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Factoring Food Security: A Q Methodology Study with Ghanaian Educators

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Abstract

Food security remains a pressing issue across sub-Saharan Africa, including Ghana. In response, education reform is essential for the country's progress. This study unveils the perspectives of Ghanaian educators, recognizing their vital role in shaping the development, mindset, and actions of Ghanaian youth and contributing to SDGs 4 and 2, Quality Education and Zero Hunger. We employed Q methodology with the research aim of discovering the priorities and viewpoints of teachers regarding food insecurity. A sample of 31 Ghanaian educators, who previously or currently engaged with youth agricultural programming, participated in the Q-sort, sorting statements related to food insecurity. The analysis yielded four factor groups: *Quality Over Quantity, Waste Not, Sustainable Sisters,* and *Futurists*, each representing unique perspectives on addressing food security challenges. The findings affirm the importance of aligning education strategies with educators' perspectives. We recommend tailored professional development opportunities to enhance awareness and effectiveness in addressing food insecurity issues. The study calls for further exploration of educator groups in Ghana, and the region, including qualitative investigations to inform targeted interventions and support the holistic development of youth engagement in addressing food security in Ghana.

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Introduction and Problem Statement

Food insecurity is identified as “limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain ability to acquire food in socially acceptable ways” (Hamilton et al., 1997, p. 50) remains an issue both globally and locally (Asare-Nuamah et al., 2023). Despite relentless global growth in economic, technological, and cultural factors (Asia Society, 2018), 795 million people worldwide are unsure of where their next meal is coming from (FAO, IFAD, & WFP, 2015). In sub-Saharan Africa, the United Nations’ Food and Agriculture Organization reported the population of undernourished people and people experiencing food insecurity has increased, even more so in West Africa, with Ghana grappling with its own share of these issues (FAO, IFAD, UNICEF, WFP & WHO, 2024; Mohammed, 2021).

For Ghana’s economy to move forward and prosper, education reform needs to occur (Iddrisu, 2018; Mensah-Aggrey et al., 2022; Osei, 2006). To effectively mitigate food insecurity globally, it is necessary to promote productive practices and develop a workforce equipped with the skills needed to address local, national, and global food security challenges (FAO, IFAD, & WFP, 2015). Holistic education reform of any kind involves understanding relevant issues and educator beliefs towards those issues (Newcomb et al., 2004). Student motivation can be leveraged through authenticity of those beliefs (Mendes, 2003; Schraw & Olafson, 2015). For education to drive such motivation and change, it is critical to understand educator beliefs and priorities as their perspectives shape the development and mindset of their students who will inevitably inherit these challenges. Yet, the problem remains that despite the local need for students equipped to tackle challenges like food insecurity, many secondary educators struggle to integrate global competencies into their curricula (Diano et al., 2023; Tudball, 2005). Therefore, the study team assessed teachers’ perspectives on food insecurity issues to better understand the population that is directly engaged with the Ghanaian youth who have the potential to improve the economic and food insecurity status of the country.

Conceptual Framework

Researchers anchored this study’s conceptual foundations from the concourse—a structured set of statements that encapsulate facets of an idea or issue (Watts & Stenner, 2012). Within Q Methodology, the concourse is central to the study as it frames participant engagement and guides viewpoint prioritization on the issue: food insecurity. This study adopts the Spence et al. (2023) concourse as a conceptual framework for capturing viewpoints and perspectives of food insecurity. Although Spence et al. (2023) characterized viewpoints of food insecurity with educators primarily in the U.S., the concourse draws upon global literature, the Feed the Future Learning Agenda, Global Hunger and Food Security Initiative, UN Goals for Sustainable, USAID Global Food Security Research Agenda, and was reviewed by international food security.

Given the concourse’s expansive global lens and its foundation within universally applicable principles of food insecurity, it was appropriate to apply within a Ghanian context. This framework allowed for the exploration of Ghanaian educator perspectives while also maintaining connections to global and local food security challenges.

Purpose and Objectives

The purpose of the study was to explain Ghanaian teacher's viewpoints in global food security issues by understanding their priorities via Q methodology. The research objectives included:

1. Analyze Ghanaian educator perspectives on food security, and;
2. Evaluate the alignment of educator priorities with global competency dimensions.

Methods

Texas A&M University's Institutional Review Board approved this research (#129757). Researchers collected and analyzed this data in the spring of 2022. We employed Q-method design to (Watts & Stenner, 2012) characterize educator priorities within food security. Q-method uses operant subjectivity to characterize viewpoints, perceptions, and opinions developed from individuals' personal experiences (Brown, 1996; Leggette & Redwine, 2016; Parrella et al., 2021; Watts, 2011). Therefore, Q method is an appropriate tool to characterize experiences and perceptions shaping teachers' views about food security issues in Ghana.

The Concourse and Q-Set

The concourse is a set of ideas that are sorted on the Q-sort board. The Q-set is a subset of the concourse and consists of statements that are sorted by the participants (Watts & Stenner, 2012). Statements are identified by condensing material from the concourse. This resulted in 36 items represented as the Q-Set related to the intersection of global learning, food security, and education, as shown in Table 1 (Spence et al., 2023).

Table 1

Q-Set Items

No.	Statement
1	Access to nutritious
2	More hygienic household and communality environments
3	Direct nutrition specific interventions and
4	Relationships between policy systems and food
5	Identifying the determinants of
6	Identifying the determinants of stunting
7	Using sound ag water management tech and practices
8	Stakeholder incentives, constraints, capacity, preference
9	Reducing reliance upon emergency food assistance
10	Effective approaches to measuring nutritional gains
11	Improved resilience of vulnerable populations
12	Improved nutrition and dietary quality
13	Improved research and development
14	Improved agricultural productivity
15	Collaboration between water users in a community
16	Food systems being sustainable
17	Zero loss of waste of food
18	Zero children being stunted under the age of two
19	Sustainably increasing agricultural production
20	Access to safe food
21	Improved gender integration and women’s empowerment
22	Increasing scarcity of viable farmland
23	Inadequate intakes of micronutrients by mothers and inf
24	Ending rural poverty
25	Empowering small farmers
26	Increase in smallholder productivity and income
27	Promoting natural resource conservation
28	Implementation of drought resistant crops in arid area
29	Improved irrigation systems and water storage technology
30	Restoration of degraded farmlands
31	Invest in long term research for food security innovation
32	Promotion of diet diversification
33	Education of populations about global food security
34	Adding post-harvest value to agricultural products
35	Increasing genetic yield of crops fish and livestock
36	Reduce and manage impacts of abiotic and biotic stress

The P-Set

The P-set are participants in a Q-method study (Watts & Stenner, 2012). We used a convenience sample to select Ghanaian teachers involved with 4-H Ghana due to their existing involvement in direct food security related programs within 4-H. The participants consisted of college degree holding Ghanaian teachers (*n* = 31; 18 male and 13 female) ranging in age from 22 to 45 in the Eastern and Central regions of Ghana. They teach from primary-secondary students, and one or more subjects including: English, Ghanaian Language, science, mathematics, and arts. Due to their involvement in 4H–an after-school program for youth based on agricultural education–the P-set had an interest in agriculture, and agricultural education.

In the Q-study, the primary form of data collection is the Q-sort, in which participants (the P-set) sort items (the Q-set) to articulate their preferences within the P-set (Leggette & Redwine, 2016). Therefore, the participants in this study sorted the Q-set statements from least important to most important, to them, on a board (Leggette & Redwine, 2016). We then analyzed the data using PQ Method software to determine emerging, statistically significant factor groups that determine personas defining groups of thought amongst the participants. In order to do this, we used varimax factor rotation to apply a non-orthogonal rotation to highlight similarities and differences between viewpoints (Watts & Stenner, 2012). Each factor represented a distinct viewpoint, and by analyzing how individuals sorted the Q set, we identified the best fit for each viewpoint. Z scores determined statistically significant items, or distinguishing statements (Watts & Stenner, 2012). Distinguishing statements are statements that participants within the factor group ranked significantly differently compared to others (Watts & Stenner, 2012). Therefore, the statement reflects a unique or defining viewpoint for a specific group within the study, highlighting the divergence in perspectives between different factor groups.

Validity and Reliability of Q Method

It is critical to note Q methodology does not fit paradigms of qualitative or quantitative research, therefore validity and reliability are appropriate psychometric properties, therefore Q method studies are assessed differently (Ramlo & Newman, 2011; Wratten et al., 2019). Q sorts are recognized as valid representations of participants' viewpoints, and, in Q methodology, generalizations are based on theoretical implications and the validity of identified perspectives or concepts (Valenta & Wigger, 1997; Wratten et al., 2019). To ensure the validity of research themes in the Q set, investigator triangulation and intercoder reliability were employed, allowing for a level of generalization in the findings. However, rather than extrapolating from a sample to a broader population, Q methodology emphasizes the transfer of perspectives on an idea (Leggette & Redwine, 2016). As a result, generalization is not always the primary aim of a Q method study (Wratten et al., 2019). For reliability in Q methodology, the composite reliability of each factor should exceed 0.80 (Watts & Stenner, 2012). The four factors we examined met this threshold, confirming the study's reliability.

Findings

This study resulted in four factor groups that explain 50% of the variance of the total population of the study. The four factor groups are primarily defined by their distinguishing statements.

Factor One: Quality Over Quantity

The Quality Over Quantity factor group explains 17% of the variance and demonstrates a high composite reliability of 0.97, indicating a strong and consistent viewpoint among its members. This factor group places significant emphasis on “Access to nutritious food” and “More hygienic household and community environments,” as shown in Table 2, highlighting the importance of ensuring basic nutritional needs and improving sanitation as foundational to addressing food insecurity. Conversely, members of this group rated “Zero loss of waste of food” and “Identifying the determinants of waste” as less important, suggesting a preference for addressing immediate and direct needs over long-term waste management strategies.

This group is comprised of ten participants, equally divided between male and female teachers, representing a diverse range of subject areas. Their collective focus on fundamental aspects of food security reflects a pragmatic approach to addressing urgent needs and improving overall quality of life in the community.

Table 2

Distinguishing Statements for Factor One

Q-sort value	Statement
+ 5	Access to nutritious food
+ 3	More hygienic household and community environments
+ 1	Investing in sustained, long-term research
-1	Understanding and addressing stakeholder incentives
-2	Zero loss of waste of food
-5	Identifying the determinants of waste

Factor Two: Waste Not

The *Waste Not* factor group accounts for 9% of the variance with a composite reliability of 0.88. This group places high importance on “Zero loss of waste of food” and “Understanding and addressing stakeholder incentives, constraints, capacity, and preferences,” as shown in table 3. These priorities reflect a focus on reducing food waste and addressing the broader systemic factors that influence food security. In contrast, “Implementing sound agriculture water management technologies” and “Education of populations about global food security” were deemed less critical by this group, suggesting a preference for more immediate and practical interventions over broader educational or technological solutions.

This factor group is defined by two male participants who are math and science teachers, indicating a potential correlation between their subject expertise and their prioritization of waste reduction and stakeholder engagement.

Table 3

Distinguishing Statements for Factor Two

Q-sort value	Statement
+ 5	Zero loss of waste of food
+ 1	Understanding and addressing stakeholder incentives
0	Increasing scarcity of viable farm land
-2	Access to nutritious food
-3	Education of populations about global food security
-4	Implementing sound agriculture water management technologies

Factor Three: Sustainable Sisters

The *Sustainable Sisters* factor explains 14% of the variance and has a composite reliability of 0.92. This group prioritizes “Improved nutrition and dietary quality” and “Food systems being sustainable,” reflecting a commitment to enhancing overall nutritional standards and ensuring the sustainability of food systems. They rated “Restoration of degraded farmlands” and “Relationships between policy systems and food security,” as shown in Table 4, as less significant, indicating a focus on direct improvements in nutrition and sustainability over policy-related aspects.

This group consists of three female English teachers from different schools, whose perspectives emphasize the integration of sustainable practices and improved nutrition as critical to addressing food security challenges.

Table 4

Distinguishing Statements for Factor Three

Q-sort value	Statement
+ 5	Improved nutrition and dietary quality
+ 3	Food systems being sustainable
+ 2	Inadequate intake of micronutrients by mothers and infant
+ 1	Implementation of drought-resistant crops in arid areas
0	Identifying the determinants of stunting
0	Restoration of degraded farm lands
-4	Relationships between policy systems and food security

Factor Four: Futurists

The *Futurists* factor group represents 10% of the variance with a composite reliability of 0.92. This group emphasizes “Promoting natural resource conservation” and “Investing in sustained, long-term research (towards food security innovations)” as key priorities, as shown in table 5. They view these factors as essential for long-term progress in food security. On the other hand, “Adding post-harvest value to agricultural products” and “Ending rural poverty” were considered less critical, suggesting a focus on resource conservation and research over immediate economic improvements.

This factor group includes three male participants who are math and economics teachers from different schools, indicating a preference for future-oriented strategies and innovations in addressing food security.

Table 5

Distinguishing Statements for Factor Four

Q-sort value	Statement
+ 5	Promoting natural resource conservation
+ 4	Investing in sustained, long-term research
+ 3	Implementation of drought-resistant crops in arid areas
-2	Identifying the determinants of waste
-2	Ending rural poverty
-4	Adding post-harvest value to agricultural products

Consensus

The analysis of consensus statements reveals areas of agreement among the participants. Notably, “Improved irrigation systems and water storage technologies” was rated as highly important with a Q-sort value of +2.5, indicating a shared recognition of the need for better irrigation and water management practices. Conversely, statements such as “Reducing and managing the impacts of abiotic and biotic stress” and “Direct, nutrition-specific interventions and services” received lower Q-sort values, as shown in table 6, reflecting less emphasis on these aspects across the educator population.

Table 6

Consensus Statements

Average Q-sort value	Statement
-1.5	Reducing and managing the impacts of abiotic and biotic
-1.25	Direct, nutrition-specific interventions and services
+ 2.5	Improved irrigation systems and water storage technologies
-1	Sustainably increasing agricultural production

Discussion, Conclusions, and Recommendations

Ghanaian educators prioritized global food security issues through four perspectives: *Quality Over Quantity, Waste Not, Sustainable Sisters,* and *Futurists*. These perspectives reflect the diverse priorities of Ghanaian educators’ viewpoints on food security issues. The results can guide further interventions within agricultural development, education, and further efforts to eliminate food security.

Understanding these perspectives is crucial for stakeholders involved in global and agricultural education. Individuals and organizations involved in educational development should use this awareness of perspectives to enhance training and professional development offerings in global education that align with these perspectives. For instance, the emphasis on *Quality Over Quantity* illustrated the importance of basic nutritional needs and sanitation. In Ghana, nutrition security has increased since the implementation of the UNSDGs in 2023, but it is still far from global averages—particularly in the Northern region of the country (Koryo-Dabrah et al., 2022). Food sanitation in Ghana remains an issue, particularly with food vendors, and lack of education is a contributor to the problem (Akparibo et al., 2021; Christiana Cudjoe et al., 2022). The *Waste Not* factor highlighted the need for practical interventions focused on food waste reduction. This issue remains pertinent in the region where roughly 37% of food is wasted post-harvest (Boon & Anuga, 2020). These perspectives offer valuable insights on issues currently impacting Ghana for practitioners to craft more effective educational programs that resonate with local priorities.

The consensus statements identified within this study highlight critical implications for advancing food security in the country. We recommend implementers consider these priority areas when developing training or educational programs and materials. For example, the emphasis on irrigation system improvement highlights the need to consider and incorporate water management, storing, or sourcing strategies within agricultural education. This topic's importance is paramount considering climate change in Ghana that continues to alter weather cycles and elongate dry seasons proving challenging for the rainwater-reliant agricultural system (Antwi et al., 2024; Armah et al., 2010; Balana et al., 2020).

By aligning educational efforts with these priorities, educators can foster a generation of learners equipped to implement innovative, context-specific solutions to food security challenges. Ghanaian educators should be aware of their perspectives and tailor instructional methods accordingly to address potential gaps in education strategies, thereby equipping students to make an impact on Ghana's food insecurity issues. In addition to personal awareness, groups such as PeaceCorps, The USDA-FAS International Agricultural Education Fellowship Program, or USAID Farmer-to-Farmer should curate specific professional development opportunities to complement these perspectives.

We recommend further investigation into other educator groups that also play a role in youth engagement in food security. We recommend qualitative studies focused on collecting contextualized and rich data on both challenges unique to specific regions and successful strategies being implemented currently to help frame future work with youth. Finally, we recommend following up with participating Ghanaian educators to understand how enhanced awareness supports their teaching strategies and scales up application to other educators.

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