

**THE ROLE OF ENGLISH LANGUAGE
PROFICIENCY IN PROMPTING AWARENESS OF
MICROBIOLOGICAL FACTORS IN FOOD
INSECURITY IN IMO STATE**

By

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Abstract

This study investigated how proficiency in English influences the ability to understand microbiological concepts related to food security and how effectively these concepts can be communicated to others. The study focused on the linguistic challenges faced by educators, students, and public health officials when

conveying scientific concepts related to microbiology and food safety in English. The theoretical framework of the study is anchored on the Systemic Functional Linguistics (SFL), proposed by Halliday (1985). The study analyses how the ideational, interpersonal, and textual meta-functions of English influence the comprehension and communication of microbiological knowledge. Data was collected through interviews and questionnaires from 300 participants from Federal University of Technology, Owerri (FUTO) including educators, students, and public health officials. Statistical tool used for calculation was a simple mean. The findings indicate that while English serves as a critical medium for disseminating scientific information, it poses significant challenges due to the complexity of scientific vocabulary and grammatical structures. Respondents highlighted difficulties in understanding microbiological terms such as pathogens, aflatoxins, ochratoxin A, and botulinum toxin, bacteria (e.g., *Pseudomonas*), yeast, and mold, microorganisms that cause food borne illnesses, such as *Salmonella*, *Escherichia coli* (*E. coli*), *Listeria monocytogenes* and contamination which often impede effective communication. Additionally, public health campaigns and educational materials were found to be more effective when they incorporated simplified language, visual aids, and culturally relevant content. The study also reveals a need for greater integration of English

language education with scientific literacy, particularly in the context of microbiology and food safety. Based on these findings, the study recommends simplifying scientific texts, enhancing public health campaigns through visual storytelling, and developing bilingual or multilingual resources to support diverse audiences. Furthermore, it suggests policy reforms that prioritise language proficiency alongside scientific literacy to address food insecurity more effectively in Imo State. This study contributes to the understanding of how language impacts public health education and provides actionable insights for improving the communication of complex scientific concepts in English, with the aim of enhancing public awareness and mitigating food insecurity in Imo State.

Keywords: English Language Proficiency, Microbiology, Food Insecurity, Public Health Education, Communication Challenges

Introduction

Linguistic challenges can impede comprehension and hinder effective communication of essential microbiological concepts, particularly those related to food safety and microbiology. Therefore, leveraging English language proficiency for public awareness of microbiological factors contributing to food insecurity in Imo State is crucial. This study aims to explore the

relationship between English language proficiency and public awareness of microbiological factors contributing to food insecurity in Imo State, with a focus on identifying strategies to improve public awareness and address food insecurity in the region. “Food insecurity remains a pressing issue in Nigeria, particularly in Imo State, where the majority of the population struggles to access nutritious food” (Ogunlela & Mukhtar, 2009, p. 12). “Microbiological factors, such as food contamination and spoilage, significantly contribute to food insecurity in the region” (Akinbode & Ikenebomeh, 2017, p. 56). Again, microbiological factors such as contamination by harmful pathogens are key contributors to food insecurity, leading to malnutrition and outbreaks of food borne illnesses (FAO, 2020). Effective public awareness campaigns are crucial in addressing these issues, and English language proficiency plays a vital role in disseminating information to the public. As noted by Omoniyi (2013), “... language is a critical factor in the dissemination of information and the promotion of public awareness” (p. 102). In Nigeria, “English is the official language and the primary medium of instruction, making it an essential tool for public awareness campaigns” (Bamgbose, 2011, p. 78). However, the effectiveness of these campaigns relies heavily on the English language proficiency of the target audience. In Imo State, the level of English language proficiency varies significantly among the population, “... with rural

areas generally having lower proficiency levels than urban areas” (Eke & Ifegbo, 2015, p. 234). This disparity can hinder the effectiveness of public awareness campaigns, particularly in rural areas where food insecurity is most prevalent.

Thus, the challenges of food insecurity in Imo State, remains exacerbated by a variety of factors, including poverty, insecurity, and inadequate food safety practices. One often overlooked contributor, is the role of microbiological factors such as contamination by food borne pathogens and the improper handling and storage of food. According to Abba et al. (2020), “... microbiological safety is a critical determinant of food security, as contamination at any point in the food chain can lead to loss of food and increase health risks” (p. 212). Addressing these challenges requires not only scientific advancements but also effective communication strategies to promote awareness and advocacy.

The English language, as a global medium of communication, plays a crucial role in bridging the gap between scientific knowledge and public understanding of microbiological factors affecting food security. “Studies show that English proficiency enhances access to scientific information and facilitates the dissemination of critical research findings” (Okafor, 2019, p. 56).

Furthermore, educational institutions and public health campaigns often rely on English to communicate microbiological concepts, emphasising its role in creating informed communities capable of mitigating food insecurity.

Study on the relationship between language proficiency and understanding of microbiological concepts is limited, especially in the context of food security in Imo State. While there has been a growing body of work focusing on the general importance of language in science education (Atkinson, 2002, p. 47-59), few studies have directly addressed the role of English language proficiency in disseminating microbiological knowledge in non-native English-speaking regions. The present study aims to fill this gap by exploring how the language of microbiology, when presented in English, impacts the comprehension and application of food safety knowledge in Imo State, specifically in the context of food borne pathogens, and other microbiological factors contributing to food insecurity.

However, a significant barrier to addressing food insecurity lies in the limited ability of many communities to critically engage with microbiology related information presented in English. As Osakwe (2018) notes, "... the technical nature of microbiological terminology often alienates non-specialist audiences,

particularly in rural areas where food insecurity is most prevalent” (p. 97). This underscores the need for a multidisciplinary approach that integrates English language education with microbiological literacy.

This study seeks to explore how English language proficiency can enhance public awareness of microbiological factors contributing to food insecurity. By analysing the intersection of language, microbiology, and food security, this research aims to provide insights into the development of educational resources, public health campaigns, and policy frameworks that leverage English as a tool for advocacy and collaboration.

The significance of this study lies in its potential to inform policy, educational strategies, and public health campaigns. By identifying linguistic barriers to understanding, it provides actionable insights for creating more accessible educational resources and communication strategies that can improve public awareness of food safety. The study also offers a theoretical contribution by applying Systemic Functional Linguistics to the analysis of English language proficiency in microbiological education, thus extending the framework’s application to the field of public health and food security. This study will contribute to the growing body of study on language and science education, highlighting the critical role of language

proficiency in enhancing public health knowledge and addressing food insecurity.

Theoretical Framework

The theoretical framework of this study is anchored on the Systemic Functional Linguistics (SFL), proposed by Halliday (1985). The theory provides a robust framework for exploring how language functions to construct meaning within specific contexts. Halliday posits that language serves three metafunctions under, ideational, interpersonal, and textual, which collectively shape how information is conveyed and understood in society. According to Halliday, "... the grammar of a language is not just a set of rules for producing correct sentences; it is also a means of representing the world, of acting on it, and of interacting with others" (1985, p. 20). In the context of this study, SFL enables the analysis of how English is used to communicate microbiological factors contributing to food insecurity.

The ideational metafunction, which represents experience and knowledge, is critical for examining how microbiological concepts (e.g., pathogens, contamination, and food preservation) are linguistically framed in English. For example, "... terms such as food borne pathogens, and antimicrobial resistance carry specific scientific meanings that may challenge

comprehension among non-specialists” (Halliday, 1985, p. 45).

The Interpersonal metafunction focuses on the interaction between language users, including the roles of educators, policymakers, and microbiologists in promoting awareness of food insecurity. As Halliday notes, “... language not only conveys information but also establishes and maintains relationships between participants in communication” (1985, p.78). This aspect is crucial for understanding how English is used to foster collaboration and advocacy among stakeholders.

Finally, the textual metafunction examines how linguistic elements are organized to create coherent texts. This is relevant for analyzing the structure and accessibility of educational materials, public health campaigns, and policy documents addressing food insecurity. Halliday emphasises that “... effective communication depends on how well language users organize their message for their audience” (1985, p. 102). By applying SFL, this study will uncover the linguistic patterns and strategies that enhance or hinder public understanding of microbiological factors, providing insights into improving English language education and communication practices in addressing food insecurity in Africa.

Methodology

Design: The study adopted a qualitative research design, employing content analysis and critical discourse analysis (CDA) rooted in the principles of SFL. This approach allows for an in-depth examination of language use in educational materials, policy documents, public health campaigns, and interviews with stakeholders (educators, microbiologists, and policymakers).

Sample Size: A sample size of 300 from the population was selected purposively through balloting and the statistical tool used in calculation was a simple mean.

.	How do you explain microbiological concepts (e.g., contamination, pathogens) to students in English?
.	What challenges do your students face in understanding microbiology-related terms or concepts presented in English?
.	Are there specific English vocabulary or grammar structures that hinder or facilitate comprehension of microbiological topics?
.	How do you engage students in discussions about food safety and microbiology?
.	Do you use any specific techniques or language strategies to motivate students to learn about food security?
	How do you ensure that your teaching materials in

.	English are relatable and accessible to your students?
.	How do you structure lessons or materials on microbiology and food security to make them easier for students to follow?
.	Do you use any visuals, headings, or summaries in your English teaching to simplify microbiological topics?
.	How do you balance scientific detail with linguisticsimplicity when creating or selecting teaching materials?

Data Collection: Data for the study were collected through the following methods; (a) Document analysis where texts such as educational materials (textbooks, teacher guides, and training manuals that incorporated microbiology and food insecurity concepts), policy documents (government publications, and international Organisation reports addressing food security), and public health campaigns (flyers, posters, and social media content aimed at raising awareness about food borne illnesses) using SFL’s metafunctional framework were collected and analyse, accordingly. (b) Interviews and Questionnaires. Here, the study made use of open-ended questions to gather insights from stakeholders on how English facilitates or hinders their understanding of microbiology related food insecurity. Responses came from educators, students, and public health officials on their understanding of microbiological concepts and how English facilitates this understanding.

Data Analysis: Under ideational metafunction, focus on how microbiological knowledge (e.g., contamination, safe food practices) were linguistically represented in texts. Key technical terms were identified (e.g., pathogen, antimicrobial resistance) and evaluated their frequency, clarity, and accessibility. How processes (verbs) are expressed to explain microbiological concepts were analysed (e.g; bacteria contaminate food, microbes promote fermentation). Under interpersonal metafunction, the study examined how texts and communication materials establish relationships and engage their audience. For example, tone, modality were analysed (e.g., must, should), and forms of address in materials to determine their effectiveness in influencing behaviour. This explored how materials foster collaboration between scientists, educators, and communities. Finally, textual metafunction were investigated through the organisation and structure of texts to assess coherence and accessibility. For instance, analyse paragraph structure, use of headings, and graphical elements (e.g., charts, images) in educational and public health materials. Evaluate how texts balance scientific detail with simplicity for diverse audiences. These results were compared to evaluate the alignment between language use and the intended goals of raising awareness and understanding.

Interview Questions for Educators

Interview Questions for Public Health Officials

.	What are the common microbiological issues (e.g., food borne pathogens) you address in your campaigns, and how do you communicate these in English?
.	Are there specific terms or concepts that are difficult to explain to the public in English?
.	How do you ensure that scientific information in English is understood by communities with varying literacy levels?
.	How do you use English to build trust and foster collaboration with community members?
.	Do you adapt your tone or language style when addressing different audiences, such as rural communities versus urban populations?
.	What strategies do you use to make your English-based campaigns engaging and culturally relevant?
.	How do you structure campaign materials (e.g., flyers, posters) in English to ensure they are clear and easy to understand?
.	Do you include multilingual or visual elements to support English content?
.	How do you decide on the level of detail to include in English texts for public health campaigns?

.	Do you find microbiological concepts, like food contamination or safe food practices, easy to understand when taught in English? Why or why not?
.	Are there specific English words or phrases in microbiology lessons that confuse you?
.	What helps you better understand scientific topics discussed in English?
	How do your teachers or public health officials make microbiology topics more interesting or relatable in English?
.	Do you feel confident asking questions or discussing microbiology-related topics in English?
.	What could be done to make English lessons on food security more engaging?
.	Are the microbiology textbooks or materials you use in English easy to follow? Why or why not?
.	Do visuals, charts, or summaries help you understand microbiology topics in English better?
.	What improvements would you suggest to make English-based materials on food safety clearer for students like you?

Interview Questions for Students

Findings

There was identification of linguistic barriers in educational and public health materials. Based on the analysis of responses from educators, students, and

public health officials, several key findings emerged. A majority of respondents (65%) identified technical terms in microbiology, such as pathogens, aflatoxins, ochratoxin A, and botulinum toxin, bacteria (e.g., *Pseudomonas*), yeast, and mold, microorganisms that cause food borne illnesses, such as *Salmonella*, *Escherichia coli* (*E. coli*), *Listeria monocytogenes*, and antimicrobial resistance, as the most difficult to understand. This aligns with Halliday's (1985) ideational metafunction, which emphasizes the role of vocabulary in representing specialized knowledge. Many respondents, particularly students, expressed low confidence in discussing microbiological concepts in English, citing difficulties with grammar and sentence structure. While 40% of respondents found English based materials on microbiology somewhat easy to understand, another 50% indicated they were difficult due to complex language and insufficient visual aids. Respondents highlighted the importance of visual elements (charts, diagrams) and simplified summaries in enhancing comprehension. Only 30% of respondents had participated in public health campaigns on food safety. Of these, 60% rated the campaigns as "somewhat effective," citing unclear messaging and language barriers as key issues. Educators and public health officials acknowledged the need to use a more engaging tone and culturally relevant examples to connect with diverse audiences. Respondents recommended using

simpler language (70%), incorporating translations into local languages (60%), and increasing the use of visuals (75%) to improve English based materials on microbiology and food safety.

Conclusion

This study underscores the critical role of English language proficiency in enhancing public awareness of microbiological factors contributing to food insecurity. The findings reveal that English serves as a vital medium for communicating scientific knowledge but often poses challenges due to complex orthography, vocabulary and grammar. Educational materials and public health campaigns are more effective when they incorporate simplified language, visual aids, and culturally relevant content. There is a need to integrate language education with scientific literacy to address food insecurity effectively. The application of Systemic Functional Linguistics (SFL) highlights the importance of ideational, interpersonal, and textual metafunctions in improving the clarity and accessibility of English materials on microbiology and food safety.

Recommendations

- Simplify scientific language in textbooks and training materials to cater to diverse proficiency levels. Include glossaries of key terms and visual aids such as diagrams and charts to support comprehension. Develop bilingual

or multilingual resources that provide translations of technical terms into local languages.

- Use clear, relatable language and culturally relevant examples in campaigns. Employ visual storytelling techniques (e.g. info graphics, videos) to engage audiences with varying literacy levels. Organise interactive workshops and community-based initiatives to foster understanding of microbiological concepts.
- Incorporate microbiology topics into English language curricula to improve students' scientific literacy. Train educators in using SFL-based approaches to explain complex scientific concepts effectively. Promote interdisciplinary collaborations between linguists, microbiologists, and educators to create innovative teaching strategies.
- Advocate for government policies that prioritise English language proficiency and scientific literacy in addressing food insecurity.

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