Development of an Animated Video to Improve Knowledge and Attitudes of Women attending Antenatal Clinics in Ibadan, Nigeria, towards Prevention and Treatment of Cleft Lip and Palate

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ABSTRACT

Objective: This study highlighted the development and validation of an animated video aimed at improving knowledge and attitude of women attending antenatal clinics in Ibadan, Nigeria towards the prevention and treatment of cleft lip and palate.

Methods: This animation video spanned 6 minutes and was developed by a team of professionals from dentistry, epidemiology, communication and language arts, and animation. The development involved desktop review on video production; development of the key messages on prevention and treatment of cleft lip and palate; script development and sketching; development and selection of characters; visual style decision; voice-over narration recording; video production; and post-video production processing. The message focused on the myths versus facts about orofacial clefts and management options. The video was created in Yoruba with English subtitles. The development processes were validated for face and content quality amongst women attending antenatal clinics, dentists, public health nurses, and community health officers through individual feedback and group discussions.

Results: Feedback from validation participants confirmed the clarity, cultural appropriateness, and relevance of the key messages. Suggestions from the validation exercise were incorporated to improve the video's accuracy, engagement, and usability.

Conclusion: This study successfully developed and validated a culturally appropriate animated educational video to address misconceptions and improve awareness about cleft lip and palate among antenatal women. The animation has the potential to serve as an effective communication tool in low-resource settings with high illiteracy levels.

Keywords: Audio-visual Aids, Cleft Lip, Cleft Palate, Health Education

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INTRODUCTION

Orofacial clefts, including cleft lip (CL) and/or palate, represent one of the most common congenital anomalies and multifaceted problems affecting individuals globally.[1] The estimated global incidence of cleft lip and palate is 1 in 700 live births.[1] The structural defects seen are due to the failure of proper fusion of facial structures during development. This condition not only affects the physical appearance of affected individuals but also affects speech, feeding, hearing, development of dentition, and psychological well-being of these individuals, as well as their families.[2] The families undergo emotional stress, guilt and bear the financial burden of the medical, surgical and other therapeutic care given to these patients.[3,4]

Studies have proven that these children and adolescents have a higher level of psychological distress than children who do not have orofacial clefts.[3,5] Children born with orofacial clefts often face feeding challenges, especially in the neonatal period, due to the inability to generate adequate pressure.[6] This leads to nutritional deficiencies and failure to thrive due to poor weight gain[7]. As they grow, speech difficulties also may arise from improper function of the palate, leading to speech issues such as hypernasality and articulation errors, which can impact communication, social interactions, and learning abilities.[8] The speech and learning delays are usually compounded by ear infections such as Otitis media with effusion.[9] Beyond feeding and speech, as previously mentioned, psychosocial consequences are long-term consequences of orofacial clefts. These psychosocial consequences range from low self-esteem to social isolation. The emotional burden goes beyond the patients to their families, who may experience guilt, anxiety, and possible financial strain in caring for the relative with orofacial cleft.[10]

The aetiology of orofacial clefts is complex and multifactorial, and involves a complex interaction between genetic and environmental components.[11] Genetic mutations such as IRF6, MSX1, and TP63 have been implicated in orofacial clefts, both syndromic and non-syndromic.[12]

Environmental influences such as maternal smoking and alcohol consumption, folic acid deficiency, certain medications, and exposure have also been identified as risk factors.[11]

Despite its complex aetiology, some preventive measures can be carried out to reduce the risk of its occurrence. For example, peri-conceptional folic acid supplementation and prenatal care can help mitigate some preventable risk factors.[13]

Given the burden associated with orofacial clefts, it is therefore important that members of society, especially those of reproductive age, are equipped with accurate knowledge and positive attitudes towards this condition to promote early diagnosis, timely interventions, and reduce stigma toward those with orofacial clefts.

Awareness can help reduce stigma and further promote timely intervention. Due to several misconceptions, especially in low- and middle-income countries, regarding the causes and management of orofacial clefts, acceptance of care may be hindered.[14] Education is known to pass accurate information, as well as possibly bringing about health-seeking behaviour in individuals. Health education has been shown to improve knowledge of risk factors and attitude to health conditions, which translates into improved skills and control of health determinants.[15] In turn, knowledge has been seen to improve attitudes and influence behaviour.[16] The right knowledge and attitude can be passed on using an effective tool. The use of print media has demerits, especially amongst people with a low literacy level.[17] Various other tools available to educate include audiovisual aids, which can enhance knowledge and attitudes.[17,18] They combine visual and auditory stimuli to enhance learning, retention, and engagement.[18]These tools are especially useful in settings where literacy levels may limit the effectiveness of printed materials or lectures, and they present information in an engaging way, thereby bridging the communication gap. Therefore, integrating animated educational videos in public health strategies could play a key role in promoting awareness of orofacial clefts and encouraging preventive practices. This paper highlights the development and validation of an animated video on improving the knowledge and attitude of women attending antenatal clinics in Ibadan, Nigeria, towards the prevention and treatment of cleft lip and palate.

MATERIALS AND METHODS

The design of this study is that of a developmental and validation design. It involved research,

development and used community based participatory approaches. The process involved three main steps- development, validation and pretesting of the animation video.

Ethical consideration

Ethical approval for the study was obtained by the Joint University of Ibadan/University College Hospital Ethics Review Committee (approval number: [NHREC/05/01/2008a]). Written informed consent was obtained from all participants prior to their involvement in the validation and pretesting phases. Confidentiality and anonymity were ensured throughout the study process.

This research took place between January 2024 and August 2024, from pre-video research to pretest of the video.

Development, validation and pretest of the animation video

Background

The animated video named Cleft Awareness, Antenatal Education, Risk Understanding and Empowered Attitude (CARE) is a 6-minute 20-second video. It was developed in Yoruba and then translated into English. The video was developed with the aim of providing an alternative form of oral health education on the prevention and treatment of cleft lip and palate among women who attend antenatal clinics. The video development process utilized a hybrid approach, combining the Research and Development (R&D) model[19] with Community-Based Participatory Research (CBPR) principles.[20] The Research and Development (R&D) model for educational products involves a structured process that begins with researching the health needs of a specific population, followed by the systematic development of innovative educational products, processes of technologies, and culminates in practical implementation and production.[19]

The process of developing and producing the animated video is based on the steps used in developing an oral health video for training of adolescents and teachers in Ibadan, Nigeria on adequate oral health behaviour.[21] These steps include: Pre-video researching, development of the fact content of the video, development and sketching of the script, animation production: character creation, design, and selection, visual style decision, voice-over narration, animated video production, and validation of the video.

Pre-Video Researching

Prior to the production of the animation video, relevant scientific papers were reviewed[22,23], which revealed a gap in knowledge of cleft lip and palate among antenatal clinic attendees in Nigeria. These studies recommended health education to increase knowledge and develop positive attitudes towards orofacial clefts.

This formed the basis for the message for the animation video developed by the research team. As prior studies often inform and shape subsequent ones[24], creating the message of the animation video based on the recommendation from a previous study[22] is an advisable approach.

Development of the fact content of the video

The 6-minute 20-second video was developed by a team of specialists from the field of dentistry, epidemiology, communication and language arts as well as animation experts. The video was adapted from a script developed in collaboration with a professional scriptwriter, based on information obtained from a review of multiple studies on cleft lip and palate.[5, 10, 11, 25] The setting of the video is a hospital: the reception area and consulting room. The video contained evidence-based information and addressed the following areas: overview of orofacial clefts, myths vs facts about orofacial clefts, the modifiable risk factors of orofacial clefts and other congenital anomalies, and management approaches available for orofacial clefts.

Development and sketching of the script

The themes and central ideas on orofacial cleft were derived from the widespread misconceptions and stigma surrounding the condition, often connected to superstitions such as witchcraft in low-literacy communities. These beliefs contributed to delayed care and poor health-seeking behavior among affected families. To address this gap, the central idea was developed, to create and validate a culturally appropriate animated video in Yoruba as an accessible tool to improve the knowledge, correct the myths, and promote positive attitudes during antenatal education. It was obtained from[22,23] and sent to the communication and language arts expert, and professional script writer, who made it into a script. The script was then reviewed by the team of specialists as stated above, for fact checking, comments, and critique.

The first scene shows a child with a large defect on his upper lip with his mother on a chair at the reception. Two women were seen chatting about the defect on the lip of the child. Another woman (Daniel's mother) is seated close to these two women. The two women discussed the possible causes of cleft lip, with each of them responding with statements like "it's caused by God's wrath", "the mother of the child may be a witch", and "it's a bad omen for the child". Also, they said "the position of the moon could have caused it", and

that "some believed that such a child could ruin households".

The second scene opened with Daniel and his mother being called into the consulting room by hospital staff. The doctor asked them to take their seats and then asked how Daniel is doing. Daniel replied that he's fine. The doctor then asked why Daniel was looking disturbed and frightened. Daniel responded that he saw a child with a big defect on his upper lip. Daniel's mother interrupted, explaining that some women who sat outside the consulting room said the child's mother was a witch, and that children like that could ruin households. In addition, the child needs prayers. The doctor then educated them about the child's condition. The doctor mentioned that it is an orofacial cleft or cleft lip and palate**,** he explained the risk factors, psychosocial effects, and the myths surrounding it. He also discussed prevention and management options.

The third scene featured Daniel's mother returning to the reception area, where she addressed the two women who had earlier gossiped about the child. She corrected their misconceptions and educated them about orofacial cleft.

Animation Production: Character creation, design, and selection

To ensure the educational content was engaging and accessible, the animation process began with the creation of both human and animated characters that aligned with the project's script. A panel of experts independently reviewed the initial designs and selected the animated characters for their ability to effectively convey information through visual storytelling.

The animator developed several character variations, which were thoroughly vetted by independent reviewers for educational clarity, cultural relevance, and audience engagement. These were presented to the research team, who approved the final character set after collaborative discussions centred on the learning outcomes and viewer comprehension.

Visual style decision

A comprehensive visual style was then developed using Cinema 4D and Unreal Engine, incorporating key educational design elements such as age-appropriate illustrations, contextual environments, clear typography for motion graphics, and colour schemes that support visual learning. The initial visual framework was reviewed by the project team and revised based on feedback to maximize clarity and instructional value.

Voice-over narration

To reinforce learning through audiovisual synchronization, voice actors were carefully selected and tested by the communication expert and animation artist. Multilingual rehearsals were conducted under the guidance of the media team, ensuring inclusivity and understanding across diverse audiences. Facial motion capture rehearsals using Unreal Engine Live Link and iClone 8 Live Face enhanced the realism and emotional expression of the animated characters, increasing viewer engagement.

Final voice recordings were professionally produced and edited using industry-standard audio tools to ensure clarity and retention. These recordings were then synchronized with the animations through precise lip-syncing and rigging, allowing characters to effectively "teach" and communicate with viewers in a relatable and compelling way.

Animated video production

The final video integrated all elements—animation, narration, motion graphics, and sound—into a unified educational tool. This was reviewed by media and research teams to ensure alignment with pedagogical goals and audience needs. After incorporating the final corrections - better translation of English language to Yoruba, ensuring the characters were dressed in a culturally acceptable manner, and ensuring the setting was more appropriate, the project delivered a high-quality educational video designed to promote awareness, foster understanding, and support learning in the target community.

This process reflects a strong commitment to creating impactful educational media that not only informs but also inspires action and sustained learning.

Validation of the Video

The initial version of the animated video was shared with reviewers to assess its face, construct, and content validity. Face validity included clarity, cultural acceptability, and ease of understanding; while content validity was to ensure accuracy and relevance of the information presented; and construct validity was to assess if the video captured knowledge and attitude about cleft in the intended way. Purposive sampling was used to ensure stakeholders were well represented. The reviewers included: public health dentists, paediatric dentists, general dentists, public health nurses, community health officers, women attending antenatal clinics, and an animator. The reviewers were asked open-ended questions on areas in the video that they felt needed to be corrected to appropriately convey the information.

Examples of these questions include: "*Which parts of the video were unclear or could misrepresent information about orofacial clefts?"*, "*How effectively does the video convey the causes and prevention of cleft lip and palate?"*, and "*What modifications would make the visuals, narration, or language more engaging and culturally appropriate for the target audience?*

Comments from the reviewers were incorporated as necessary into the characters that were created for the animation video. These were communicated independently to the team via WhatsApp messaging.

Comments were documented, summarized and informed revisions made to the video. Corrected versions were repeatedly corrected until a consensus was reached.

Pre-Test of The Animation Video

The aim of the pretest was to evaluate the clarity and acceptability of the content of the animation video, and to test the questionnaire. The animation video was pretested amongst five pregnant women at a primary healthcare centre in Ibadan North West, Oyo state.

Five women were purposively selected during one of the antenatal clinic days, after providing informed consent.

They completed a structured interviewer administered questionnaire in Yoruba and English languages that captured sociodemographic characteristics, knowledge of orofacial clefts and attitudes towards the condition. The questionnaire included both close ended and likert- scale items.

RESULTS

Validation

A total of five reviewers took part in the validation of the animation video. Comments received from the reviewers were about the characters, and video. One of the reviewers commented on the dressing of the characters in the video: "the characters should be locally dressed"

Another comment was on the sex of the character; "the female doctor can be changed to a male, considering that most of the other characters were female".

Another stated: "The doctor should wear a tie and put a stethoscope around his neck to depict a doctor. and some words were still in English, e.g. 'tobacco' and 'Orofacial clefts', instead of translating them into Yoruba".

One of the reviewers said: "Beautiful one, I must say. However, the child's cleft is not clearly shown, there are a lot of medical terms, and it will be good to add pictures of post-orofacial cleft" were the words of another independent reviewer.

Additionally, another reviewer added that- the role of genetics in the development of cleft was not captured, there is a need for better Yoruba translation.

Another said the picture of the cleft should be clearer and that more images could be added. It was also emphasized that it was well-presented, insightful, and of great value for education purposes

After incorporating final suggestions as the project team deemed fit, the animation team delivered a high-quality educational video designed to promote awareness, foster understanding, and support learning in the target community.

Pretest

The mean age of the respondents during the pretest was 24.2±7.4 years (Range: 19-37 years). All participants were married, were all traders, all of them practiced Islamic religion, and all had completed secondary school education. Of all the pregnant women, only one was primigravida

During the pretest, it was discovered that pictures needed to be added to give a better understanding of what was being discussed. Also, the need to further convert some words into a more comprehensible Yoruba language was identified. These suggestions were then incorporated into the final animation video.

DISCUSSION

This study describes the development, validation, and pretesting of a culturally appropriate animated video aimed at improving knowledge and attitudes toward cleft lip and palate among women attending antenatal clinics in Ibadan, Nigeria. The final product was judged by both participants and professionals to be accurate, culturally sensitive, and suitable for use in health education among the antenatal population.

Findings from reviews received highlight the importance of culturally acceptable health communication tools, such as the animated video in this case. Consistent with previous reports, most participants indicated that visual depictions and the use of local language improved comprehension and relatability[15–18,20]. The use of Yoruba narration with English subtitles ensured accessibility, and wider coverage. Earlier studies on cleft awareness interventions in Nigeria and other low- and middle-income countries have also emphasized that educational tools tailored to local beliefs and practices are more effective in dispelling myths and misconceptions[22,23], than a generalized educational tool.

Table 1: Result of pretest

Aspect Assessed	Feedback from Pregnant women	Revisions Made
Clarity of terms	Some medical/Yoruba terms are still difficult to understand	Simplified expressions and added short explanatory phrases
Visuals of cleft anomalies	Needed more explicit images of cleft lip and palate before/after repair	Inserted additional still images and clearer illustrations
Subtitle synchronization	Subtitles lagged behind narration in some sections	Adjusted timing of subtitles to match narration
Cultural relatability	Liked use of Yoruba language and characters in local attire	Retained local language and cultural setting
Overall acceptability	Found video engaging, easy to follow, and useful for antenatal Education	No change required

The validation process demonstrated that engagement of professionals in relevant fields was essential to refining the video till the final output. Input from health workers and antenatal clinic attendees helped to ensure accuracy in language translation, cultural appropriateness, and the clarity of the medical information being passed across. This aligns with recommendations from community-based participatory research approaches, which emphasize the value of involving end users in the development of health interventions.[20]

Pretesting confirmed the acceptability and perceived effectiveness of the tool amongst a similar population in another locality. Similar to findings from multimedia health education studies, participants reported that animation was engaging and easy to follow.[17,18,21] Importantly, the video addressed common misconceptions, such as superstitious causes of orofacial clefts, which are known to contribute to stigma and delayed seeking of treatment seen in Nigeria and other low- and middle-income countries.[22,23]

A key strength of this study is the integration of expertise across dentistry, public health, and communication, ensuring both scientific accuracy and effective message delivery. Another strength is the repeated feedback process, which enhanced the credibility and acceptability of the final product. However, this study also has limitations. The validation and pretesting were conducted among a small group of participants in a single geographic area, which may limit generalizability.

This study demonstrates that culturally adapted animated videos can serve as effective educational tools for antenatal health promotion. Wider implementation and evaluation of the tool across diverse settings in Nigeria and other low-resource communities are recommended. Such approaches may contribute to improved awareness, reduced stigma, and earlier treatment-seeking for children born with orofacial clefts.

CONCLUSION

This paper described the development of an animated video to help improve the knowledge and attitude of women attending antenatal clinics in Ibadan, Nigeria, towards cleft lip and palate. The video was carefully designed to be culturally appropriate, visually engaging, and easy to understand. It addresses common misconceptions, risk factors, prevention, and treatment of orofacial clefts.

Feedback from reviewers showed that the video was engaging, informative, and useful for learning and sharing with others. This positive response

highlights the animation video's potential as an effective tool for maternal health education. Health authorities and antenatal care providers are encouraged to consider integrating the video into routine antenatal services, as it can improve knowledge, encourage early presentation, and reduce stigma associated with cleft lip and palate.

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