pdf.
18. Rahayu S. Faktor-Faktor yang Berhubungan dengan Kejadian Anemia Ibu Hamil Trimester III di Puskesmas Cikampek Kabupaten Karawang. *HSG* 2017;1(2):46-53.
19. Rylander C, Øyvind Odland J, Manning Sandanger T. Climate change and the potential effects on maternal and pregnancy outcomes: an assessment of the most vulnerable – the mother, fetus, and newborn child. *Glob Health Action* 2013;6(1):19538. doi:[10.3402/gha.v6i0.19538](https://doi.org/10.3402/gha.v6i0.19538)
20. Bonell A, Sonko B, Badjie J, Samateh T, Saidy T, Sosseh F, et al. Environmental heat stress on maternal physiology and fetal blood flow in pregnant subsistence farmers in The Gambia, west Africa: an observational cohort study. *Lancet Planet Health* 2022;6(12):e968-76. doi:[10.1016/s2542-5196\(22\)00242-x](https://doi.org/10.1016/s2542-5196(22)00242-x)
21. Tuong W, Larsen ER, Armstrong AW. Videos to influence: a systematic review of effectiveness of video-based education in modifying health behaviors. *J Behav Med* 2014;37(2):218-33. doi:[10.1007/s10865-012-9480-7](https://doi.org/10.1007/s10865-012-9480-7)
22. Mutiara VS, Pamungkasari EP, Padmawati RS, Probandari A. The experiences of virtual communities in conducting health promotion during the COVID-19 pandemic: a qualitative study in Indonesia. *J Qual Res Health Sci* 2025;14(1):1-9. doi:[10.34172/jqr.1418](https://doi.org/10.34172/jqr.1418)
23. Mbanda N, Dada S, Bastable K, Ingall GB, Ralf WS. A scoping review of the use of visual aids in health education materials for persons with low-literacy levels. *Patient Educ Couns* 2021;104(5):998-1017. doi:[10.1016/j.pec.2020.11.034](https://doi.org/10.1016/j.pec.2020.11.034)
24. Vooradi S, Acharya LD, Seshadri S, Thunga G, Vijayanarayana K. Preparation, validation and user-testing of patient information leaflets on diabetes and hypertension. *Indian J Pharm Sci* 2018;80(1):118-25. doi:[10.4172/pharmaceutical-sciences.1000336](https://doi.org/10.4172/pharmaceutical-sciences.1000336)
25. Sirimalla S, Mateti UV, Shenoy P, Shetty S. Health education for chronic kidney disease patients not on dialysis through the pictorial patient information leaflet. *J Pharm Technol* 2023;39(6):274-80. doi:[10.1177/87551225231198988](https://doi.org/10.1177/87551225231198988)
26. van Beusekom MM, Grootens-Wiegers P, Bos MJ, Guchelaar HJ, van den Broek JM. Low literacy and written drug information: information-seeking, leaflet evaluation and preferences, and roles for images. *Int J Clin Pharm* 2016;38(6):1372-9. doi:[10.1007/s11096-016-0376-4](https://doi.org/10.1007/s11096-016-0376-4)
27. Sarfaraz M, George A, Nivya S, Abdul Gaffar P. Development and evaluation of patient information leaflet usefulness in patients with hypertension in a tertiary care teaching hospital. *Manipal J Pharm Sci* 2020;6(2):79-86.
28. Ganta R, Mamatha N, Bhanupratap A, Guru B. Role of media in climate change management. *Int J Multidiscip Educ Res* 2017;6(6):5.