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The importance of socio-demographic factors on food literacy in disadvantaged communities

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Introduction: Food literacy, the ability to make informed food choices supporting health and sustainability, plays a critical role in addressing malnutrition and food insecurity, especially in disadvantaged communities. Despite its importance, much of the existing research has focused on developed countries, leaving gaps in understanding food literacy in low-income contexts. This study examines food literacy in a disadvantaged community in western Honduras, specifically analyzing how socio-demographic factors influence food-related behaviors.

Methods: We assessed food literacy levels in 400 predominantly female-headed households in a disadvantaged community in western Honduras. Using a locally adapted food literacy assessment, four dimensions were evaluated: Planning and Management, Selecting, Preparing, and Eating food.

Results: The results revealed a moderately high overall food literacy level (average score: 82.73/114), but with significant variations across dimensions. The lowest scores were observed in Planning (66.24%) and Selecting (59.2%), indicating challenges in meal planning and choosing healthy foods. Food preparation skills were notably high, suggesting resilience despite limited resources. Socio-demographic factors such as age, income, education, and location significantly influenced food literacy. Older adults (50+) scored significantly lower than younger groups (ANOVA, $p < 0.05$), as did individuals with lower income levels and those residing in rural areas or small municipalities ($p = 0.000$ for both). Higher levels of education correlated with better food literacy, particularly in Planning ($p = 0.00$) and Selecting food ($p < 0.05$).

Discussion: The findings highlight the importance of addressing socio-economic factors such as education, income, and infrastructure to improve food literacy in disadvantaged communities. Education emerged as a key determinant of food literacy, especially in meal planning and food selection. Interventions should be designed to address these gaps, with a particular focus on older adults and rural populations. However, to achieve meaningful progress, policies that improve income levels and enhance infrastructure connecting rural and urban areas are essential. Integrating food literacy education into community programs is crucial to fostering healthier food practices.

KEYWORDS

food literacy, disadvantaged areas, food system sustainability, healthy eating, socio-demographic factors, food insecurity, food policy

1 Introduction

In recent years, concern for healthy eating in disadvantaged countries has increased, driven by, among others, the United Nations Sustainable Development Goals (SDGs). Specifically, number two spurs governments to work to End hunger, achieve food security and improved nutrition and promote sustainable agriculture. This invites us to continue questioning our food systems as guarantors of this.

Food literacy has gained increasing attention as a crucial determinant of health, often surpassing traditional socio-demographic characteristics such as age, occupational status, educational level, race, or income in its predictive power (Yan Chung, 2017). This concept is now widely used in policy development, professional practice, and research, as well as among the public (Ronto et al., 2017; Krause et al., 2018; Gartaula et al., 2020; Palumbo et al., 2019). Food literacy encompasses the knowledge, skills, and behaviours necessary to plan, select, and prepare healthy meals, forming the basis of many social intervention programmes to address poor diet quality (Begley et al., 2019a). Improving food literacy is essential in tackling significant community challenges, such as malnutrition and food insecurity, especially in disadvantaged areas (Begley et al., 2019b; Gallegos, 2016).

Food literacy empowers individuals to make informed decisions about their food and nutrition, enhances broader community health outcomes, and supports the sustainability of local food systems (Truman and Elliott, 2019; Zareimanesh and Namdar, 2022). The term emerged to describe the everyday practicalities associated with healthy eating (Truman et al., 2017; Renwick and Powell, 2019) and attempts to capture the comprehensive set of knowledge, skills, and behaviours required to maintain a healthy diet (Fingland et al., 2021; Wijayaratne et al., 2018; Amouzandeh et al., 2019). Significantly, food literacy extends beyond mere nutritional knowledge, incorporating the ability to make appropriate food choices that support both personal health and sustainable food systems, considering environmental, social, economic, cultural, and political contexts (Mohsen et al., 2022; Cullen et al., 2015).

However, criticisms arise when food literacy is viewed too narrowly as focusing solely on individual behaviours, neglecting broader issues related to food system sustainability (Cullen et al., 2015; Kimura, 2011; Sumner, 2013; Renwick and Powell, 2019; Rosas et al., 2020). External factors, such as available resources and environmental conditions, often constrain the ability of individuals, institutions, or organisations to adopt specific behaviours (Truman and Elliott, 2019; Forray et al., 2023). These external influences shift in response to changes across micro, meso, and macro environments, such as family structures or global food systems (Fingland et al., 2021). Perry et al. (2017) identified "ecological" factors, beyond the individual level, as a critical category for analysing food literacy, highlighting how broader cultural, environmental, and economic factors interact with food choices (Engler-Stringer, 2010; Ronto et al., 2017).

Food literacy plays a particularly significant role in disadvantaged communities, as these areas often face higher malnutrition rates, stunting, and micronutrient deficiencies due to insufficient access to quality food (Gallegos, 2016). Research has predominantly focused on measuring food literacy within specific population groups—such as children, youth, and disadvantaged families—in developed countries, leaving a gap in our understanding of food literacy in impoverished contexts. Few studies have examined how food literacy functions in high-poverty settings, making it difficult to determine which dimensions are most relevant in these environments or the extent to which external factors condition food literacy (Hemmer et al., 2021).

In low-income settings, where agricultural, transportation, and healthcare infrastructures are weaker, food literacy may not necessarily translate into healthier food practices due to the inability to apply the knowledge (Gallegos, 2016). This context-specific nature of food literacy challenges measurement and evaluation (Hemmer et al., 2021).

Socio-demographic factors also heavily influence food literacy. Specific groups, such as those with low numeracy skills, children, older adults, Indigenous peoples, immigrants, and individuals from lower socioeconomic backgrounds, tend to exhibit lower food literacy compared to populations in contexts with lower inequality or greater social integration (Krause et al., 2018). For example, families experiencing food insecurity often clearly understand healthy eating but are forced to prioritise quantity and satiety over quality due to circumstances (Gallegos, 2016). Food literacy, therefore, must be understood in the broader context of food availability, politics, socialisation, and marketing strategies (Krause et al., 2018).

Low income is mainly associated with higher risks of developing diet-related chronic diseases, such as obesity, diabetes, hypertension, and heart disease, as well as poorer diet quality (Hemmer et al., 2021; Gallegos, 2016). Additionally, socioeconomic factors such as limited access to grocery stores, affordable housing, functional kitchen equipment, and time constraints related to income generation further complicate the adoption of healthy eating habits (Lavelle et al., 2017; Perry et al., 2017).

In conclusion, while there is growing recognition of the importance of food literacy, there remains a significant gap in understanding how socio-demographic factors intersect with food literacy in disadvantaged communities. This paper aims to contribute to a more systemic perspective of food literacy by examining three core questions: (1) to what extent is there limited food literacy in a disadvantaged community, (2) which socio-demographic factors contribute to inadequate food literacy practices, and (3) how these factors relate to the different dimensions of food literacy. The analysis will explore factors such as income, educational level, age, and area of residence, considering how these variables shape access to food, understanding nutritional information, and the ability to adopt and maintain healthy eating behaviours.

2 Materials and methods

Measuring food literacy is a complex issue. Despite being an increasingly recognised term, there is still no shared understanding of the meaning of the construct and its components, resulting in a lack of consensus (Begley et al., 2019a; Vidgen and Gallegos, 2014; Cullen et al., 2015; Sumner, 2015). There is no universally accepted scale to measure the concept. Often, partial measurement scales do not capture the different facets that such a concept may entail. The most recognised empirical conceptualisations of food literacy include the framework of Vidgen and Gallegos, the work of Desjardins and colleagues, and the conceptualisations of Slater and coauthors or Cullen and colleagues (Rosas et al., 2020). For this study, we will base our approach on the food literacy framework by Vidgen and Gallegos (2014), which includes the domains of Planning and Management, Selection, Preparation, and Eating. This approach aligns with other

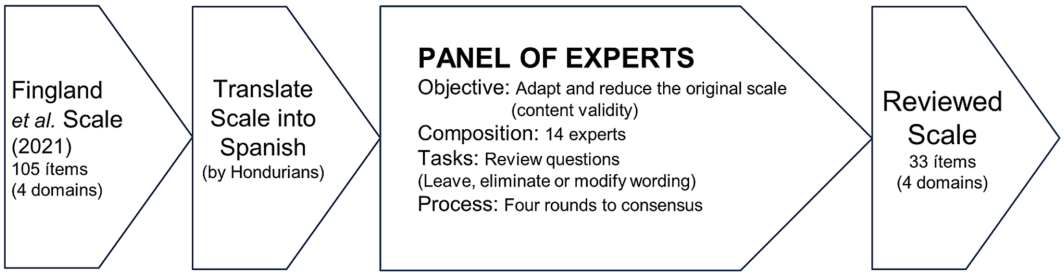

FIGURE 1
Methodological process flow-chart for adapting the scale.

well-known models while presenting unique distinctions. The four domains encompass essential skills and areas of knowledge, similar to other frameworks that emphasise practical food-related competencies (Amouzandeh et al., 2019). Like many models, it considers the socio-economic context, addressing how individual capabilities interact with broader social factors (Manna et al., 2024).

However, some models do not explicitly categorise food literacy within these four domains, leading to a broader interpretation that lacks the structured focus of Vidgen and Gallego's framework (O'Brien et al., 2024). On the other hand, the domains of Planning and management are often underrepresented in other frameworks, which tend to focus more on Selection and Preparation (Mancone et al., 2024). Vidgen and Gallego's approach emphasises the importance of managing food resources (such as time, budget, and access), which directly influences selection and preparation decisions. Additionally, it explicitly incorporates the "Eat" domain, thus completing the food literacy cycle from planning to effective action at the table. When comparing these domains with other frameworks, we can observe that the chosen approach offers a comprehensive perspective and reflects a holistic view that encompasses the physical aspects of food preparation and the social and economic context that shapes food choices. This differentiated approach also facilitates a better understanding of individuals' barriers and opportunities in adopting healthy eating practices across various contexts.

Based on the conceptualisation by Vidgen and Gallegos, the instrument used in our study to measure food literacy is based on the one developed by Fingland et al. (2021), a scale grouped into the four domains of Planning and Management, Selection, Preparation, and Eating.

Since the Fingland et al. scale turned out to be too extensive, with 105 items, and the authors themselves recognised the need to adapt it to different contexts, countries, cultures, and socioeconomic levels, in the present study, we carried out the methodological process shown in Figure 1 to apply to a context of disadvantaged people in a community in western Honduras.

Firstly, the initial questionnaire referred above (105 items) was translated into Spanish by Hondurans, taking care that the expressions, manners and vocabulary used in the area were respected. This was essential to ensure reliable information collection.

Secondly, adapting the scale to the context and reducing the length without losing content validity was worked on with a panel of experts, asking them to evaluate each item and indicating whether they would leave it, eliminate it, or modify its wording.

For the selection of experts, different profiles were sought that could have different perspectives on the healthy consumption habits of the reference population. Thus, we contacted: (a) government representatives related to the health area; (b) academics, teachers, and school directors for their close knowledge of the food reality of families; (c) representatives of companies in the food industry who could incorporate their knowledge of purchasing habits; (d) local media professionals who had addressed the health and nutrition problem and (e) specialists in medicine and nutrition. Finally, the collaboration of 14 experts was achieved according to the following profiles: three government representatives, four teachers or school principals, four actors in the food supply chain, two media professionals with specific programming on food and nutrition, and one physician specialising in nutrition.

Given the excessive number of questions, the experts were asked to choose those they would consider strictly essential to assess the food literacy of people in their community, paying attention to the characteristics of the local context. The authors defined the following inclusion criteria for the items evaluated by the experts: (1) Those items for which there was unanimity would be eliminated directly. Those items that most experts are inclined to eliminate after the first round of reviews would also be eliminated. The rest of the items would be submitted to other rounds of review until a consensus on their elimination or inclusion is reached. Regarding the modifications in the wording, we collected the changes in those questions, in which more than one expert proposed modifications, and these were sent to the next round for approval. The consultation with experts was complex, and four rounds were carried out to reach a consensus, leaving the questionnaire reduced to 33 items.[1]

To study the impact of socio-demographic factors on food literacy among household heads the following variables were included in the questionnaire: age, number of people in the household, monthly income, level of education, area of residence, and municipality. According to data from the Honduras Annual Country Report (World Food Programme, 2023)—including our reference community—, the households most vulnerable to food insecurity are headed by women, with larger families, where the educational level of the head of household is lower, and are primarily located in rural areas. The age variable was categorised into four groups: under 30 years old, between 30 and 40 years old, between 40 and 50, and over 50, seeking to analyse the impact of different generations within the reference community.

1 See Suplementary material (Spanish scale used and English translation).

For the number of people in the household, we dichotomised the variable into 1–4 people and more than four people based on information on the average family size in the area. Since this is generally a poor community, we decided to categorise monthly income from information on annual GDP per capita of $2,780 (approx. $2,500 in 2021) (Oficina Diplomática, 2021). Thus, we divided the respondents into two categories: income below 5,000 lempiras/month (approx. $200) or above that amount. About the level of education, the variable was categorised as follows: no education or primary education not completed; completed primary education; secondary education and university education. A posteriori, it was decided to combine secondary and university studies, given the low number of people with university degrees. A distinction was made between rural and urban areas of residence. Finally, the decision was made to dichotomise the variable municipality, distinguishing between belonging to the municipality of Marcala (head city of the region) and other municipalities. This decision was based on the socio-cultural differences of the capital city, compared to the greater homogeneity of the rest of the municipalities and the more significant development of food environments in urban areas and the head municipality.

2.1 Recruitment and sampling

The sample comprised 400 housewives from the Department of La Paz, Honduras. The area has a population of 196,322 inhabitants within an area of 2,525 square kilometres. According to Honduras Annual Country Report, it has one of the highest levels of acute food insecurity, with 25% of the population (World Food Programme, 2023).

The sample element was the household, surveying the person responsible for food planning, selection, and preparation. People with this role have been referred to as the guardians of household nutrition and, traditionally, have been women or mothers. Indeed, focusing the study on the housewife as a dietary gatekeeper means not examining possible influences on nutritional choices from other household members. However, the housewife's choice as the sampling unit offers us a perspective that is quite close to the reality of the household in these cultural communities. In the cultural context of the study, the mother is often the primary dietary gatekeeper in the familiar home environment (Wijayaratne et al., 2018). Previous studies highlight the importance of dietary literacy as the dietary gatekeeper in overcoming barriers to healthy eating and fostering greater satisfaction with the health of the family diet. The gatekeeper has a strong influence on shaping the diet and food preferences, not only of their children but also of their spouse or partner (Hannon et al., 2003). The dietary guardian generally serves three critical food-related roles in the household: that of food consumption controller, that of food provider, and that of primary role model for food consumption (Wijayaratne et al., 2018).

The sample size was estimated at 400 households for a 95% confidence level, given an average household size in Honduras of 4.2 members and a target population of 149,002 citizens (Instituto Nacional de Estadística de Honduras, 2018). We used the formula for the estimation of the sample size in an infinite population, $n = (Z^2 * p * q)/E^2$, for p and q of 50%, resulting in an estimated value of $n = 384.16$.

Quota sampling was followed (Table 1) according to the size of each of the municipalities in the Department. Within each quota, participants were selected for convenience.

TABLE 1 Quota sampling.

Municipality	Population	Percentage population	Number of surveys
Cabañas	4,028	2.70%	11
Chinacla	9,009	6.05%	24
Guajiquiro	16,191	10.87%	43
Marcala	34,330	23.04%	92
Opatoro	8,229	5.52%	22
San José	9,279	6.23%	25
Santa Ana	13,395	8.99%	36
Santa Elena	14,185	9.52%	38
Santa María	12,209	8.19%	33
Santiago Puringla	17,867	11.99%	48
Yarula	10,280	6.90%	28
TOTAL	149,002	100.00%	400

2.2 Data collection

Information was collected between October 17 and December 16, 2022. Previously, geographic information on the study area, locations, distances, and types of roads was sought to obtain primary data and make the programming according to the established times and goals. For the administration of each survey, local surveyors were selected, hired, and trained. University professional personnel were selected, and an interview was conducted before hiring. A presentation was prepared, and a training workshop was held. A glossary of 15 specialised terms used in the survey was explained to them and delivered (for example: trans fats, saturated fats, unsaturated fats, chronic diseases, or best before date). A small pilot test was carried out with five people to validate the questionnaire. During the process, the accompaniment and monitoring of the information collection were carried out.

Each survey took an average of 30 min and was carried out with a firm commitment to respect human dignity, especially protecting women's rights as study subjects. All research procedures were oriented to guarantee the confidentiality of the participants, who were previously informed of the study's objective by verbally requesting their consent to administer the survey.

2.3 Analysis

First, we analysed the reliability of the set of questions of the Food Literacy scale by calculating Cronbach's α. Secondly, aggregate summative variables were created to allow us to assign an overall Food Literacy value and a value for each of the scale dimensions on which we have based ourselves, as explained above: Planning and Management, Selection, Preparation, and Eating. The use of summative scales obeys the interrelated nature of the Food Literacy components and the construct as a whole, as suggested by some authors (Amouzandeh et al., 2019). The sum variables were constructed considering the Vidgen and Gallegos framework. Thus, for the Planning and Management dimension, questions related to intake planning (questions 6–9), viable food decisions (questions 10–14), and

prioritisation of time and money (questions 15 and 16) were considered. For the Selection dimension, the following questions were considered: information and impact (questions 17–21) and ability to judge food quality (question 22). In the case of the Preparation dimension, questions related to skills to prepare food (questions 23–27) and hygiene and handling (questions 28–30) were included. Finally, the Eating dimension was constructed from personal wellbeing (questions 31–33), knowledge of what is or is not healthy (question 34), and those related to eating as a social act (questions 35–38).

Using ANOVA, a descriptive analysis of the variables was then carried out to analyse the differences in the means of the overall scale and its dimensions according to different sociodemographic variables. Bonferroni post-hoc tests were also conducted to explore the possible differences between groups in those significant variables. The SPSS version 26 software package was used.

3 Results

First, the internal consistency reliability of the questionnaire used was calculated. Cronbach's α was used for subscales and domains with Likert-scale response options, obtaining an acceptable value of the $\alpha = 0.745$ statistic. This indicates a moderate to good level of internal consistency for the questionnaire. That is, the items in the questionnaire are reasonably reliable and measure the same underlying construct. There was no significant improvement if items were eliminated from the scale.

The resulting sample of respondents was distributed according to the sociodemographic variables analysed, as shown in Table 2.

TABLE 2 Sample description.

	Frequency	Percentage
Age		
Less than 30	78	19.5
Between 30 and 40	102	25.5
Between 40 and 50	93	23.3
More than 50	127	31.8
People in the household		
4 or less	237	59.3
More than 4	163	40.8
Income		
Less than 5,000 lempiras per month (200$)	278	69.5
More than 5,000 lempiras per month (200$)	122	30.5
Level of education		
Primary not completed	85	21.3
Primary completed	198	49.5
Secondary or upper	117	29.3
Residence		
Rural	227	56.8
Urban	173	43.3
Municipality		
Marcala (Head of the region)	308	77.0
Other municipalities	92	23.0

3.1 Global perspective on food literacy in a disadvantaged community

The following is an overview of the food literacy of the study's reference community based on self-reported data. Overall, the overall score of the sample ranges from 55 to 109, for a maximum possible value of 114 (see Table 3). This represents a mean value of 82.73, 72.57% of the maximum value. This is a remarkable figure, higher than expected for a disadvantaged community. However, we can see relevant differences and nuances concerning the overall average value if we analyse by dimensions. The results are presented below.

Regarding the Planning and Management dimension, out of a maximum of 33 points, an average value of 21.86 (66.24%) was obtained. This is the dimension with the second-lowest score after selection skills. Going into more detail, we can see how the behaviours with the lowest values are those related to meal planning (barely planned, with an average of 1.23 out of three), the tendency to buy cheaply on every occasion (average of 1.21 out of three); the preparation of healthy snacks when away from home (1.21 out of 3) and the lack of time to buy or prepare nutritious meals (1.29 out of 3).

In the case of the Selection dimension, out of a maximum of 24 points, a mean value of 14.21 (59.2%) was obtained, which is the food literacy dimension with the lowest mean. Here, it is observed that the main difficulties have to do with reading and understanding labelling and the best-before date (values below two out of three), lack of knowledge about the social or environmental impact of products, or their place of origin (averages of 1.3, 1.44 and 1.74, respectively, out of three).

For the preparation dimension, out of a maximum possible 33 points, an average value of 28.52 (86.42%) was obtained, which is the dimension with the highest average value in food literacy. If we analyse the different aspects it encompasses, scores bordering on maximum values are reached in most of them, except for using leftovers to make other meals (1.88 out of three) and knives (1.86).

Finally, in the case of the Eating dimension, out of a maximum possible 24 points, an average of 18.13 (75.54%) was obtained. More specifically, the lowest values were obtained regarding the understanding of the impact of diet on chronic diseases (1.89 out of three), knowledge of food safety (1.99), and the existence of different mealtimes among household members (1.9).

3.2 Influence of sociodemographic factors

3.2.1 Age

The ANOVA test (Table 4) found significant differences by age groups, F (3, 398) = 3.540, $p = 0.015$. The Bonferroni *post hoc* tests indicated that the differences occur between the 30–40-year-old group (mean global score of 84.04) and the group over 50 years of age (mean global score of 80.82) ($p = 0.019$). This indicates the sharpest contrast in food literacy between younger and older generations. If we further elaborate on these differences, according to the ANOVA tests, these differences occur in the dimensions Planning and Management (F (3, 399) = 9.165, $p = 0.000$) and Selecting (F (3,

TABLE 3 Descriptive analysis.

		Planning	Selection	Preparation	Eating	Food literacy
Valid		400	400	399	400	399
Lose		0	0	1	0	1
Mean		21.86	14.2	28.52	18.13	82.73
Median		22	14	29	18	83
Mode		24	14	28	19	82
Standard Dev		3.5	3.1	2.5	2.4	8.1
Range		20	15	14	14	54
Min		11	8	19	10	55
Max		31	23	33	24	109
Percentile	25	19	12	27	16.25	78
	50	22	14	29	18	83
	75	24	16	30	20	89

TABLE 4 Socio-demographic factors influence (ANOVA results).

	Planning	Selection	Preparation	Eating	Food literacy
Age	$F = 9.165$ **$p < 0.001$**	$F = 2.930$ **$p = 0.034$**	$F = 1.599$ $p = 0.189$	$F = 2.391$ $p = 0.068$	$F = 3.540$ **$p = 0.0150$**
N° of people in the household	$F = 0.001$ $p = 0.973$	$F = 0.039$ $p = 0.843$	$F = 0.920$ $p = 0.338$	$F = 0.051$ $p = 0.822$	$F = 0.169$ $p = 0.681$
Income	$F = 22.128$ **$p < 0.001$**	$F = 1.408$ $p = 0.236$	$F = 4.953$ **$p = 0.027$**	$F = 13.412$ **$p < 0.001$**	$F = 18.123$ **$p < 0.001$**
Educational level	$F = 79.430$ **$p < 0.001$**	$F = 28.766$ **$p < 0.001$**	$F = 5.889$ **$p = 0.003$**	$F = 15.695$ **$p < 0.001$**	$F = 62.316$ **$p < 0.001$**
Zone of residence	$F = 7.467$ **$p = 0.007$**	$F = 10.788$ **$p = 0.001$**	$F = 0.887$ $p = 0.347$	$F = 7.398$ **$p = 0.007$**	$F = 12.627$ **$p < 0.001$**
Municipality	$F = 18.996$ **$p < 0.001$**	$F = 15.985$ **$p < 0.001$**	$F = 7.637$ **$p = 0.006$**	$F = 5.277$ **$p = 0.022$**	$F = 25.077$ **$p < 0.001$**

All p-values in bold are statistically significant at the 95% confidence level.

399) = 2.930, $p = 0.034$). In the case of Planning, the results of the Bonferroni post hoc tests indicate that the group over 50 years of age are those who plan purchases the least (mean global score of 20.66/max. 33, vs. 23.02 for the younger group), with no differences among the other three age groups. Something similar happens with selection skills. In this case, it is once again older people who present the lowest skills (13.57/max. 24, vs. 14.69 for the 30–40 years group). No differences are observed in the rest of the dimensions.

3.2.2 Number of people in the household

Regarding the number of people in the household, the ANOVA test (Table 4) found no significant differences regarding the degree of food literacy, F (1, 399) = 0.169, $p = 0.681$. Consequently, evidence has yet to be obtained that the number of people living together in disadvantaged communities is relevant. No significant differences were observed in this respect when descending to the level of the four dimensions analysed in food literacy. These results differ from those of Novoa-Sanzana et al. (2024) in Latin American communities during COVID-19 concerning food insecurity. In this case, lower levels of food insecurity were reported in households with more than four people or with children under 10 years of age.

3.2.3 Income

The volume of household income is a significant variable in explaining differences in the degree of food literacy, as previously postulated. ANOVA tests (Table 4) yield a result of F (1, 398) = 18.123, $p = 0.000$; thus, lower-income households exhibit lower literacy (mean global score of 81.59, vs. 85.30 for higher-income households). This difference marked by income carries over to almost all dimensions of food literacy, except food selection skills: Planning and Management (F (1, 399) = 22.128, $p = 0.000$), Preparing (F (1, 398) = 4.953, $p = 0.027$) and Eating (F (1, 399) = 13.412, $p = 0.000$). In all three dimensions, people with higher income levels show higher mean scores in food literacy (23.07 vs. 21.32, 28.94 vs. 28.33 and 18.13 vs. 17.84, respectively).

3.2.4 Educational level

The level of education is also shown to be one of the most relevant variables explaining significant differences in the level of food literacy (Table 4), F (2, 398) = 62.316, $p = 0.000$. Considerable differences are generated between the three levels of education, especially those with no or incomplete primary education (mean score of 75.36) and the other two levels (completed primary education and secondary/

university education) (means of 83.73 and 86.41, respectively). The different levels of education also translated into significant differences in the four dimensions of food literacy, with *p*-values equal to or less than 0.003.

Bonferroni analyses allow us to highlight some differences that occur in each dimension. In the case of the Planning and Management dimension, there is a positive correlation between the different levels of education and the recognised ability to plan, with a range of mean scores from 18.92 for the lowest level of education to 24.29 for the highest (max. 33). For the case of food selection skills (Selection), the differences occur between the lowest level of studies and the rest ($p = 0.000$), with no differences being observed between levels 2 and 3 (12.03 vs. 14.80/max. 24). The same happens for the case of the Preparation dimension, where the people with the lowest level of studies recognise a lower food literacy than the other two groups of educational level ($p = 0.013$ and $p = 0.03$) (27.72 vs. 28.88/max. 33). Finally, in the social dimension of Eating, significant differences are again obtained between the three educational level groups, in an increasing gradation (17.15, 18.03 and 19.00/max 24, respectively).

3.2.5 Zone of residence

ANOVA tests (Table 4) also show significant differences for the area of residence, $F(1, 398) = 12.627$, $p = 0.000$. Thus, people living in rural areas show a significantly lower mean food literacy (mean score 81.47 vs. 84.36). These differences are reproduced in the dimensions of Planning and Management ($F(1, 399) = 7.467$, $p = 0.007$), Selecting ($F(1, 399) = 10.788$, $p = 0.001$) and Eating ($F(1, 399 = 7.398)$, $p = 0.007$), with mean values of 21.87 vs. 22.95/max. 33, 14.17 vs. 15.26/max 24, and 18.15 vs. 18.87/max. 24, respectively. However, no significant differences were observed in the Preparation dimension ($p = 0.347$).

3.2.6 Municipality

Beyond rural/urban, living in the head town of the municipality also marks significant differences in food literacy (Table 4), $F(1, 398) = 25.077$, $p = 0.000$. The inhabitants of this area have a significantly higher mean score than those of the other towns in the municipality (mean 86.37 vs. 81.63). These differences are also reproduced in the four dimensions analysed: Planning and Management ($F(1, 399) = 18.996$, $p = 0.000$), Selecting ($F(1, 399) = 15.985$, $p = 0.000$), Preparing ($F(1, 399) = 7.637$, $p = 0.006$) and Eating ($F(1, 399) = 22.128$, $p = 0.022$), with mean values of 21.45 vs. 23.22/max. 33, 13.86 vs. 15.34/max 24, 28.33 vs. 29.15/max. 33, and 17.98 vs. 18.64/max 24, respectively.

4 Discussion

The study that has been conducted allows us to offer a perspective on food literacy in disadvantaged communities and detect the influence of contextual factors that condition the advances that could be pursued in this relevant aspect of food security and health. Unlike other studies, we relate these factors to different dimensions of food literacy, seeking to deepen our knowledge of their interrelationships. The results prove that such progress in this community goes beyond improving personal attitudes to understanding and addressing other socioeconomic aspects of the food system.

The results show that the average food literacy in a disadvantaged community reaches a reasonably high level, driven mainly by self-reported meal preparation and socialisation skills. However, these results hide some systemic issues that are worth analysing carefully. The following are the main conclusions drawn from the results obtained.

4.1 Influence of age on food literacy

As also observed in other studies (Gartaula et al., 2020), age plays a significant role in planning and selection, the two main sub-dimensions of food literacy where the most problematic behaviours were observed. Older individuals consistently show significantly lower ratings in both areas than younger groups. Lower planning and poorer selection of healthy foods are more prevalent among older adults. Here, no significant differences have been detected among all groups, the difference being more pronounced between people aged 30–40 (higher level of food literacy) and those over 50 (lower level). This result is partly consistent with Yoo et al. (2023), who obtained a higher food literacy score in the 40–49 age group. This indicates a specific generational change, perhaps due to a greater sensitivity to the increased importance of nutrition in the media agenda. This change, however, is not seen in the younger generation. This could be due to factors such as those found by Colatruglio and Slater (2016) in a study with young adults. According to these authors, the main reasons were a lack of food and nutrition education at home and school before independent living, time constraints, and complex food relationships. For example, as older people stop cooking due to lack of time, they lose the opportunity to teach younger people (Silva et al., 2023). However, other aspects may also play a role. As Silva et al. (2023) suggested, significant social, emotional, and cognitive changes during youth mean a greater tendency to engage in risky behaviours during this stage of life.

4.2 Influence of income on food literacy

Income plays a significant role in meal planning behaviours, as it is one of the three primary resources, along with education and time, that are impacted by contextual challenges. Our results show that low-income individuals are likelier to buy the cheapest foods and avoid planning healthy meals when away from home. This aligns with the study by Darmon and Drewnowski (2015), which found that low-income households face barriers such as higher food prices and limited grocery store access. These financial constraints lead individuals in disadvantaged communities to rely on inexpensive, highly processed foods. The scarcity of income makes long-term meal planning more difficult, forcing people to focus on immediate needs. For example, Sriram and Tarasuk (2016) found that lower-income households prioritise cost over nutritional quality when planning meals. This results in food plans that include a limited variety of affordable staple foods, while other essential expenses (like housing or healthcare) further constrain food budgets. Likewise, to obtain a minimum wage level, individuals are often forced to work multiple jobs, which leaves less time for shopping or leisure activities. In our community of reference, the shortage of time and income means that many families need help to afford to eat out together or only rarely do so. In the authors' experience, these occasions are used to indulge in

pleasurable but unhealthy food (generally in fast-food environments). These considerations contrast with Zareimanesh and Namdar's (2022) work, in which a negative influence of income level is reported, with higher levels of food literacy found among people with lower income levels. This result may be because the study was conducted in a rural area rich in agricultural production, where people can come into more significant contact with healthier products and lifestyles. The specificity of intervention groups or the use of highly educated samples may represent relevant limitations (Lavelle et al., 2017).

Income is also influential for the preparation and eating dimensions. The act of preparing fundamentally involves time and equipment. Paradoxically, lower socioeconomic levels may favour a more remarkable dedication of time to food preparation (Méjean et al., 2017), which may prima facie have an impact on healthier eating; however, lower economic means that this more excellent preparation is based on cheaper and less nutritious food (ibidem). At the same time, adequate equipment (stoves, utensils, etc.) is also lower in disadvantaged communities, which increases the risk of health preparation. On the other hand, income could also partly explain the low score given to using leftovers. Just enough or scarce food is bought, or cheap, more efficiently utilised products are purchased. Similarly, long working hours in poorer socioeconomic and geographic conditions make family meals difficult and tend to coexist with different schedules.

4.3 Influence of education on food literacy

Education is crucial in enhancing planning skills and decision-making abilities related to food literacy. Studies such as those by Mills et al. (2018) and Begley et al. (2019a) have shown that higher levels of education lead to more effective meal planning, as individuals with better education are more equipped to understand and apply information regarding food and health. This is particularly significant among those with lower educational attainment, who often face difficulties reading, writing, and understanding more complex information. Shim et al. (2014) reinforce this by showing that better-educated individuals are more likely to engage in detailed meal planning and food tracking, resulting in healthier eating patterns and improved management of chronic diseases. Similarly, Hardcastle and Blake (2016) highlight the impact of food literacy and cooking skills—both enhanced by education—on meal-planning abilities and healthier eating habits.

The influence of education extends beyond planning to the ability to make healthier food choices. It affects access to food, access to information about food and its impacts, and the ability to understand that information. Individuals with lower educational levels often lack knowledge about how food choices influence health, the environment, and the origins of food, which in turn impacts their ability to make informed decisions. This lack of knowledge not only affects personal health but also undermines the sustainability of local food systems. Silva et al. (2023) emphasise that lower educational attainment is closely linked to poorer decision-making skills and a reduced ability to make healthy food selections, further illustrating the essential role of education in shaping food literacy and healthier behaviour.

The level of education is also influential for the preparation and eating dimensions. Low levels of education can lead to less knowledge about the use of utensils, which can be critical to the transmission of diseases, as well as to understanding the importance of diet for health, the two aspects with the lowest scores in terms of meal preparation and the act of eating.

The findings related to educational level in this study differ from those reported in other research. For example, Yoo et al. (2023) found a negative relationship between educational level and food literacy among citizens of Seoul, though the mean values were very close. This discrepancy could stem from socioeconomic and cultural differences between the two countries studied—Korea and Honduras. In the communities analysed in the current research, lower education means insufficient training that limits nutritional understanding and the ability to interpret product labels. As a result, food literacy tends to be lower in these contexts. Additionally, the impoverished environments in which many of these communities exist may hinder the promotion and understanding of healthy eating practices, further contributing to lower food literacy. On the other hand, other studies, such as that by Zareimanesh and Namdar (2022), found that food literacy increases with academic level up to high school but declines again in higher education. This could be attributed to time constraints, hectic lifestyles, and competing priorities for individuals with higher education in more developed contexts, which may reduce their focus on food literacy despite their advanced education. However, it is crucial to specify in which dimensions of food literacy these relationships are observed, as variations may exist across different aspects, such as planning, selection, or nutritional knowledge. Understanding these discrepancies can offer more nuanced insights into how education impacts food literacy in various cultural and socioeconomic settings.

4.4 Influence of area of residence/ municipality

The challenges mentioned earlier become even more pronounced when considering the area of residence or the municipality where individuals live. Our findings suggest that inadequate rural development policies can significantly worsen the conditions in disadvantaged rural communities. Residents in these areas often face barriers in accessing information, markets, schools for their children, and educational policies related to food and food security. This aligns with other Latin American studies, such as Novoa-Sanzana et al. (2024), which have also identified rural communities' obstacles, particularly regarding food literacy. Furthermore, the role of school location is crucial in shaping informal knowledge acquisition. While rural students may benefit from increased interaction with local agroecology, they often have less time for formal school activities. Gartaula et al. (2020) suggest that rural schools could harness this experiential learning to promote food literacy among rural students.

The rural/urban divide is further exacerbated by insufficient infrastructure that hinders mobility and access to diverse food supplies, as Losada-Rojas et al. (2021) highlighted. In contrast, the influence of living in the central areas of municipalities significantly enhances all dimensions of food literacy. Individuals residing in these urban centres tend to have higher food literacy scores, emphasising the role of central population hubs in facilitating better access to food, information, and education. However, this also highlights social inequalities, as public policies favour urban

residents over rural counterparts. Failures in the local food system, particularly regarding food distribution, processing, and services (such as access and affordability), are evident, as Woodhill et al. (2022) noted. These disparities underscore the need for more inclusive policies that address the specific challenges of both rural and urban populations.

Other studies have evidenced the role of socioeconomic inequalities in food literacy globally. For example, Mohsen et al. (2022) surveyed MENA countries, revealing that the majority of individuals had inadequate food literacy. Their findings linked poor food literacy to several factors, including limited consultation of food labels, cultural consumption patterns, low school performance, food safety concerns, and reduced dietary diversity and nutrient adequacy. Similarly, low educational attainment, living in rural areas, and older age have been associated with lower food literacy and food insecurity in disadvantaged populations, such as those in northwestern Romania (Forray et al., 2023) and Latin American communities (Novoa-Sanzana et al., 2024). These patterns have been observed in other contexts, including Italy (Palumbo et al., 2019) and Korea (Yoo et al., 2023), underscoring the global nature of these challenges across diverse cultural and geographic settings.

4.5 Conclusion

In conclusion, enhancing the planning component of food literacy in disadvantaged communities can only be achieved by addressing two key factors: income and education. Our findings suggest that even modest improvements in foundational education could significantly increase planning skills. To achieve this, it is essential to revisit public policies on education and employment in these communities, especially in resource-poor countries where such interventions are often limited or nonexistent.

For older adults, improving food literacy requires targeted educational programmes. Wallace et al. (2016) demonstrated through a quantitative study that training adapted to older adults' needs increases knowledge and leads to long-term changes in dietary and healthy habits. This highlights the value of investing in educational initiatives designed for older populations. However, focusing on early life stages is equally important, as schools play a crucial role in shaping food literacy in children and young people.

Beyond improving education, there must be a concerted effort to explain the personal and societal impacts of food choices and to ensure better access to information. Food literacy is not just a matter of attitude but of aptitude, requiring knowledge and the ability to apply it. Education alone is insufficient if people cannot access information about the food they purchase—a challenge particularly acute in rural areas or municipalities far from regional hubs. In this context, better infrastructure for transport, digitalisation, and food traceability are critical to ensuring equitable access to food literacy for all.

This research has some limitations. First, as indicated above, this study was based on an analysed sample of women responsible for household food in the community, which induces a particular bias. Women, often responsible for household tasks, including food preparation, may face time constraints due to other responsibilities such as child care and agricultural labour, which can negatively impact nutritional outcomes for the family (FAO, 13AD). Although women are usually the food gatekeepers in these communities, it would be interesting to explore the perspectives of men and their possible differences. Likewise, although the community analysed may reflect a cultural reality that could be extended to other Central American communities, further studies in different geographic or culturally diverse areas would be very interesting to draw lessons that could better guide public policies.

Second, other studies have highlighted that household size may influence the amount of resources available for nutrition education and, therefore, there may be a lower priority for nutrition education and food literacy, affecting the learning of healthy eating habits (Béné et al., 2015). However, our study did not obtain evidence on household size and food literacy. Further research is needed on this aspect, as well as on the intergenerational composition of households. The latter could give rise to influences explaining differences in healthy eating habits. This aspect has not been investigated in this work.

Finally, the study has been based on a particular way of conceiving food literacy. This widely used model may reflect only some ways of understanding and measuring food literacy. It is a dynamic concept that must be improved conceptually and methodologically.

This study illustrates the profound influence of contextual factors on food literacy disparities in disadvantaged communities suffering from systemic poverty and government neglect. In such environments, it is clear that achieving a healthier, better-nourished population will remain elusive unless education, income levels, the food environment, and public infrastructure are improved simultaneously. Tackling food illiteracy is not a straightforward task; it requires the collaboration of multiple stakeholders and the integration of diverse perspectives. As Pope et al. (2021) emphasise, only through holistic systems thinking can we address the complex web of issues influencing food literacy and, ultimately, public health.

Some authors have highlighted the overemphasis of various governments on individual responsibility for food literacy (Gallegos, 2016), with the understanding that low-income families could do better if they planned and managed more efficiently. However, as Gallegos (2016) insightfully argues, the food insecurity experienced by these families is rarely the result of poor financial management. Low-income individuals are often constrained to select foods that fit within their economic means and social circumstances, gradually influencing their preferences and cultural norms. Therefore, effective public health policy must be grounded in a thorough understanding of the local food system and its unique challenges. It is crucial to design interventions that combine theoretical education with practical experiences, adapt content to the cultural and regional context, and promote active community participation. Implementing intersectoral policies and community-based programmes—such as urban gardens, cooking centres and health advice—can effectively transform knowledge into everyday and sustainable practices that improve the health and wellbeing of the population. These strategies and policies, adapted to the particularities of the context studied, can contribute significantly to closing the gaps in food literacy and promoting a healthy and sustainable diet in the community.

In conclusion, enhancing food literacy is not merely a policy objective but a shared journey towards a healthier, more resilient

community. By embracing locally driven initiatives and culturally attuned practices, we empower every individual to transform their meal into a celebration of knowledge, tradition, and hope. Let us move forward together, making every table a testament to our collective commitment to a brighter future.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors without undue reservation.

Ethics statement

Ethical approval for this study involving human samples was not required according to local legislation and institutional requirements. Written informed consent for participation was obtained from the participants' legal guardians or next of kin. The study was conducted within the framework of a project approved in a Spanish public call, with bidding rules established for selecting the research company responsible for data collection, which included deontological clauses signed by the contracted entity to ensure ethical standards were met.

Author contributions

RA-P: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. MM-S: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fsufs.2025.1441694/full#supplementary-material

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