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Linguistic Barriers to Global Food Systems Communication: Evidence from the Interpretation of Food Systems Concepts in Mandarin Chinese

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Article

Keywords: Science communication, Food systems, Food security, Translation consistency, Linguistic diversity, High-context languages, FAO Terminology Portal, Global food systems communication

Posted Date: November 25th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-11305844/v1

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Additional Declarations: No competing interests reported.

Abstract

Accurate translation is essential for effective communication in global food systems. As many food systems concepts originate in English and are disseminated internationally through translation, differences may emerge in how these concepts are interpreted across linguistic contexts. This study examined how key food systems concepts are interpreted within a major non-English linguistic context using Mandarin Chinese as an empirical case. A questionnaire covering four socio-demographic characteristics and seven food systems concepts was administered as part of a national online sustainable food systems knowledge contest in China. A total of 2,221 valid responses were analyzed. Substantial variation was observed in concept interpretation. Interpretation preferences were significantly associated with ethnic minority status and growing-up environment. These findings suggest that terminology standardization does not necessarily generate shared understanding across linguistic contexts. Translation should therefore be viewed not only as a technical process but also as a factor shaping communication and interpretation in global food systems.

Background

Accurate translation is essential for effective knowledge dissemination and program implementation in global food systems (Arundhathi et al., 2025). Food systems are increasingly understood as complex and interconnected socio-ecological systems spanning production, processing, distribution, and consumption within broader social, economic, and environmental contexts, and they can contribute to all 17 Sustainable Development Goals (SDGs) (FAO, 2018; FAO, 2021). As global food systems governance relies on coordinated action across countries and stakeholders, effective communication of key concepts is critical for enabling policy alignment, public engagement, and the implementation of sustainable food systems transformation.

A set of commonly used terms frequently appears in the literature and United Nations (UN) documents to describe food systems, including food security, food resilience, food generation, and food production (FAO, 2024). However, most of these concepts are developed in English and disseminated globally through translation, requiring concepts to travel across linguistic and cultural contexts. While translation is often treated as a technical process, it may also influence how concepts are interpreted and understood by different audiences.

Evidence from institutional sources, such as the FAO Terminology Portal (FAO, 2024), indicates that even standardized food systems terms are translated inconsistently across official publications. Even basic concepts such as “food” may have multiple translations with distinct nuances of meaning. For example, in Mandarin Chinese—one of the six official languages of the United Nations—the concept of “food” is commonly translated into at least three terms (□□, □□, □□), each reflecting different semantic emphases (FAO, 2024). Such variation raises concerns about whether shared concepts in global food systems are consistently understood in practice.

These inconsistencies are not merely technical issues, but may reflect deeper structural challenges in cross-context communication. Differences in linguistic structure, cultural interpretation, and familiarity with scientific terminology may shape how translated concepts are understood. In particular, high-context languages may increase the likelihood that standardized terms are adapted or reinterpreted (Guo and Li, 2025). Such variation may create communication barriers between institutions, researchers, practitioners, and the public, potentially affecting the dissemination, accessibility, and implementation of food systems knowledge.

Despite growing attention to global food systems governance, little empirical research has examined how translation influences the interpretation of food systems concepts across linguistic contexts. Although some literature, such as Kennedy et al. (2021), emphasized the importance of having consistent terms to describe underutilized foods in traditional and Indigenous food systems, the broader implications of translation for food systems communication remain largely unexplored. This gap is particularly important because effective food systems transformation depends on shared understanding among diverse actors operating across languages, cultures, and institutional contexts.

To address this gap, this study uses Mandarin Chinese as a large-scale empirical case to examine the extent to which key food systems concepts are interpreted consistently within a major non-English linguistic context. It further investigates how socio-demographic factors are associated with variation in interpretation and discusses the implications of translation-mediated differences for global food systems communication and their potential relevance for food systems governance and transformation.

The research questions are:

RQ1. To what extent are key food systems concepts interpreted consistently within a major non-English linguistic context?

RQ2. What socio-demographic factors are associated with variation in the interpretation of food systems concepts?

RQ3. What are the implications of translation-mediated variation for global food systems communication and food systems transformation?

Methods

Survey Design and Data Collection

To address the research questions, Good Food Fund China Action Hub developed a Mandarin-language questionnaire through a committee of professionals with expertise in sustainable food systems. It was integrated as an optional component of a national-level online sustainable food systems knowledge contest for Chinese college students from May to July 2023. All participants were informed of Free, Prior, and Informed Consent in accordance with Chinese ethics regulations.

The questionnaire contained 11 items. Questions 1–4 addressed socio-demographic indicators: whether Mandarin is the native language, whether parents are ethnic minorities (Indigenous), whether participants work or study in food system-related fields, and their growing-up environment.

Questions 5–11 examined participants' interpretation of seven food systems concepts frequently used in international policy and academic discussions: Food, Food Systems, Indigenous Food Systems, Food Security, Food Systems Resilience, Food Generation, and Food Production (Table 1). For each concept, participants were provided with a definition and asked to select the Mandarin-language expression that best reflected the meaning of the definition.

Definitions were sourced from United Nations documents or authoritative dictionaries and translated by the expert committee. The response options consisted of alternative Mandarin-language expressions that have been used in FAO terminology databases, policy documents, academic literature, or public discourse (FAO, 2024). Detailed wording of all definitions, Mandarin-language expressions, dictionary explanations, and English translations is provided in Supplementary Appendix 1.

Because several concepts contained the term "food", Question 5 examined alternative interpretations of the word "food" as a standalone concept, while Questions 6–11 examined its use within broader food systems terminology. For clarity, the paper uses labels such as 5A to indicate option A in Question 5, with similar formatting used for all other questions.

A total of 3,319 questionnaires were collected. After review, responses completed in less than 60 seconds were excluded based on pilot testing conducted by the professional committee, which indicated that approximately 60 seconds was the minimum time required to review and answer the questionnaire. This yielded 2,221 valid responses for statistical analysis.

Table 1
Food Systems Concepts Examined in the Survey

Question	Concept
Q5	Food
Q6	Food Systems
Q7	Indigenous Food Systems
Q8	Food Security
Q9	Food Systems Resilience
Q10	Food Generation
Q11	Food Production

Statistical Analysis

Descriptive statistics were used to examine the distribution of responses across alternative Mandarin-language expressions for each food systems concept.

Chi-square tests were conducted to evaluate associations between socio-demographic characteristics (Q1–Q4) and concept interpretation preferences (Q5–Q11), with p-values < 0.05 considered statistically significant.

To further explore these relationships, multinomial logistic regression was applied, appropriate for nominal response variables with more than two unordered categories. Majority options (Native Chinese language speaker, no minority association, no related education background and rural areas) for socio-demographic variables were selected as reference categories for comparison purposes. For concept interpretation variables, reference categories corresponded to the most commonly used FAO translations available at the time the questionnaire was designed (August 2023). Details of all response options are provided in Supplementary Appendix 1.

All analyses were conducted using standard statistical procedures for categorical survey data.

Qualitative Interpretation of Findings

Following the statistical analysis, a group of ethnic minority youth whose first language was not Mandarin participated in a structured discussion of the findings with the professional committee. The professional committee included native simplified Chinese speakers from mainland China and Malaysia, professional Chinese-English interpreters, and a native traditional Chinese speaker from Taiwan. All committee members have relevant experience in food or health systems.

The purpose of these discussions was not to generate additional empirical data, but to assist in interpreting observed patterns in terminology preferences and concept interpretation. Insights from these discussions informed the Discussion section and were used to contextualize the quantitative findings.

Results

Descriptive Results

Table 2 shows the descriptive results for all 11 survey questions, with both raw counts and corresponding percentages in the question. For Questions 5–11, results describe participants' preferences among alternative Mandarin-language

expressions representing seven food systems concepts. The dominant FAO expression for each concept is highlighted in bold.

Table 2

Distribution of Responses for Socio-demographic Variables and Food Systems Concept Interpretation Questions (From Q5 to Q11, the bold-option is the dominant translation in FAO Terminology Portal)

	Choices (Refer to Table 1)	Numbers	Percentage
Question 1: Native Language†	A.	2169	97.7
	B.	52	2.3
Question 2: Belonging to ethnic minorities‡	A.	399	18.0
	B.	1822	82.0
Question 3: Work/study in relevant fields.	A.	586	26.4
	B.	1635	73.6
Question 4: Grow-up environment	A.	1398	62.9
	B.	823	37.1
Question 5: translate food	A.	1877	84.5
	B.	179	8.1
	C.	**105**	**4.7**
	D.	52	2.3
	E.	8	0.4
Question 6: translate food systems	A.	1110	50.0
	B.	**223**	**10.0**
	C.	210	9.5
	D.	168	7.6
	E.	208	9.4
	F.	168	7.6
	G.	127	5.7
	H.	7	0.2
Question 7: translate Indigenous food systems	A.	**259**	**11.7**
	B.	248	11.2
	C.	653	29.4
	D.	793	35.7
	E.	129	5.8
	F.	32	1.4
	G.	103	4.6
	H.	4	0.2
Question 8: translate food security	**A.**	**536**	**24.1**
	B.	405	18.2

	C.	96	4.3
	D.	132	5.9
	E.	330	14.9
	F.	70	3.2
	G.	262	11.8
	H.	262	11.8
	I.	79	3.6
	J.	49	2.2
	K.	0	0
Question 9: translate food system resilience	A.	**411**	**18.5**
	B.	88	4.0
	C.	259	11.7
	D.	478	21.5
	E.	479	21.6
	F.	195	8.8
	G.	160	7.2
	H.	149	6.7
	I.	5	0.0
Question 10: translate food generation	A.	201	9.0
	B.	1748	78.7
	C.	**144**	**6.5**
	D.	53	2.4
	E.	71	3.2
	F.	4	0.2
Question 11: translate food production	A.	427	19.2
	B.	228	10.3
	C.	**1361**	**61.3**
	D.	125	5.6
	E.	73	3.3
	F.	7	0.3

Note:

†: The rate of Mandarin-speaking people was 80.72% in China in 2022 (http://www.moe.gov.cn/fbh/live/2022/54618/mtbd/202206/t20220628_641478.html).

‡: The percentage of ethnic minorities in China was 8.89% in 2020 (https://www.gov.cn/guoqing/2021-05/13/content_5606149.htm).

Consistency of Concept Interpretation

The degree of interpretation consistency varied substantially across concepts. Among the seven food systems concepts examined (refer to Table 1), Food Production (Q11) was the only concept for which the dominant FAO expression was both the most frequently selected option and supported by a majority of respondents (61.3%). Food Security (Q8) was the other concept for which the dominant FAO expression was the most frequently selected option, although it was chosen by only 24.1% of participants, indicating limited consensus in this topic.

For other concepts, the dominant FAO expression received relatively little support. The dominant FAO terms for Food (Q5), Food Systems (Q6), and Food Generation (Q10) were selected by only 4.7%, 10.0%, and 6.5% of respondents, respectively. In contrast, alternative expressions not used as the dominant FAO terminology were preferred by most participants. The most frequently selected alternatives accounted for 84.5% of responses for Food, 50.0% for Food Systems, and 78.7% for Food Generation.

Interpretation was particularly fragmented for Indigenous Food Systems and Food Systems Resilience. For Indigenous Food Systems, the dominant FAO expression ranked third and was selected by only 11.7% of respondents, while two alternative expressions received substantially greater support (35.7% and 29.4%, respectively). A similar pattern was observed for Food Systems Resilience, where the dominant FAO expression ranked third with 18.5% support, while two alternative expressions were selected by 21.6% and 21.5% of respondents.

Chi-square Test Results

Table 3 shows the results of the Chi-square test. Belonging to ethnic minorities or not significantly influenced how to translate “food” (Question 5, $\chi^2(2) = 34.3$, $p < 0.01$), “food generation” (Question 10, $\chi^2(3) = 16.7$, $p < 0.01$), and “food production” (Question 11, $\chi^2(3) = 20.6$, $p < 0.01$). On the other hand, food-related education background does not show any significant influence on the translation. Meanwhile, growing-up environment significantly influenced how to translate “food” (Question 5, $\chi^2(2) = 10.1$, $p = 0.03$), Indigenous Food Systems (Question 7, $\chi^2(5) = 16.7$, $p = 0.02$), Food Security (Question 8, $\chi^2(8) = 27.3$, $p < 0.01$), and Food System Resilience (Question 9, $\chi^2(6) = 16.9$, $p = 0.03$). Notably, no selected variables influenced the translation of Food Systems.

Table 3

The Results of Chi-square Test for Whether Social-Demographic Factors are Associated with Each Translation. (The statistically significant terms are highlighted in bold).

Characteristic	Test 2: Whether the participant or the parents are ethnic minority	Test 3: whether studied or worked in food related field	Test 4: whether grow-up in a rural environment
Question 5: Foods	$\chi^2(2)=39.34\:$ $p<0.01$	$\chi^2(2)=7.68\:$ $p=0.10$	$\chi^2(2)=10.10$ $p=0.03$
Question 6: Food System	$\chi^2(5)=1.87\:$ $p=0.97$	$\chi^2\left(5\right)=9.37\:$ $p=0.23$	$\chi^2(5)=9.03\:$ $p=0.25$
Question 7: Indigenous Food Systems	$\chi^2(5)=11.35\:$ $p=0.12$	$\chi^2(5)=8.98\:$ $p=0.25$	$\chi^2(5)=16.70\:$ $p=0.02$
Question 8: Food Security	$\chi^2(8)=7.13$ $p=0.62$	$\chi^2(8)=5.48$ $p=0.49$	$\chi^2(8)=27.28$ $p<0.01$
Question 9: Food System Resilience	$\chi^2(6)=14.81$ $p=0.06$	$\chi^2(6)=6.68$ $p=0.57$	$\chi^2(6)=16.90$ $p=0.03$
Question 10: Food Generation	$\chi^2(3)=16.71$ $p<0.01$	$\chi^2(3)=7.87$ $p=0.16$	$\chi^2(3)=3.37$ $p=0.64$
Question 11: Food Production	$\chi^2(3)=20.55$ $p<0.01$	$\chi^2(3)=3.01$ $p=0.70$	$\chi^2(3)=1.33$ $p=0.93$

Multinomial Logistic Regression Results

Multinomial logistic regression was conducted to further investigate how factors are associated with variation in concept interpretation.

Consistent with the Chi-square results, ethnic minority status and growing-up environment emerged as the most important predictors of interpretation preferences. Significant associations were observed for Food, Indigenous Food Systems, Food Security, Food Systems Resilience, Food Generation, and Food Production, whereas no meaningful associations were

identified for Food Systems (Q6). Native language status and food systems-related educational background showed limited influence. Detailed regression coefficients, odds ratios, confidence intervals, and significance levels are provided in Supplementary Appendix 2.

For the concept of Food, respondents from ethnic minority backgrounds were less likely to select the most frequently preferred interpretation ($p < 0.01$, $k = -0.81$). The have a preference on the agricultural-oriented terminology, which is also the FAO expression. While participants from non-rural environments were more likely to select commercially oriented terminology ($p = 0.01$, $k = 0.65$).

For Indigenous Food Systems, participants from non-rural environments were more likely to select several alternative interpretations than the reference category (FAO expression) (option B, $p = 0.01$, $k = 0.48$; Option D, $p = 0.01$, $k = 0.39$; Option E, $p = 0.03$, $k = 0.48$). Respondents from ethnic minority backgrounds were less likely to select two of these alternative interpretations (Option C, $p = 0.03$, $k = -0.40$; Option D, $p = 0.04$, $k = -0.37$). Notice that this is one of the questions that received more diverse answers, while only 11.7% of respondents prefer the reference FAO expression, while over 65% of the respondents prefer option C or D.

For Food Security, participants from non-rural environments were more likely to select interpretations emphasizing supply assurance rather than the dominant FAO expression (Option E, $p = 0.03$, $k = 0.31$; Option H, $p < 0.01$, $k = 0.63$).

For Food Systems Resilience, ethnic minority status and growing-up environment remained significantly associated with the same interpretation preferences (Option C, $p = 0.03$, $k = -0.63$; $p < 0.01$, $k = -0.51$), while this is not a domain preference.

For Food Generation and Food Production, we provide the same set of selections. Even though the FAO expressions are both option C, respondents make different choices here. Over 75% of respondents prefer option B over option C in question 10 while over 60% of the respondents are consistent with FAO expression in question 11. To be more specific, for Food Generation, respondents from ethnic minority backgrounds were less likely to select the most frequently preferred interpretation, Optional B, while they do prefer the FAO expression ($p = 0.02$, $k = -0.50$). For Food Production, respondents from ethnic minority backgrounds were more likely to select alternative interpretations (Option A, which is the second largest option) than the reference category, which is also the FAO expression ($p < 0.01$, $k = 0.46$).

Discussion

This study demonstrates that most dominant institutional terminology was not aligned with the most widely accepted interpretations among participants within a major non-English linguistic context. Among the seven concepts examined, Food Production was the only concept for which the dominant FAO expression was both the most frequently selected interpretation and supported by a majority of participants (61.3%). Food Security was the only other concept for which the dominant FAO expression ranked first; however, it was selected by only 24.1% of respondents, indicating limited consensus. For Food, Food Systems, and Food Generation, the dominant FAO expressions received support from only 4.7%, 10.0%, and 6.5% of participants, respectively. For Indigenous Food Systems and Food Systems Resilience, the dominant FAO expressions ranked only third among available options. These findings suggest substantial divergence between institutional terminology and public interpretation of food systems concepts.

The study also identified important socio-demographic patterns. Ethnic minority status and growing-up environment were significantly associated with interpretation preferences across multiple concepts, whereas native language status and food systems-related educational or professional experience showed little influence. Together, these findings suggest that interpretation of food systems concepts is shaped not only by institutional terminology but also by broader social, cultural, and experiential factors.

Translation as a Barrier to Food Systems Communication

The findings show that translation-related challenges in food systems communication extend beyond terminology standardization. Mandarin Chinese provides an informative case because it is one of the six official languages of the United Nations and one of the most widely spoken non-English languages globally. Even within the FAO Terminology Portal, multiple Mandarin translations already coexist for several key food systems concepts. The survey results further demonstrate that the dominant FAO expressions often differed from the interpretations preferred by respondents.

These findings support a distinction that is often overlooked in food systems communication: standardized terminology reflects institutional consensus, but it does not necessarily ensure shared understanding among audiences. The two are different issues, and addressing one does not automatically resolve the other. In non-English linguistic contexts, communication challenges cannot be addressed through terminology standardization alone. How concepts are understood by diverse publics requires equal and independent attention.

This distinction matters for understanding communication difficulties. When food systems messages do not reach or resonate with intended audiences, explanations often focus on access, literacy, or engagement. The present findings suggest that differences in interpretation may be another, less examined source of difficulty. Even among a relatively highly educated sample of university students, substantial variation in concept interpretation was observed. This suggests that differences between institutional terminology and audience understanding may be more common than currently recognized.

The findings are also has direct relevance for food systems governance. Effective food systems governance depends on international cooperation and coordination among governments, researchers, civil society organizations, producers, consumers, and international institutions (Arundhathi et al., 2025). Such coordination requires not only shared terminology but also a reasonably shared understanding of what that terminology means. When dominant institutional expressions differ from the interpretations preferred by target audiences, communication efforts may become less effective, potentially affecting the dissemination of food systems knowledge, stakeholder engagement, and broader efforts toward food systems transformation.

Why Do Interpretations Differ?

Several factors may help explain the substantial variation in interpretation observed in this study.

First, linguistic structure and cultural context may influence how food systems concepts are understood after translation, particularly for high-context languages. Mandarin Chinese is often characterized as a high-context language, in which meaning depends not only on vocabulary but also on social context, cultural background, and speaker intention. Translation therefore requires not only linguistic knowledge but also cultural literacy (Li, 2021). When concepts are translated primarily through word-for-word substitution without sufficient consideration of sociocultural context, misunderstandings may emerge, particularly for abstract, scientific, or policy-oriented terminology (Brazill, 2016). This may help explain why more abstract concepts in the present study showed greater variation in interpretation. For example, Indigenous Food Systems and Food Systems Resilience were among the most fragmented concepts. For Indigenous Food Systems, the dominant FAO expression was selected by only 11.7% of respondents, while two alternative expressions were selected by 35.7% and 29.4%, respectively. Similarly, for Food Systems Resilience, the FAO expression was selected by 18.5% of respondents, compared with 21.6% and 21.5% for two alternative expressions. By contrast, the more concrete concept of Food Production showed considerably greater agreement, with 61.3% selecting the dominant FAO expression. This pattern suggests that concepts whose meanings are more closely tied to social context, institutional arrangements, or culturally specific experiences may be more open to variation in interpretation. Although Mandarin was examined in the present study, similar challenges may exist in other high-context languages, including many Asian languages, such as Japanese (Nevgi et al., 2008) and Thai languages (Muir et al., 2018), and Indigenous languages (Kondayya, 2025), where contextual meaning plays an important role in communication (Guo and Li, 2025).

Second, most food systems concepts originate from international scientific and policy communities and are subsequently adapted into different linguistic and cultural contexts. The institutions and scholars that initially define concepts often operate in English and within Western intellectual traditions (Tucker, 2014). As concepts are introduced into other languages, translators and users must identify equivalent expressions from existing vocabularies that may not fully capture the original meanings. Different communities may respond to this challenge through transliteration, literal translation, conceptual translation, or locally adapted expressions, generating multiple competing variants and regional preferences. This can produce multiple variants that emphasize different aspects of the same concept. The results for Food, Food Systems, and Food Generation are consistent with this process. The dominant FAO expressions for these concepts were selected by only 4.7%, 10.0%, and 6.5% of respondents, respectively, while alternative expressions were substantially more popular. In particular, 78.7% of respondents selected an alternative expression for Food Generation, compared with only 6.5% selecting the dominant FAO expression. These differences suggest that concepts entering a local linguistic context may acquire meanings that reflect existing usage and conceptual categories rather than simply reproducing the terminology used by international institutions.

This process of conceptual adaptation extends far beyond food systems terminology. Throughout history, societies have faced similar difficulties when introducing new religious, scientific, political, and philosophical concepts across languages. Research on the translation of Christianity in China suggests that translation choices can influence the localization and dissemination of imported concepts, providing a useful historical parallel for this study. For example, during the Tang Dynasty (7th–10th Century), Nestorian missionaries borrowed concepts from Buddhism and Taoism to translate Christian theological ideas (Liu, 1995; Luo, 2016). Their translation strategies facilitated initial communication but ultimately failed to support long-term localization and dissemination (Luo, 2016). Even today, the Chinese word "□□" is used to translate several distinct English concepts, including "nation," "country," and "state" (Liu, 2013), despite important conceptual differences among them. These examples illustrate that translation challenges are not unique to food systems but commonly emerge whenever concepts cross linguistic and cultural boundaries.

The results of this study suggest that food systems terminology may currently be undergoing a similar process of localization and adaptation. For example, Good Food Fund China used different mandarin terms to translate "food systems" in 2020 ("□□□□" and "□□□□") and 2023 ("□□□□") (Good Food Fund China, 2020; 2023). This evolution reflects an emerging process of consensus-building among practitioners seeking language that better reflects local understanding while maintaining alignment with international food systems discourse.

Third, dominant terminology may persist because of historical path dependence and institutional authority. Some expressions may become widely used because they emerged within specific historical circumstances rather than because they provide the most accurate representation of contemporary concepts. Once adopted by influential institutions, governments, educational materials, or academic communities, these expressions may continue to be reproduced with limited critical reflection.

For example, Tortajada and Zhang (2021) suggest that grain-centered terminology became dominant in Chinese discussions of food security because of historical concerns regarding grain self-sufficiency and food shortages. Such historical origins may help explain why certain translations became institutionalized. However, contemporary food systems encompass a much broader range of foods, actors, supply chains, and governance mechanisms than those associated solely with grain production. As food systems evolve, institutional terminology may not always evolve at the same pace.

This tendency may also be reinforced by disciplinary conventions and academic hierarchies. Following Kuhn's (1974) discussion of scientific paradigms, terminology can become embedded within professional practice through repetition, authority, and institutional legitimacy. Once a term becomes dominant, alternative interpretations may receive limited attention even when substantial ambiguity or disagreement exists. In the Chinese academic context, concerns about the influence of "scholar-tyrants", a term often used to describe highly influential scholars who exercise substantial authority

over academic resources, evaluation systems, and disciplinary discourse, further highlight how power relations may shape the acceptance and persistence of particular terminologies (Zheng and Cao, 2018). This may help explain why some institutional terms remain widely used even when respondents in the present study preferred other expressions. Consequently, institutional terminology and public understanding may gradually diverge over time.

Fourth, some food systems concepts are inherently linked to politically sensitive issues, which may further shape interpretation. Concepts concerning identity, rights, land, governance, and Indigenous Peoples are often interpreted differently across political and institutional contexts. Indigenous food systems provides a particularly relevant example. In the present study, it was one of the most fragmented concepts: the dominant FAO expression was selected by only 11.7% of respondents, while two alternative expressions received 35.7% and 29.4% of responses. The concept of indigeneity is understood and institutionalized differently across national and international contexts. The Chinese government officially maintains that there are no Indigenous Peoples in China and generally uses the term “ethnic minority” instead. In contrast, many international organizations, including United Nations bodies, argue that numerous ethnic minority groups in China meet widely accepted definitions of Indigenous Peoples (Wang & Mashford-Pringle, 2022). These differences may affect how the concept is translated, interpreted, or communicated differently across contexts. The substantial variation observed for Indigenous food systems in this study may therefore reflect not only linguistic challenges but also broader political and institutional differences regarding identity, representation, and rights. Importantly, the present study measures ethnic minority background rather than Indigenous identity, so these political and institutional explanations should be understood as possible contextual factors rather than direct explanations of individual respondents’ choices.

In summary, these findings suggest that variation in food systems terminology should not be viewed simply as a translation error. The pattern across concepts suggests that interpretation may be shaped by the interaction of language, cultural context, conceptual adaptation, historical usage, and institutional and political context. The particularly high variation observed for Indigenous Food Systems and Food Systems Resilience, as well as the strong divergence for Food and Food Generation, contrasts with the relatively high consistency observed for Food Production. This suggests that the degree of interpretive variation may depend partly on how abstract a concept is and how closely its meaning is connected to social, cultural, historical, or institutional contexts. As food systems transformation increasingly depends on communication among diverse stakeholders operating across languages and governance systems, understanding these influences becomes essential for improving communication effectiveness and supporting more inclusive participation in food systems transformation.

The Influence of Social and Cultural Background

Ethnic minority status and growing-up environment were associated with interpretation preferences across multiple concepts, while native language status and food-related educational or professional experience showed limited influence. This pattern suggests that differences in interpretation may be shaped less by formal linguistic or disciplinary background than by the social and cultural contexts in which food is experienced and understood.

The limited influence of native language status should be interpreted with caution, as nearly all participants reported Mandarin as their native language. More informative is the finding that food-related education and professional experience were not significantly associated with interpretation preferences. Formal exposure to food systems knowledge therefore did not consistently bring participants closer to the dominant institutional terminology. This suggests that familiarity with food systems as an academic or professional field may not necessarily determine how related concepts are understood. Everyday experience, cultural background, and familiarity with different food environments may also shape the meanings that audiences attach to food systems concepts.

This finding is consistent with a broader understanding of science communication in which audiences do not simply receive and reproduce institutional terminology. Rather, prior experience, cultural background, and social context can influence how new concepts are interpreted and understood (Wynne, 1992). The present study extends this perspective to

a multilingual policy context. When food systems concepts move across linguistic and cultural boundaries, their interpretation may be shaped not only by the language in which they are communicated or by formal knowledge of the field, but also by the social and cultural experiences through which audiences encounter food and food systems.

Participants from ethnic minority backgrounds showed different interpretation patterns for Food, Food Systems Resilience, Food Generation, and Food Production. These differences may reflect the influence of different linguistic traditions, local knowledge systems, and cultural experiences in shaping food-related understanding. Similarly, growing-up environment was associated with interpretation of Food, Indigenous Food Systems, Food Security, and Food Systems Resilience. Individuals who grow up in different food environments may develop different understandings of food access, security, production, and resilience through everyday experience. The stronger variation observed for concepts such as Food Systems Resilience and Indigenous Food Systems is particularly relevant in this regard, as both concepts involve meanings that extend beyond technical definitions and are closely connected to social, institutional, and cultural contexts.

These findings are consistent with existing research showing that Indigenous culture and local context can influence the development and application of food systems indicators and interventions (Kuhnlein, 2013; Jernigan et al., 2021). The present study adds to this literature by showing that such differences may also be reflected in the interpretation of terminology itself. Importantly, these patterns were observed even within a relatively highly educated population. For food systems communication and governance, this suggests that standardized terminology may not be interpreted uniformly across groups with different social and cultural backgrounds. Communities whose everyday experiences and knowledge systems differ from those reflected in international policy discourse may therefore require greater attention to local interpretation and context when food systems concepts are communicated and implemented.

Implications for Institutional Science Communication and Governance

These findings have implications for how institutions communicate scientific and policy concepts, as well as how audiences understand them. Standardizing a term is often treated as an important solution to communication problems: once a consistent expression is established, shared understanding is expected to follow. However, this assumes that audiences interpret institutional terminology in the way intended by those who develop it. The findings of this study suggest otherwise. Food-related education and professional experience showed limited influence on interpretation preferences, while ethnic minority status and growing-up environment were associated with differences across several concepts. This suggests that how people understand food systems terminology may depend not only on formal knowledge but also on social and cultural experience.

This has direct implications for the terminology work of FAO and other international organizations. Standardization remains important for maintaining consistency in multilingual scientific and policy communication, but it does not necessarily ensure shared understanding. Science communication research has long emphasized the importance of considering how audiences interpret and use scientific information rather than treating communication as a one-way transmission of knowledge (Bucchi, 2008; Simis et al., 2016). Terminology developed at the institutional level may therefore benefit from being tested with the audiences who are expected to use or understand it. Where substantial differences in interpretation are identified, institutions could consider whether alternative expressions or additional explanations would communicate the intended concept more effectively.

The case of Indigenous Food Systems illustrates why some communication gaps cannot be addressed through translation alone. The concept is closely connected to questions of identity, rights, and institutional recognition, which may be understood differently across political and institutional contexts. In such cases, differences in interpretation may reflect more than linguistic ambiguity. They may also reflect different understandings of the social and institutional meaning attached to a concept. Translation should therefore not be treated as a purely technical process when terminology carries

broader questions of identity, rights, and representation. The same consideration may apply to other food systems concepts whose meanings are closely connected to particular social, historical, or institutional contexts.

These issues are also relevant to global food systems governance. Food systems transformation depends on communication and coordination among international organizations, governments, researchers, civil society organizations, producers, and consumers. Such coordination requires not only common terminology but also a reasonably shared understanding of the concepts used in policy and practice. When institutional terms are understood differently across linguistic and social contexts, communication may become less effective, with potential consequences for stakeholder engagement, knowledge dissemination, and the implementation of food systems initiatives. The present study does not directly demonstrate these governance effects, but it identifies a potential source of difficulty when internationally developed concepts are communicated across different linguistic and social contexts.

This may be particularly important for international organizations working across multiple linguistic and institutional settings. Rather than assuming that standardized translation produces conceptual alignment, multilingual communication could incorporate audience testing, consultation with local stakeholders, and greater attention to established local terminology. Such approaches would not require abandoning standardization. Instead, they would recognize that institutional consistency and local intelligibility are related but distinct objectives.

More broadly, these findings suggest that translation deserves greater attention in science communication research. Mandarin Chinese provides one empirical case, and further research across languages and policy domains is needed to determine whether similar patterns occur elsewhere. Treating translation as part of the process through which scientific and policy concepts are interpreted, rather than simply as a means of transferring them between languages, may help explain why institutional terminology and audience understanding sometimes diverge. This perspective may also contribute to more effective and inclusive communication in increasingly multilingual systems of science and governance.

Contributions and Limitations

This study makes four contributions. First, it provides one of the first empirical assessments of how food systems concepts are interpreted within a major non-English linguistic context. Second, it demonstrates that substantial variation may exist between institutional terminology and public interpretation. Third, it highlights the role of social and cultural backgrounds in shaping conceptual understanding. Fourth, it introduces language and translation as an often-overlooked dimension of food systems communication, with potential implications for food systems governance and transformation.

Several limitations should also be acknowledged. First, approximately one-third of questionnaires were excluded because completion times were too short to indicate meaningful consideration of the questions. Second, all participants were college students and therefore do not fully represent the broader population. In 2021, only 24.9% of the Chinese population had received higher education (Ministry of Education of the People's Republic of China, 2022). Consequently, the participants in this study had substantially higher educational attainment than the general population, limiting the representativeness of the sample. Nevertheless, even among this relatively highly educated group, considerable variation and confusion were observed in the interpretation of food systems terminology. This suggests that misunderstanding of these concepts may be even greater among the general public.

Third, the study focused on Mandarin Chinese and therefore cannot directly determine whether similar patterns exist in other linguistic and cultural contexts. Fourth, although expert discussions helped contextualize the findings, the study was not designed as a formal linguistic analysis and did not include participants with professional training in linguistics. Finally, only a small proportion of respondents reported that Mandarin was not their native language, limiting the ability to evaluate the influence of language background on concept interpretation.

Conclusion

This study examined how key food systems concepts are interpreted within a major non-English linguistic context using Mandarin Chinese as an empirical case. The results revealed substantial variation in the interpretation of several widely used food systems concepts. For most concepts, the dominant terminology used in the FAO Terminology Portal was not the most widely preferred interpretation among participants. Ethnic minority status and growing-up environment were significantly associated with interpretation preferences, while native language status and food systems-related educational or professional experience showed limited influence.

These findings suggest that translation is more than a technical process of language conversion. Standardized terminology does not necessarily generate shared understanding, particularly when concepts move across linguistic, cultural, and social contexts. As food systems transformation increasingly relies on communication, collaboration, and governance across diverse stakeholders, differences in interpretation may create barriers to knowledge dissemination, stakeholder engagement, policy implementation, and international cooperation. Greater attention to how food systems concepts are understood by different audiences may therefore strengthen global food systems communication and support more inclusive and effective food systems transformation.

Declarations

Acknowledgement:

We appreciate Mr. Yuhua Zong from Good Food Fund China collected and shared the relevant data for the current study.

Declaration of conflicting interest:

There has no conflict of interest.

Funding Statement:

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Ethical approval and informed consent statements:

This study was conducted according to the guidelines laid down in the Declaration of Helsinki and all procedures involving research study participants were approved by the Ethical Review Borad at the Good Food Fund China Action Hub. Written informed consent was obtained from all subjects/patients.

Data availability statement:

The data are not publicly available due to ethical and privacy considerations related to the collection of data from human participants. The survey instrument and detailed statistical results are provided in the supplementary materials. The data may be available from the corresponding author upon reasonable request, subject to appropriate ethical and privacy requirements.

Authorship:

ZW was in charge of the research design and drafted the manuscripts. XY conducted data analysis and drafted the manuscripts. WD participated in drafting and revising the manuscripts. XL MM, and YL participated in the questionnaire design. All other co-authors joined the discussion and revision of the manuscripts and agreed the publication.

References

1. Arundhathi C, Reddy KA, Keerthi P (2025) Agricultural Knowledge Management and Dissemination Strategies. Transforming Agriculture through Modern Extension Education Techniques, p 170
2. Brazill SC (2016) Chinese to English translation: Identifying problems and providing solutions. Doctoral dissertation, Montana Tech of The University of Montana
3. China Agricultural University - College of Economics and Management (2023) https://mp.weixin.qq.com/s/Cjh77WR6-kKtCmlAXCYpYA
4. Ewing B, Cooper T, Matthews C, Baturo A, Sarra G, Duus E, Golding J (2009) Getting skilled for education, training and employment: Indigenous Cultural Knowledges and mainstream knowledges of mathematics. In *Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS) 2009 National Indigenous Studies Conference*. 21
5. FAO (2018) Sustainable Food Systems - Concept and Framework. http://www.fao.org/3/ca2079en/CA2079EN.pdf
6. FAO (2021) Food Systems Summit x SDGs | United Nations. https://www.un.org/en/food-systems-summit/sdgs#:~:text=Sustainable%20food%20systems%20can%20ensure,in%20our%20natural%20water%20systems
7. FAO (2022) Policy recommendations - PROMOTING YOUTH ENGAGEMENT AND EMPLOYMENT. https://www.fao.org/fileadmin/templates/cfs/policy-products/2022_Youth_EN.pdf
8. FAO (2024) Food safety and quality. https://www.fao.org/food-safety/en/
9. FAO (2024) FAO Terminology Portal. https://www.fao.org/faoterm/en/
10. Good Food Fund China (2020) □□2021□□□□□□□□□□□□□□□[Written in advance of the 2021 United Nations Food System Summit]. https://mp.weixin.qq.com/s/E8dhpNPMmhf7MmlfJYImJw
11. Good Food Fund China (2023) COP28, □□-□□□□□□□□□□□□□, □□□□□□□□□□□□□□□[Good Food Fund - China's public interest organisations engage in global dialogue to promote a healthy and sustainable food system transition]. https://mp.weixin.qq.com/s/EqFlSCjES1LyHwne6QxEUQ
12. Guo Z, Li C (2025) Translating Discourse with Chinese Characteristics Guided by High and Low Context Cultures Theory: A Case Study of the Series of Understanding Contemporary China. Translation Linguistics (Transling) 5(2):125–138
13. HanDian[□□] https://cidian.gushici.net/fd/b9ce6318b006.html
14. Inner Mongolia Government Service Network (2020) □□□□□□□□□□□□□□□□□□□□□□□[Policy Interpretation: The Trend of Promoting the State Common Language and Writing System]. https://zwfw.nmg.gov.cn/pub/fwzx/202009/t20200921_13054.html
15. Jernigan V, Maudrie TL, Nikolaus CJ, Benally T, Johnson S, Teague T, Taniguchi T (2021) Food sovereignty indicators for Indigenous community capacity building and health. Front Sustainable Food Syst 5:1–9. https://doi.org/10.3389/fsufs.2021.704750
16. Kennedy G, Kanter R, Chotiboriboon S, Covic N, Delormier T, Longvah T, Kuhnlein H (2021) Traditional and indigenous fruits and vegetables for food system transformation. Curr Developments Nutr 5(8):1–5. https://doi.org/10.1093/cdn/nzab092
17. Kondayya A (2025) The games people play: using the game of Taboo to develop indigenous concepts. Decision 52(2):209–215
18. Kuhn TS (1974) Second thoughts on paradigms. Struct Sci Theor 2:459–482
19. Kuhnlein HV (2013) What food system intervention strategies and evaluation indicators are successful with indigenous peoples? Indigenous peoples' food systems and well-being: interventions and policies for healthy comm*unities*, ed. Harriet, V. K., Bill, E., Dina, S, Barbara, B., 237–256. https://www.fao.org/3/i3144e/I3144e00.pdf
20. Li N (2021) Study on the Influential Analysis of Cultural Context in English-Chinese Translation. Linguistics 9(4):201–205. https://doi.org/10.11648/j.ijll.20210904.19
21. Liu Y (2013) □□□□□□ □□ □□[The Concept of Guojia in Guojia Security]. □□□□[International Forum]

22. Liu Y (1995) [The Earliest Chinese Translation of Christian Literature and Misinterpretation and Misinterpretation in Translation]. [Journal Jinan University] 17(01):66–71
23. Luo J (2016) [On the Failure of Spreading of Nestorianism in China From the Perspective of Scripture Translation]. [Journal Tongji University(Social Sci Section)] 27(01):119–124
24. Ministry of Education of the People's Republic of China (2022) : 2.18[Decade of education: more than 218 million people with a university education nationwide]. http://www.moe.gov.cn/fbh/live/2022/54875/mtbd/202209/t20220927_665364.html
25. Muir JA, Braudt DB, Swindle J, Flaherty J, Brown RB (2018) Cultural antecedents to community: An evaluation of community experience in the United States, Thailand, and Vietnam. City community 17(2):485–503
26. Nevgi A, Tella S, Nishimura S (2008), May The effect of high-context/low-context culture to university teachers' use of ICTs in teaching and to teaching approaches in Finland, Japan and India. In London SoTL 7th International Conference SoTL Connect: The Challenge of Boundaries for the Scholarship of Teaching and Learning. London, UK
27. Online Dictionary of Modern Chinese[] https://cidian.gushici.net/fd/b9ce6318b006.html
28. Peng K (2022) : 80.72%, 2.67[Ministry of Education: the national Putonghua penetration rate reached 80.72 per cent and the illiteracy rate dropped to 2.67 per cent]. http://www.moe.gov.cn/fbh/live/2022/54618/mtbd/202206/t20220628_641478.html
29. Tortajada C, Zhang H (2021) When food meets BRI: China's emerging Food Silk Road. Global food Secur 29:100518. https://doi.org/10.1016/j.gfs.2021.100518
30. Tucker V (2014) Cultural perspectives on development, 1st edn. Routledge. https://doi.org/10.4324/9781315831633
31. Wang Z, Mashford-Pringle A (2022) Nutritional Challenges and Dietary Practices of Ethnic Minority (Indigenous) Groups in China: A Critical Appraisal. Front Sustainable Food Syst 6:867848. https://doi.org/10.3389/fsufs.2022.867848
32. Wynne B (1992) Misunderstood misunderstanding: social identities and public uptake of science. Public Underst Sci 1(3):281
33. Zheng Z, Cao H (2018) [The Phenomenon and Governance of Scholar-tyrant in Universities]. [Education Teach Research] 32(06):20–25

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- originaldataset.csv
- originaldataanalysisresult1.xlsx
- Appendixquestionnairessupplementarytables.docx