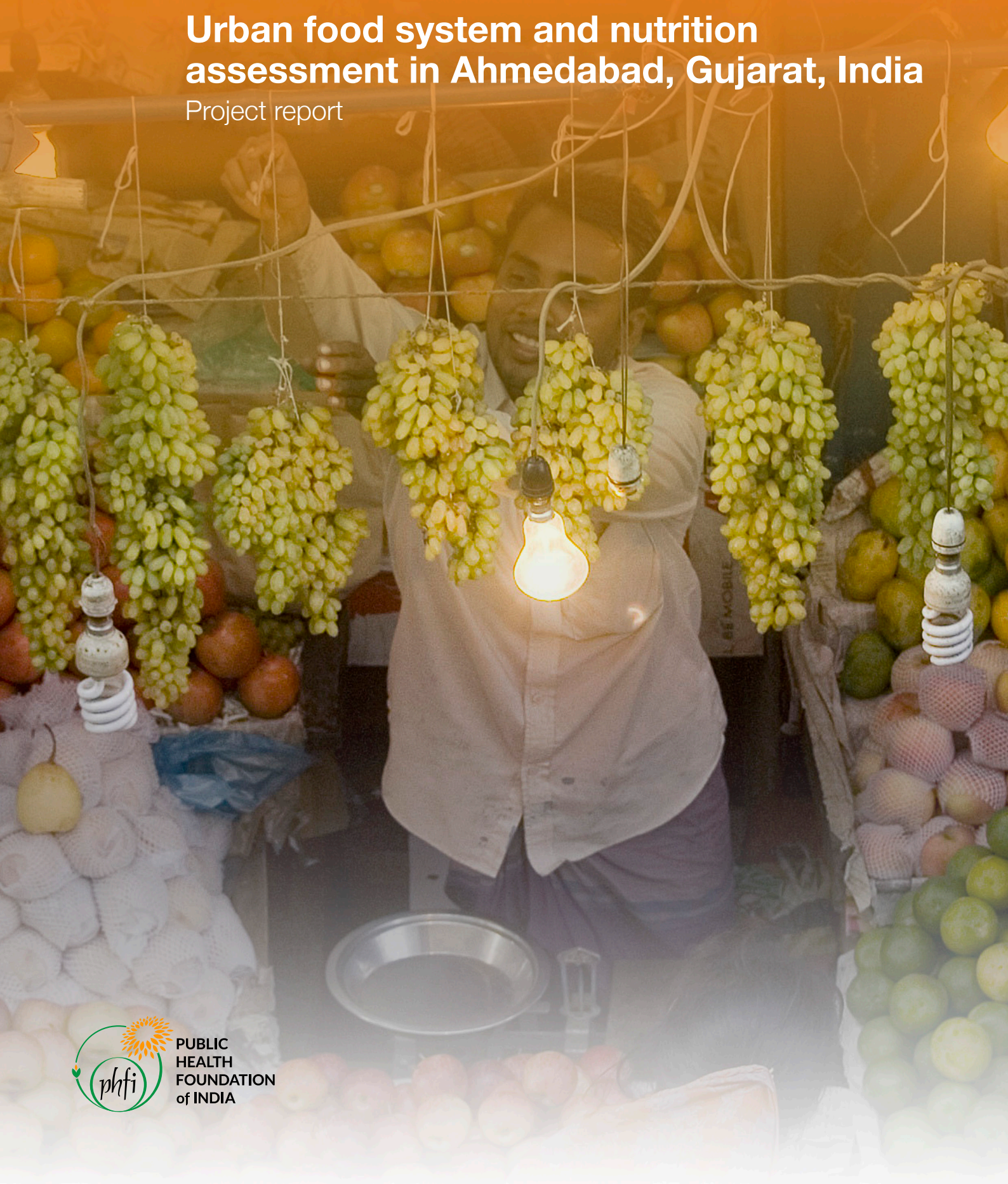




Food and Agriculture Organization  
of the United Nations

# Urban food system and nutrition assessment in Ahmedabad, Gujarat, India

Project report





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This report presents the key findings of the application of the UFSAN tool in Ahmedabad, India. It was written by Ahmed Raza (FAO), Himanshi Pandey (Public Health Foundation of India [PHFI], New Delhi), Aameeka Shereen Lobo (PHFI, New Delhi) and Anjali Ganpule Rao (PHFI, New Delhi), with helpful feedback from Isabela Sattamini (FAO).

The local research partners in Ahmedabad were Ashok Jadeja, Jaimik Makwana and Bhavesh Mehta. Overall guidance on the implementation of the tool in Ahmedabad was provided by Ahmed Raza (FAO), Anjali Ganpule Rao (PHFI) and Lindsay Jaacks (University of Edinburgh), with support from Manu Raj Mathur (PHFI, New Delhi) and Prabhakaran Dorairaj (PHFI, New Delhi).

The document was edited by Sarah Pasetto, and Davide Cascella was responsible for the layout and the development of the illustrations. Bianca Carlesi and Chiara Deligia provided communication support.



## ABBREVIATIONS AND ACRONYMS

AMC	Ahmedabad Municipal Corporation
CHC	community health center
COVID-19	coronavirus disease 2019
IDDS	individual dietary diversity score
MDD-W	minimum dietary diversity - women
PHFI	Public Health Foundation of India
UFSAN	Urban Food System Assessment for Nutrition
UNICEF	United Nations Children's Fund
INR	Indian Rupee*

\* INR 1 = USD 0.0135 (average 2020 rate)



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# 1. BACKGROUND

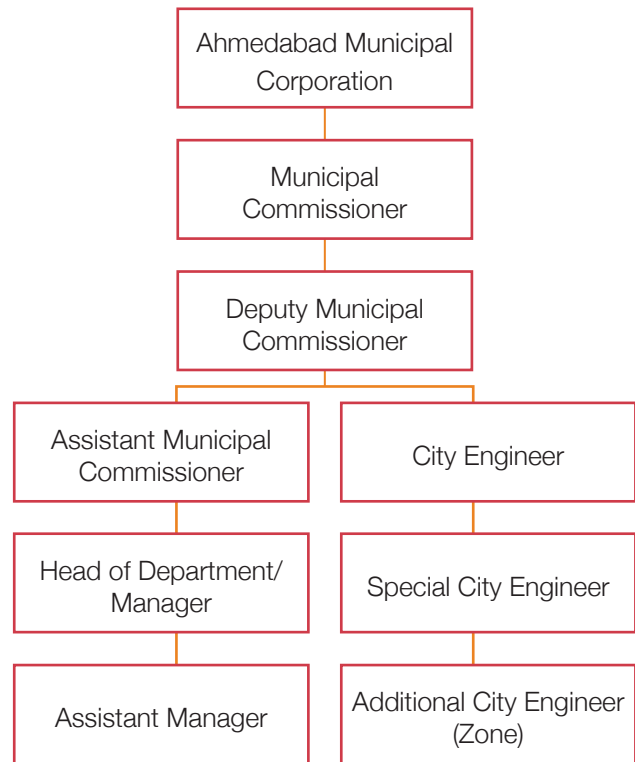
Ahmedabad is a historical industrial city. The largest city in the state of Gujarat, Ahmedabad acquired the status of a megacity in 2005; since then, the rate of growth and development has been exponential (AMC, 2021). In 2017, Ahmedabad became the first Indian city to be conferred the title of UNESCO World Heritage City. This is envisaged to help it to become a major tourist destination in the western part of India. In 2016, Ahmedabad was selected as one of the first 20 smart cities under the SMARTNET project launched by the Government of India (Solanki, Patel & Doshi, 2019).

## 1.1. Administrative overview

The city's local government authority, the Ahmedabad Municipal Corporation (AMC), was established in July 1950 under the Bombay Provincial Corporation Act, 1949, and is responsible for the civic infrastructure and administration of the city. The AMC is headed by a Municipal Commissioner, an officer of the Indian Administrative Service appointed by the Government of Gujarat who exercises the executive power of the body. For administrative purposes, the city is divided into six zones. Each zone is further split into wards. The zones are Central, East, West, North, South and New West, comprising a total of 64 wards. Each ward is represented by four corporators. An election is held to elect corporators every five years. The Mayor is the head of the party with the largest number of corporators elected (AMC, 2021). Figure 1 presents the administrative structure of the AMC.

**FIGURE 1.**

Organizational structure of the Ahmedabad Municipal Corporation's (AMC) administrative wing



Source: Ahmedabad Municipal Corporation (AMC), 2021.

## 1.2. Socio-economic profile – population trends

The total area of the megacity is 464.16 km<sup>2</sup> and its population, according to the census conducted in 2001, is of 4 505 539 inhabitants. The city of Ahmedabad is the seventh largest metropolis in India (AMC, 2021).

## 1.3. The malnutrition situation in Ahmedabad District

**TABLE 1.**

Prevalence of key nutrition indicators in Ahmedabad district

Indicator	Prevalence
Stunting (children < 5 years of age)	29.4
Wasting (children < 5 years of age)	27.1
Underweight children (< 5 years of age)	31.0
Anaemia among children (< 5 years of age)	76.0
Anaemia among women (15–49 years of age)	62.9

Source: NITI Aayog State Nutrition Dashboard.

## 1.4. Food security and nutrition programmes in Gujarat

In recent years, the Government of Gujarat has implemented several new initiatives to overcome the problem of malnutrition. In order to improve the current status of nutrition, the government has noted that preventive and curative strategies must be evolved very carefully, keeping in view the various stages at which interventions are desirable, namely: adolescence; the nine months of pregnancy to the first two years of age (the critical first 1 000 days); and childhood up to six years of age (Government of Gujarat, 2020).

### Food and nutrition initiatives by the Government of Gujarat

#### Doodh Sanjeevani Yojana

This initiative was launched in collaboration with the Integrated Child Development Services. The initiative envisages the provision of 100 ml of flavoured and double-toned pasteurized milk to children of 3 to 6 years of age, twice a week. The budget allowance is 2.45 Indian rupees (INR) per beneficiary for a one-time supply of 100 ml of milk. This scheme is implemented with the help of local dairies.

#### Third Meal

Support from this initiative is provided to moderate and severely underweight children of 3 to 6 years of age, to increase calorie and protein intake and promote weight gain.

#### Mobile anganwadis

Thirty-six mobile *anganwadis* (child care centres) are active in all of Gujarat, where supplementary nutrition is provided to the beneficiaries designated by the National Rural Employment Guarantee Act, the children of *agariya*,<sup>1</sup> pregnant women, nursing mothers and adolescent girls (Government of India, 2018).

<sup>1</sup> Community belonging to various states in India. In Gujarat, the community is mainly involved in salt making.

---

### **Kishori Shakti Yojana (KSY)**

This scheme was implemented using the infrastructure of the Integrated Child Development Services. The objectives of this scheme were to improve the nutrition and health status of girls of 11 to 18 years of age, to equip them to improve and upgrade their home-based and vocational skills, and to promote their overall development, including awareness about their health, personal hygiene, nutrition and family welfare and management.

### **Gujarat State Nutrition Mission**

This initiative is expected to entail the convergence of various key local government departments, including those for women and child development, health, education, rural development, tribal development, urban development, and water supply (Gujarat Corporate Social Responsibility Authority, 2018). The mission adopts a focused and accelerated approach to the issue of child and maternal malnutrition, with a strategy addressing both preventive and curative aspects. In particular, the mission envisages the following key centres:

- intensive nutrition care centres (*Ghanishth Poshan Abhiyan Kendra*), established at *anganwadi* centres for malnourished children without any medical needs;
- child malnutrition treatment centres (*Bal Sewa Kendra*) at Primary Health Centres, community health centres and sub-district levels for malnourished children; and
- nutrition rehabilitation centres (*Bal Sanjeevani Kendra*) at district hospitals and medical colleges, for malnourished children needing significant medical care (Gujarat Corporate Social Responsibility Authority, 2018).

### **Anaemia Mukh Bharat**

In this programme, beneficiaries receive iron and folic acid supplements irrespective of their iron and haemoglobin status. The program follows a life-cycle approach, with the interventions based on recommendations by the World Health Organization.

### **National Programme for Prevention & Control of Fluorosis**

Approximately 100 districts from 17 states of India have been identified as having population affected by fluorosis; Gujarat is one of these states. This programme is implemented in three districts in Gujarat: Jamnagar, Sabarkantha and Vadodara.

### **National Deworming Day**

National Deworming Day is the programme of the Government of India that provides Albendazole to children (National Health Portal, 2016).

### **Initiatives by United Nations organizations**

The United Nations Children's Fund (UNICEF) works for the effective implementation of the Mother's Absolute Affection programme, which aims to improve breastfeeding practices. UNICEF has supported the piloting of the One Full Meal Scheme, an intervention to improve nutrition among pregnant women and breastfeeding mothers. The organization aids implementation of facility- and community-based management of children with severe acute malnutrition; in addition, it provides support to improve the coverage and quality of the Government of India's Weekly Iron Folic Acid Supplementation Programme for adolescent girls and women. The technical support provided by UNICEF focuses on the institutional strengthening of *anganwadi* training centres, including with regard to early childhood curriculum development. Under the umbrella of Rashtriya Bal Suraksha Karyakram of the Government of India, UNICEF focuses on ensuring the survival of preterm babies and those having low weight at birth who are discharged from special newborn care units. These activities are supported by early identification of developmental delays and provision of care at district early intervention clinics. The aim is to increase awareness, among parents and caregivers, of the importance of stimulation and early childhood education (UNICEF India, 2020).

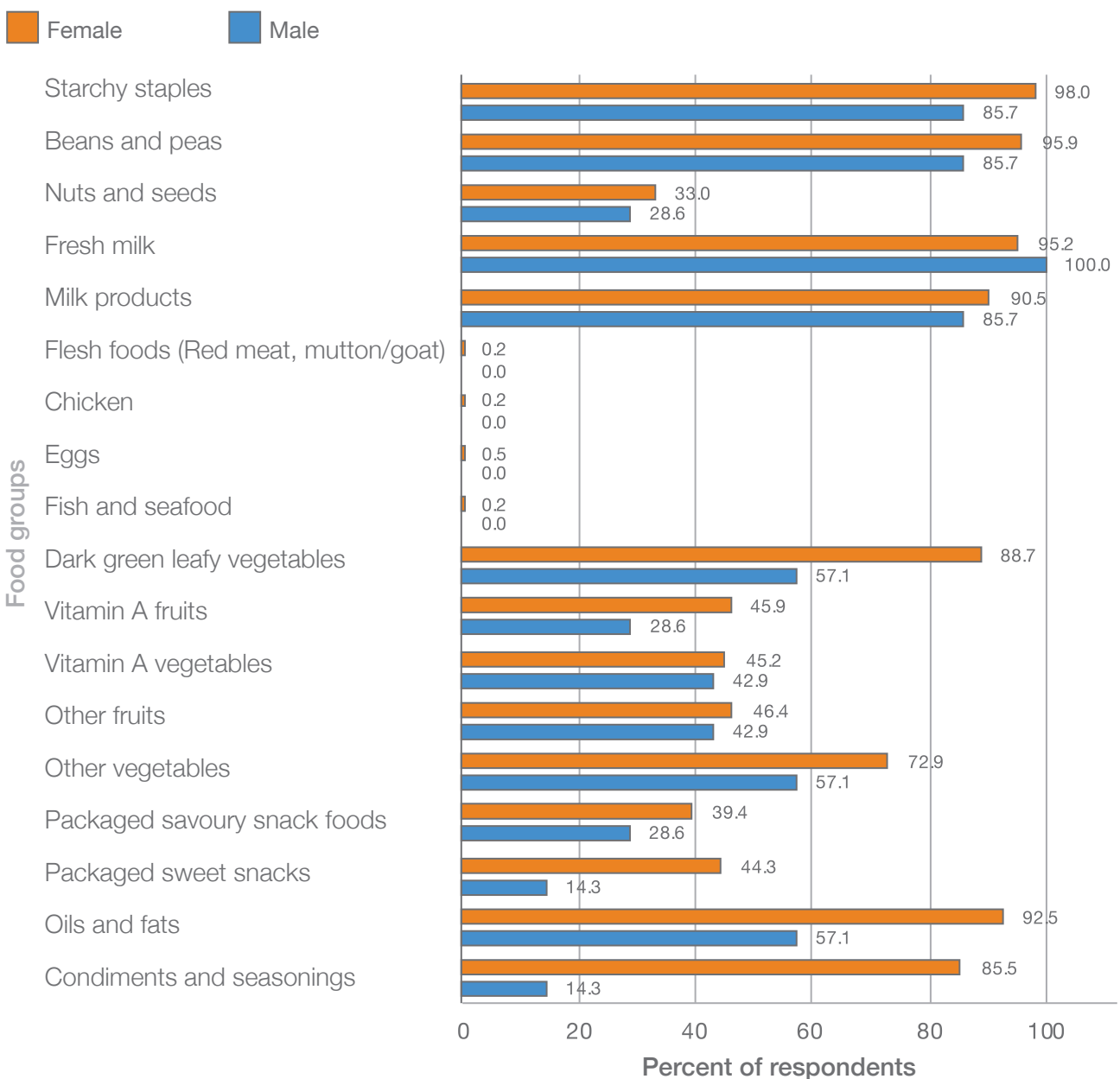


# OVERVIEW OF DIETS IN AHMEDABAD

- Ninety-eight percent of the participants consumed starchy staples daily.
- More than 90 percent consumed beans and peas (96 percent), fresh milk (95 percent) and milk products (90 percent) daily.
- Eighty-eight percent consumed dark green leafy vegetables, 84 percent consumed condiments and seasonings, 79 percent consumed other vegetables, 45 percent consumed vegetables rich in vitamin A, 46 percent consumed fruits rich in vitamin A, and 33 percent consumed nuts and seeds.
- Very few participants (less than 1 percent) consumed eggs, flesh foods and fish and seafood on a daily basis.
- Thirty-nine percent reported consuming packaged savoury snacks and 44 percent reported consuming packaged sweets on a daily basis.
- The mean Individual Dietary Diversity Score (IDDS) score was 5.92.
- Higher-income individuals had a higher IDDS.
- The mean minimum dietary diversity score for women of reproductive age (15–49 years) (MDD-W) was 5.95.

**FIGURE 2.**

Distribution of food consumption on a daily basis by gender (N=449)



Source: Authors' own elaboration.





---

## 2. DIETS

A total of 449 participants were interviewed across two wards, Paldi and Maninagar, by face-to-face interviews.<sup>2</sup>

A high proportion of respondents reported consuming, on a daily basis, starchy staples (98 percent), beans and peas (96 percent), fresh milk (95 percent), milk products (90 percent), dark green leafy vegetables (88 percent), condiments and seasonings (84 percent), and other vegetables (79 percent). On the other hand, fruits (46 percent), vegetables rich in vitamin A (45 percent), fruits rich in vitamin A (46 percent), nuts and seeds (33 percent), and eggs (0.4 percent) were consumed in lower proportions.

Almost 92 percent of respondents reported consuming oils and fats. Very few mentioned consumption of chicken (0.2 percent), flesh foods (0.2 percent), fish and seafood (0.2 percent) on a daily basis. Sweets and packaged savoury snacks were reported to be consumed by 44 percent and 39 percent of respondents, respectively.

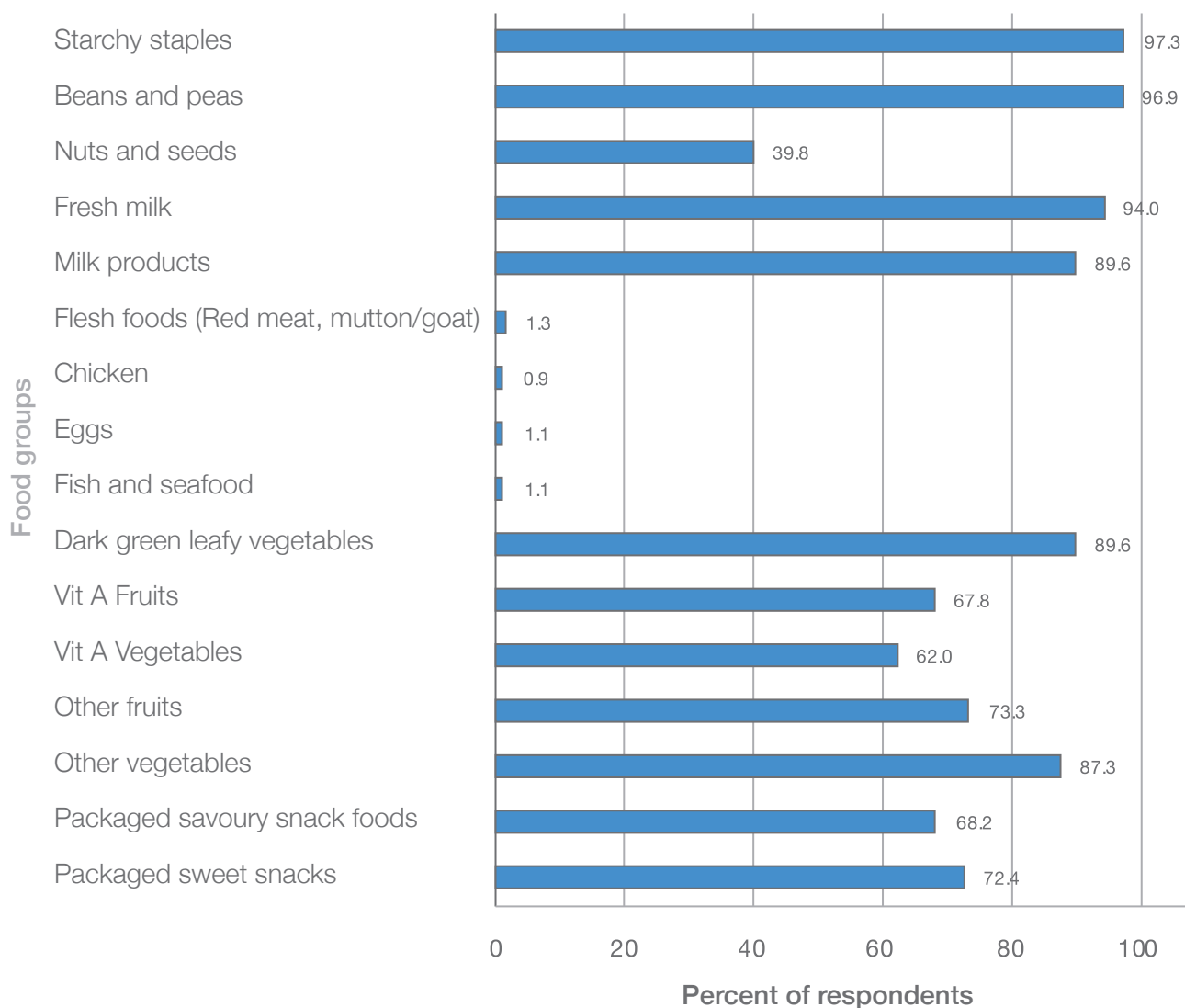
The weekly food consumption of participants also revealed a higher consumption of staples, beans and peas, fresh milk and dark green leafy vegetables (Figure 3). Concernedly, consumption of packaged savoury snack foods and packaged sweet snacks was high – 68 percent and 72 percent, respectively. The consumption of oils and fats was reported to be 92 percent.

---

<sup>2</sup> The consumer interviews were conducted from 17 October 2020 to 10 December 2020.

**FIGURE 3.**

Distribution of food consumption on a weekly basis by gender (N=449; Female=442, Male=7)



Source: Authors' own elaboration.

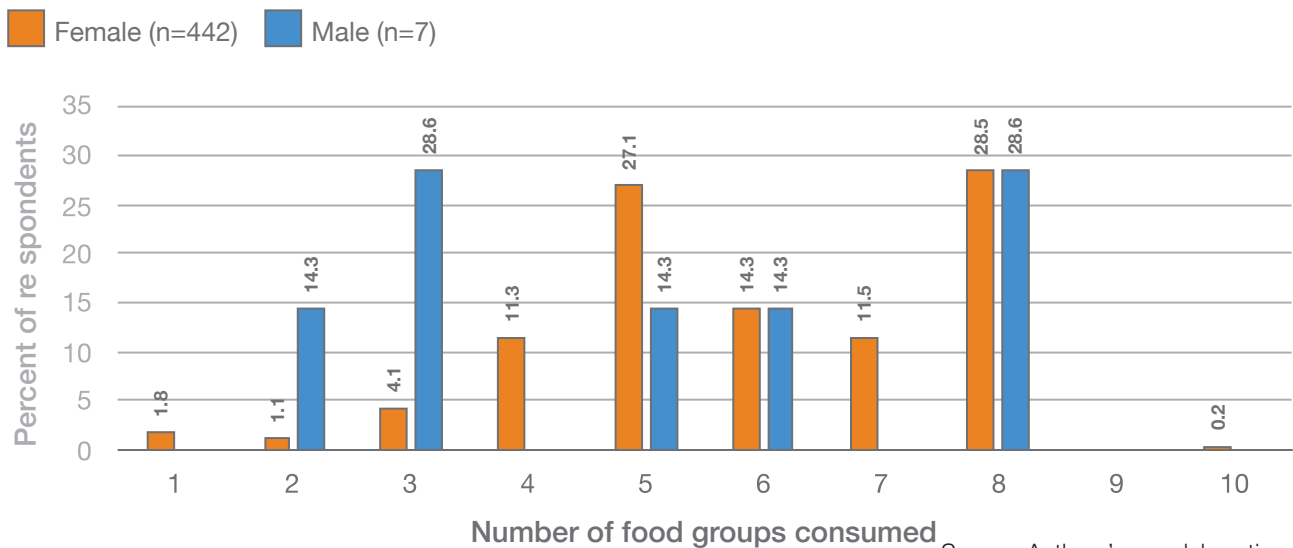
The mean individual dietary diversity score (IDDS)<sup>3</sup> was 5.92. Female respondents (n=442) reported a mean IDDS of 5.93 and male respondents reported a mean score of

5.00 (n=7). Approximately 81 percent of the respondents recorded an IDDS of 5 and above.

<sup>3</sup> The dietary diversity score was calculated considering ten food groups: starchy staples, legumes, nuts and seeds, milk and milk products, flesh foods, eggs, dark green leafy vegetables, vitamin-A rich fruits and vegetables, other vegetables, and other fruits.

**FIGURE 4.**

Percent of consumption of food groups by female and male respondents during the previous 24 hours (N=449)

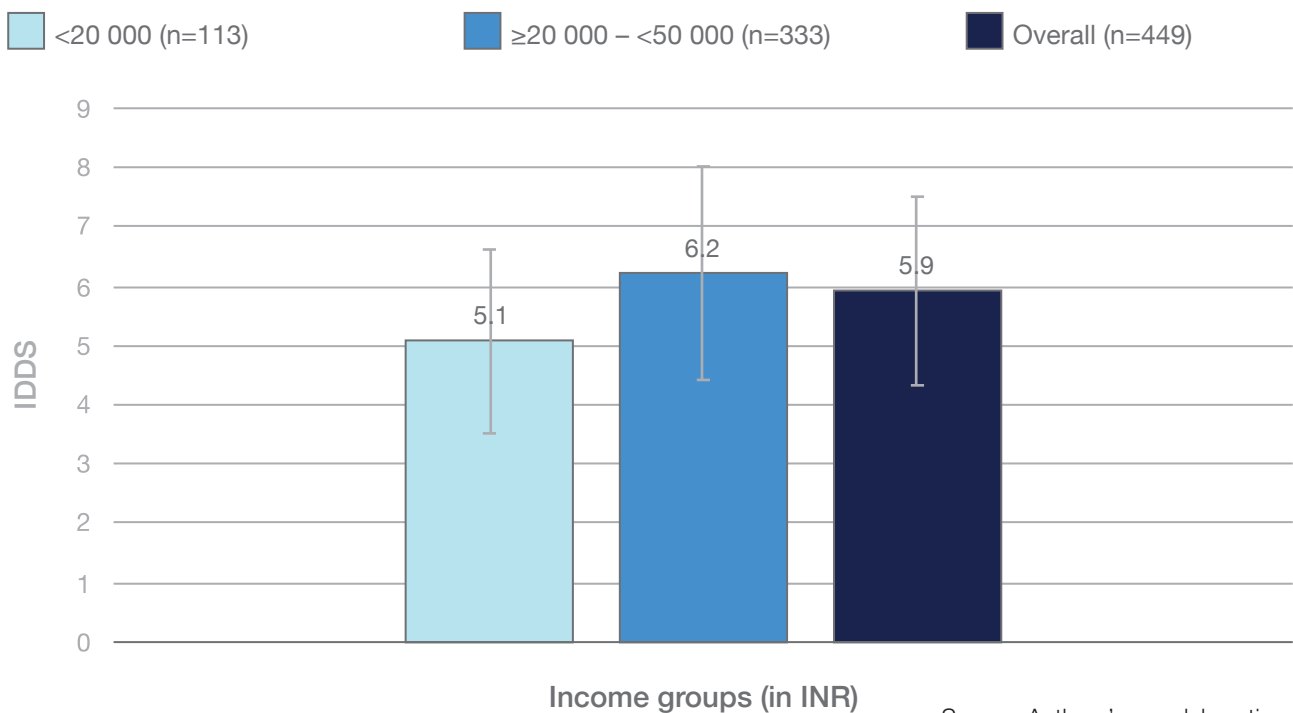


Source: Authors' own elaboration.

There was a significant increase in individual dietary diversity score as income levels increased (see Figure 5).

**FIGURE 5.**

Distribution of individual dietary diversity score by income group (N=449,  $p < 0.05$ )



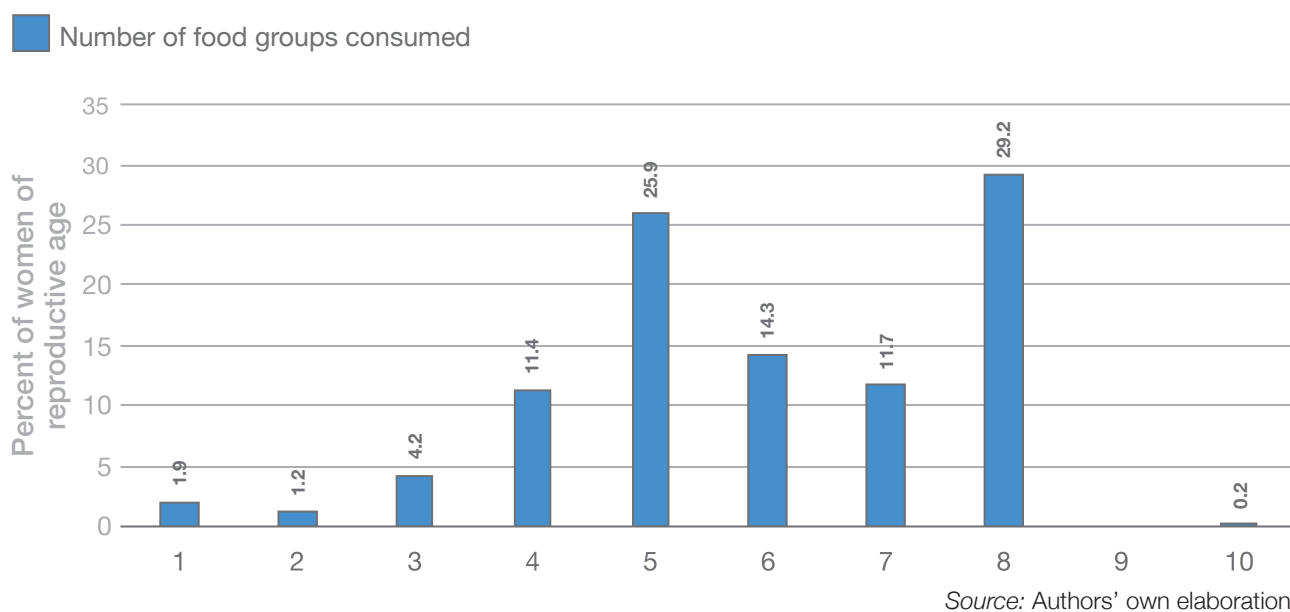
Source: Authors' own elaboration.

The mean minimum dietary diversity score for women of reproductive age (15–49 years) (MDD-W) was 5.95. Approximately, 81 percent of

this population group recorded a dietary diversity score of 5 and above.

**FIGURE 6.**

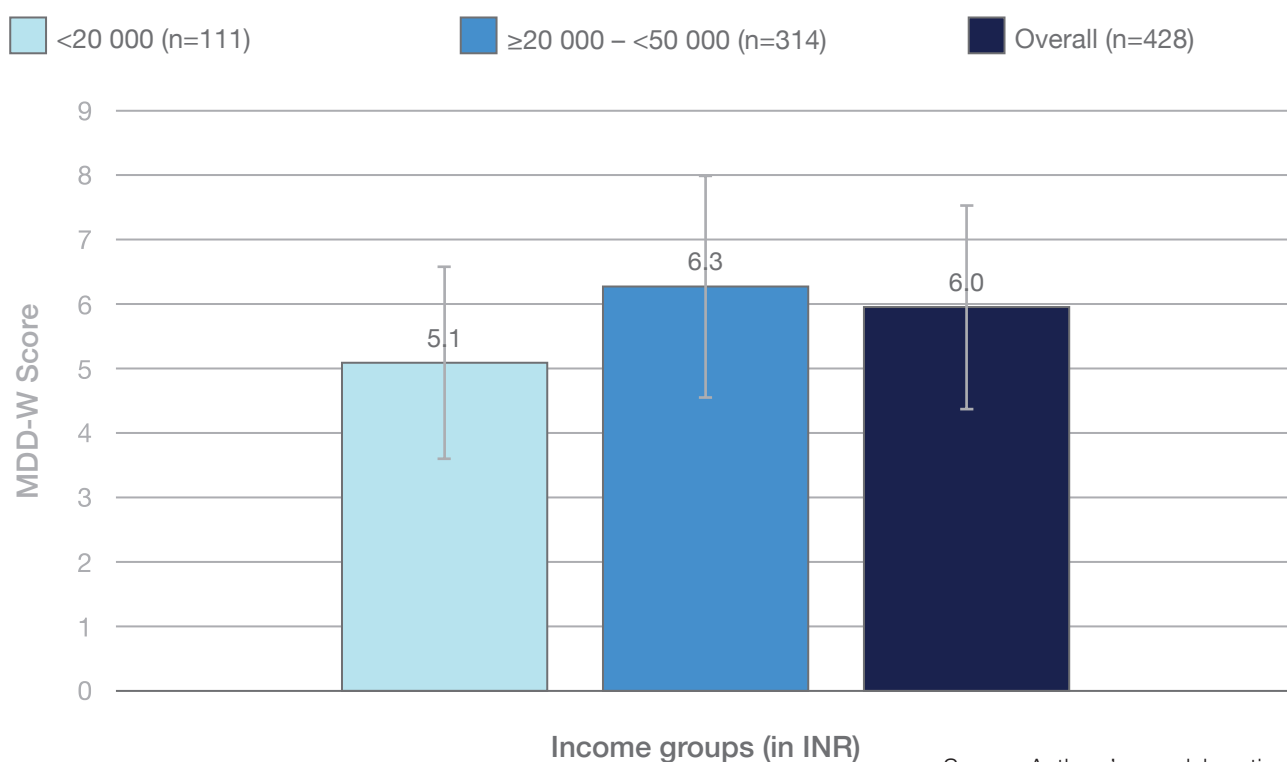
Percent of consumption of food groups by women of reproductive age during the previous 24 hours (N=428)



There was a significant increase in MDD-W as income levels increased (Figure 7).

**FIGURE 7.**

Distribution of MDD-W by income group among women of reproductive age (15–49 years) (N=428,  $p < 0.05$ )







# OVERVIEW OF CONSUMER BEHAVIOUR IN AHMEDABAD

**TABLE 2.**

Overview of consumer behaviour in Ahmedabad

Socio-economic characteristics	Accessibility of food	Desirability and acceptability of food	Food preparation	Eating patterns
<ul style="list-style-type: none"> <li>The majority of the participants were females, married, literate and between 18 to 75 years of age.</li> <li>Most of the participants owned a refrigerator or a freezer.</li> <li>A small number owned microwave ovens and had paid help for cooking.</li> <li>Water piped into the dwelling was the major source of cooking and drinking water.</li> <li>More than 50 percent of the participants strained water through a cloth as a treatment before use.</li> </ul>	<ul style="list-style-type: none"> <li>All of the participants purchased most of their food from retail outlets.</li> <li>The preferred retail outlets included: wet markets, small local shops, speciality stores, street vendors, mobile door-to-door vendors, grocery stores, and government ration shops.</li> <li>The least popular retailers included e-commerce (Internet delivery-based) food retailers.</li> <li>On each occasion, consumers' maximum expenditure was made on staples, followed by flesh foods and pulses and nuts.</li> </ul>	<ul style="list-style-type: none"> <li>Most consumers preferred to buy from retailers that:               <ul style="list-style-type: none"> <li>offered an opportunity to bargain on the price;</li> <li>offered a competitive price;</li> <li>were open at convenient times;</li> <li>gave a safe feeling; and</li> <li>provided food that tasted good.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>A high proportion of respondents did food shopping on their own, with very few reporting that they shared the responsibility with their spouses.</li> <li>A high proportion of respondents did food preparation on their own; few reported sharing the responsibility with other family members in the household.</li> <li>Both food shopping and food preparation were done predominantly by women.</li> </ul>	<ul style="list-style-type: none"> <li>The majority of the consumers reported lack of storage facilities as the main reason for not consuming food.</li> <li>Food not consumed was generally put in the household waste, fed to animals or given to someone else. This trend was generally seen across all food groups.</li> </ul>

Source: Authors' own elaboration.





### 3. CONSUMER BEHAVIOUR

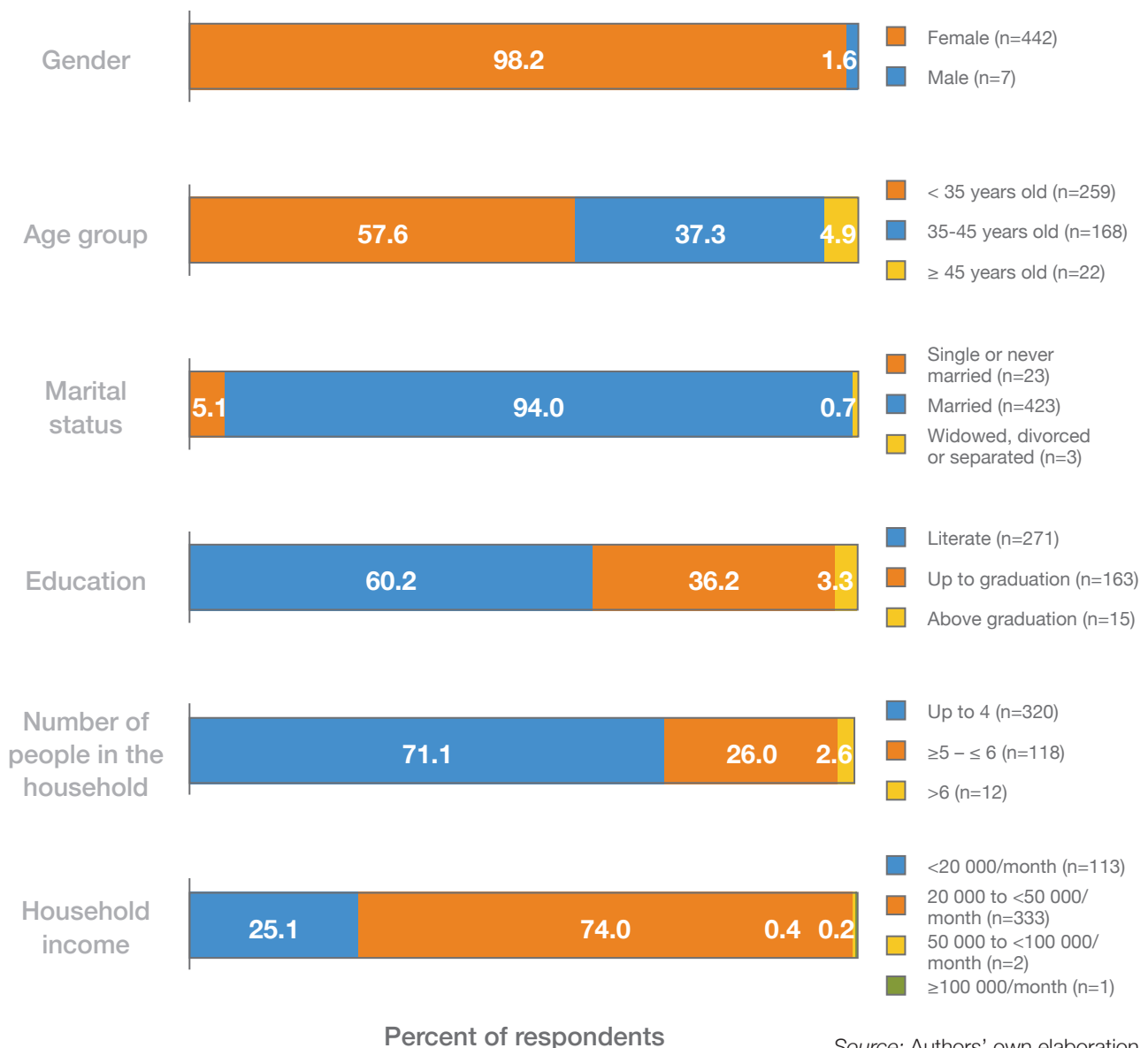
#### 3.1. Socio-economic characteristics

The survey was conducted mainly among females (98.2 percent), the majority of which were married. More than half of the participants were between 25 and 35 years of age; the mean age of the participants was 34.9 years.

Sixty percent of the participants were literate and one third of the households followed a nuclear family pattern, with four family members. Almost three quarters of participants earned up to INR 20 000 to 50 000 per month (see Figure 8).

**FIGURE 8.**

Distribution of socio-demographic profiles (N=449)



Source: Authors' own elaboration.

Note: Graduates are persons who have received a degree or diploma upon completing a course of study in a university or college.

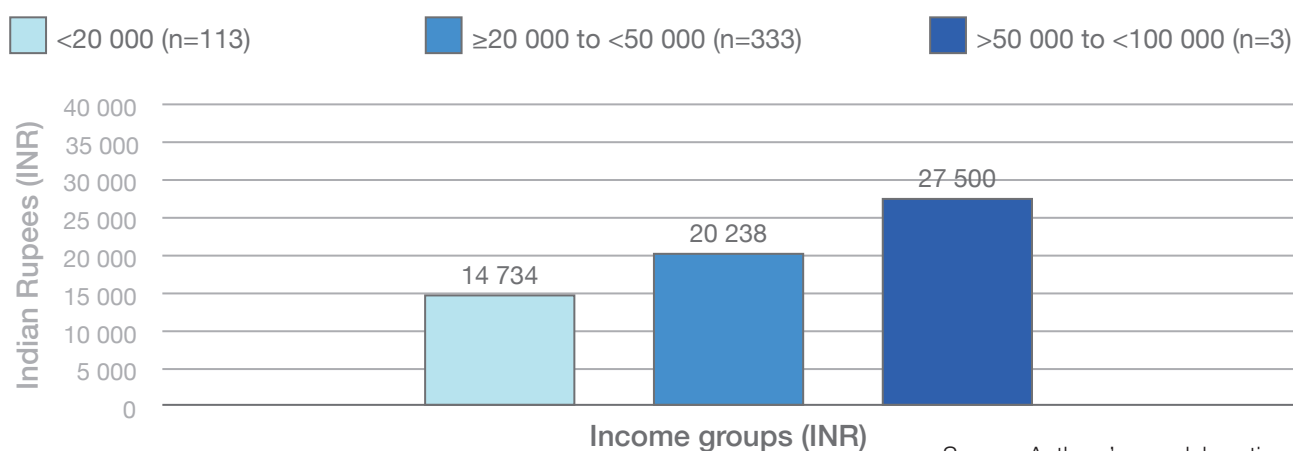
The majority of the participants owned a refrigerator (98 percent) and/or a freezer (94 percent) and used piped water within their dwelling as the source of cooking water (98 percent) and drinking water (98 percent). Approximately 24 percent of the participants owned a microwave oven and 6 percent had

paid help for cooking. Approximately 83 percent of the participants treated water before use, with straining through cloth (57 percent) and the use of electronic water purifiers (20 percent) being the most common methods to treat water.

Most of the food expenditure was made at the retailer level (Figure 9).

**FIGURE 9.**

Distribution of mean food expenditure by income groups (N=449, p<0.01)



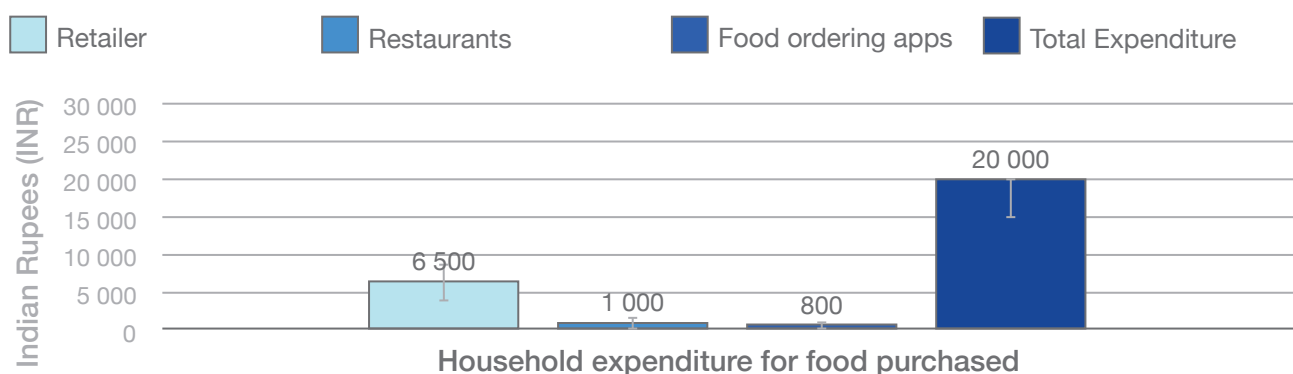
Source: Authors' own elaboration.

The consumers who participated in the assessment had a median household food expenditure of INR 20 000 per month. As the

income levels increased, the expenditure also increased significantly (Figure 10).

**FIGURE 10.**

Distribution of monthly median household expenditure on food (N=449)



Source: Authors' own elaboration.

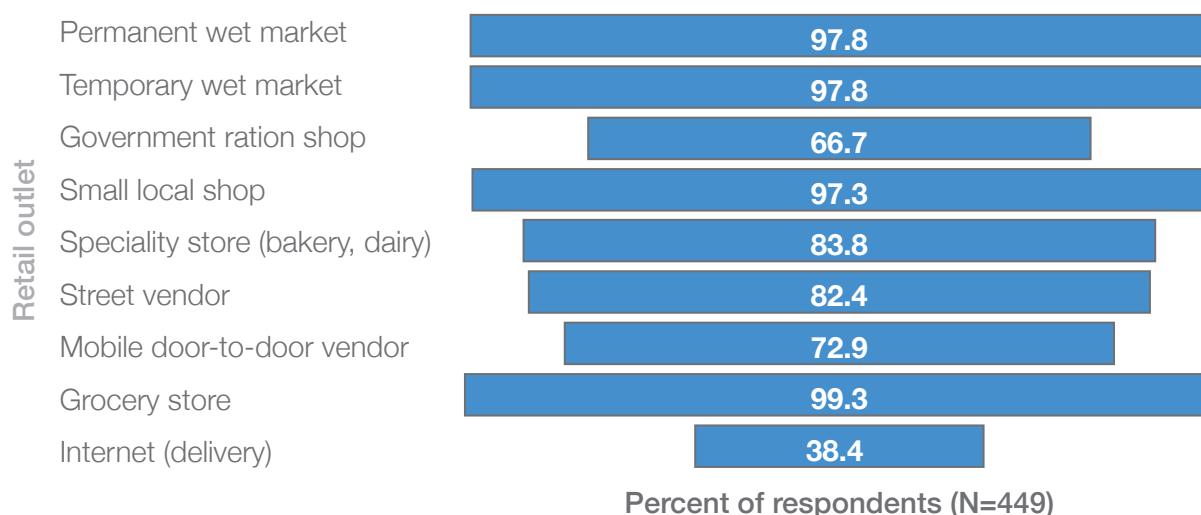
### 3.2. Accessibility of food

For consumers in Ahmedabad, wet markets (permanent and temporary), small local shops, speciality stores (bakeries, dairies), street vendors, mobile door-to-door vendors, grocery

stores, and government ration shops were the main retailers frequented. The least popular type of retailers included e-commerce (Internet delivery-based) food retailers (Figure 11).

**FIGURE 11.**

Distribution of food purchased from retailers (N=449)



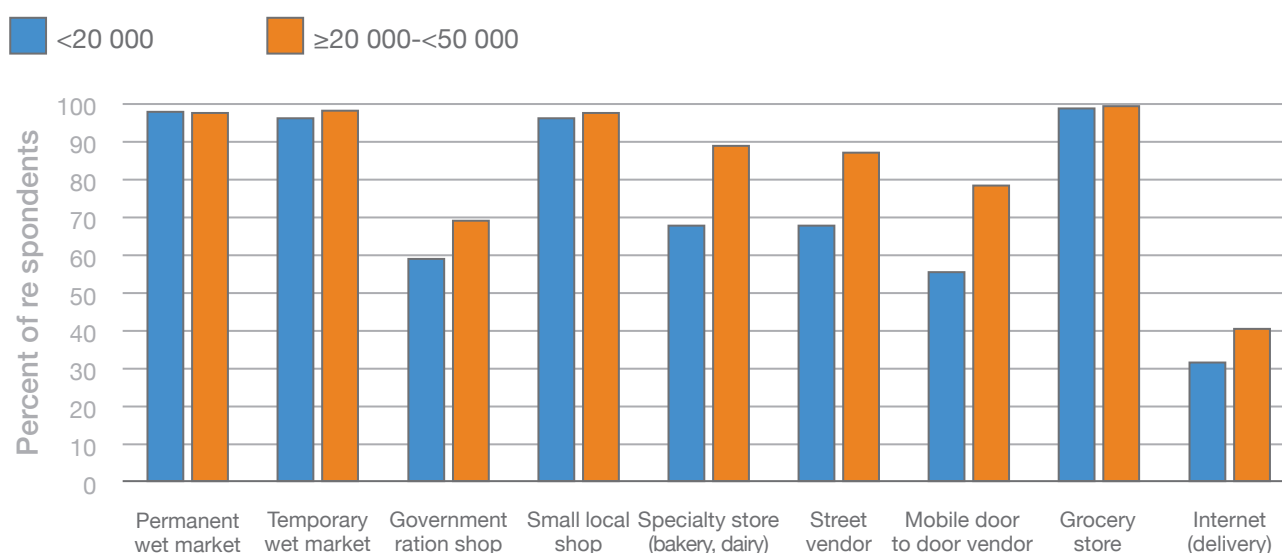
Source: Authors' own elaboration.

For low-income households (having a monthly income less than INR 20 000 per month), grocery stores (99 percent), permanent wet markets (98 percent), temporary wet markets (97 percent) and small local shops (97 percent) were the

preferred place for buying food (Figure 12). Similar preferences were noted for respondents belonging to households in the income group earning INR 20 000 to 50 000 per month.

**FIGURE 12.**

Distribution of foods purchased from the retailer, by income group (N=449)



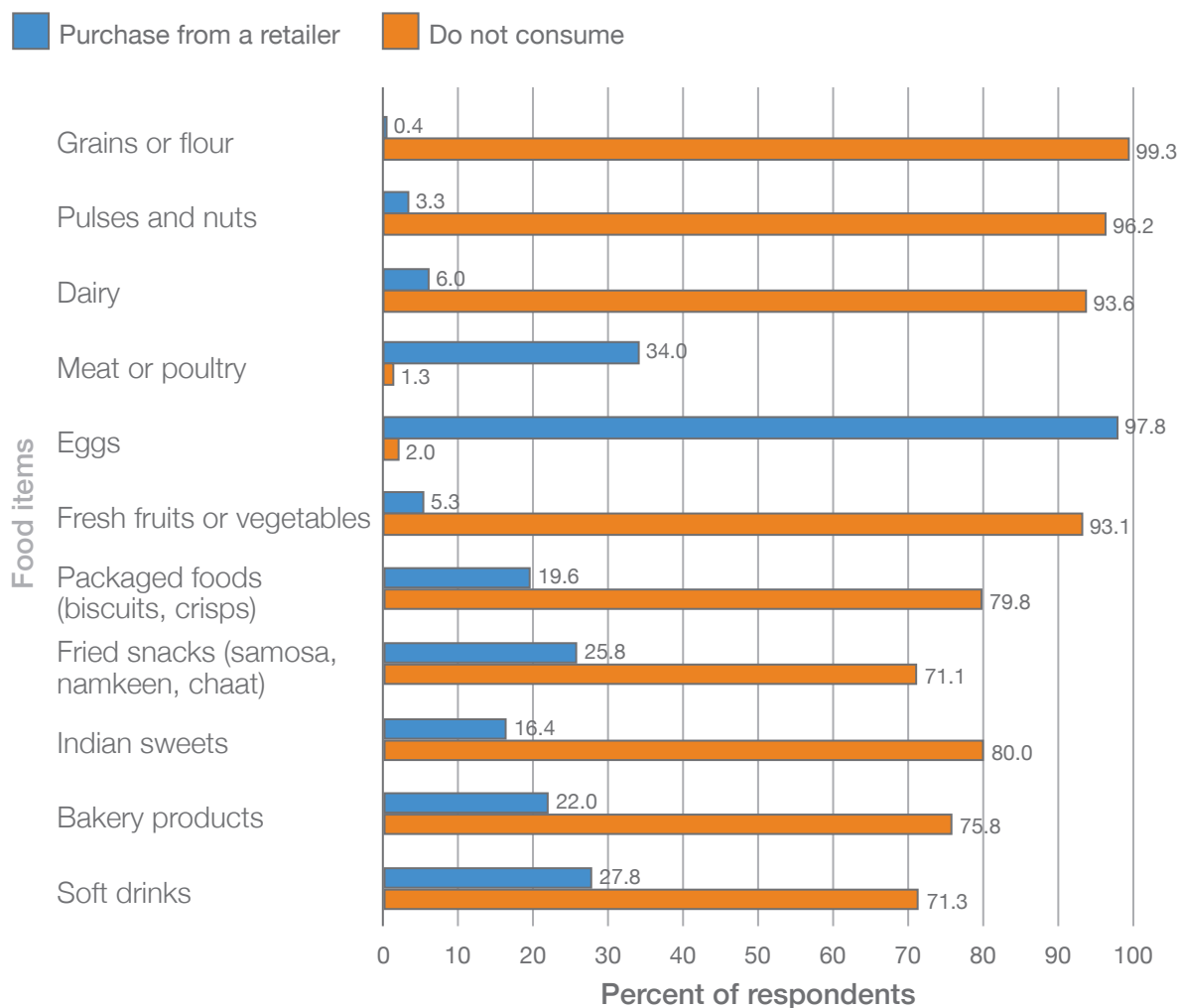
Source: Authors' own elaboration.

All of the participants purchased most of their food from retail outlets (Figure 13). For instance, a high proportion frequented retailers to buy grains, including flour (99 percent), pulses and nuts (96 percent), dairy products (94 percent), fresh

fruits and vegetables (93 percent), purchased foods such as biscuits and crisps (80 percent), bakery products (76 percent), Indian sweets (80 percent), fried snacks (71 percent) and soft drinks (71 percent).

**FIGURE 13.**

Distribution of food purchases, by location (N=449)



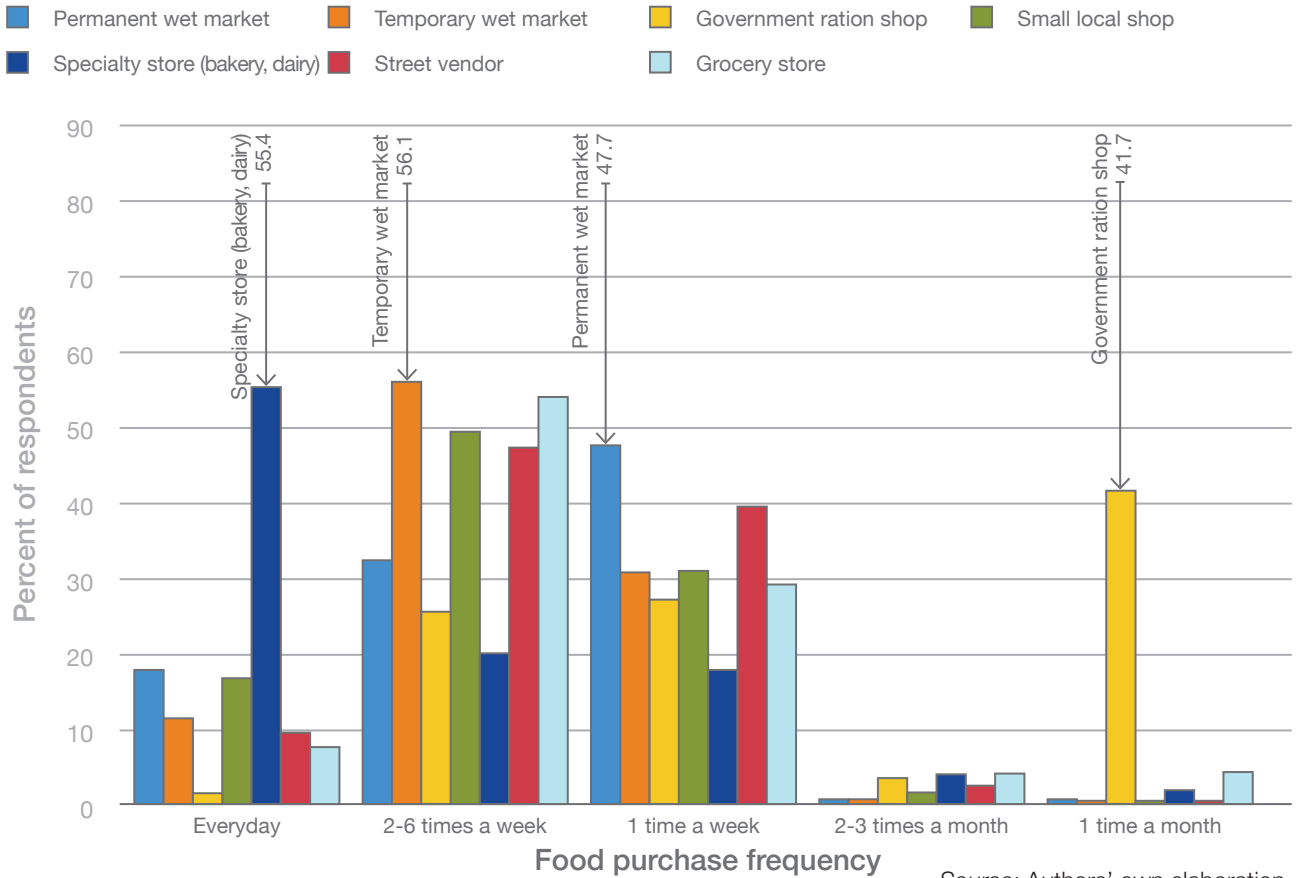
Source: Authors' own elaboration.

Consumers did their daily shopping at special stores (bakeries, dairies, etc.), whereas temporary wet markets, small local shops, street vendors and grocery stores were mostly frequented for multiple trips during the week

(two to six times a week) (Figure 14). Weekly shopping was done at permanent wet markets, and government ration shops were the preferred places to shop on a monthly basis.

**FIGURE 14.**

Distribution of percent of purchase from the retailer (N=449)

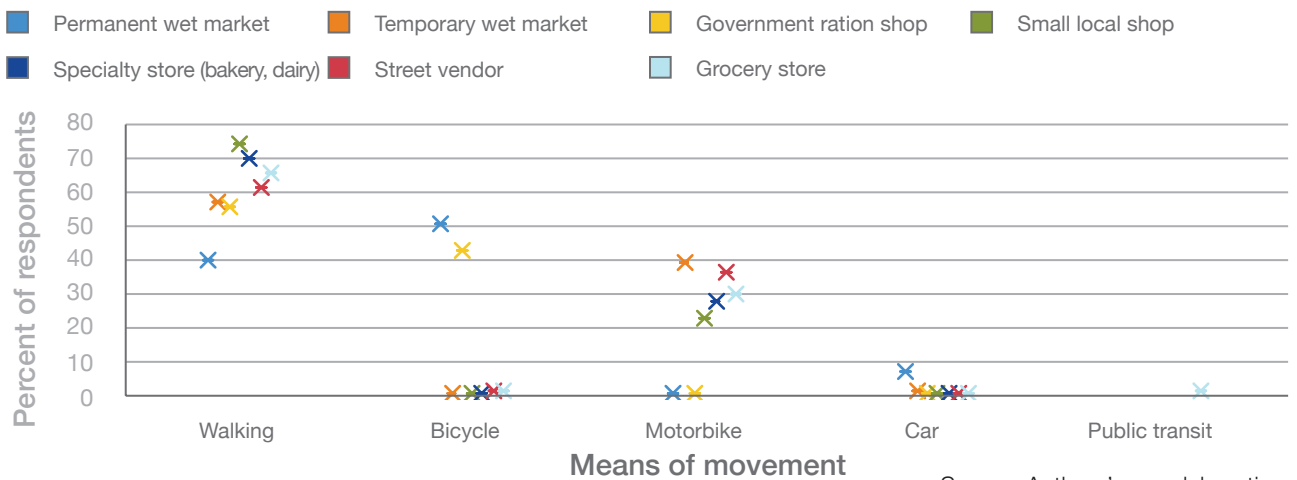


Source: Authors' own elaboration.

The majority of the respondents preferred either walking or using a motorbike as a means to purchase food from retailers (Figure 15).

**FIGURE 15.**

Preferred means of transportation to access retail outlets (N=449)



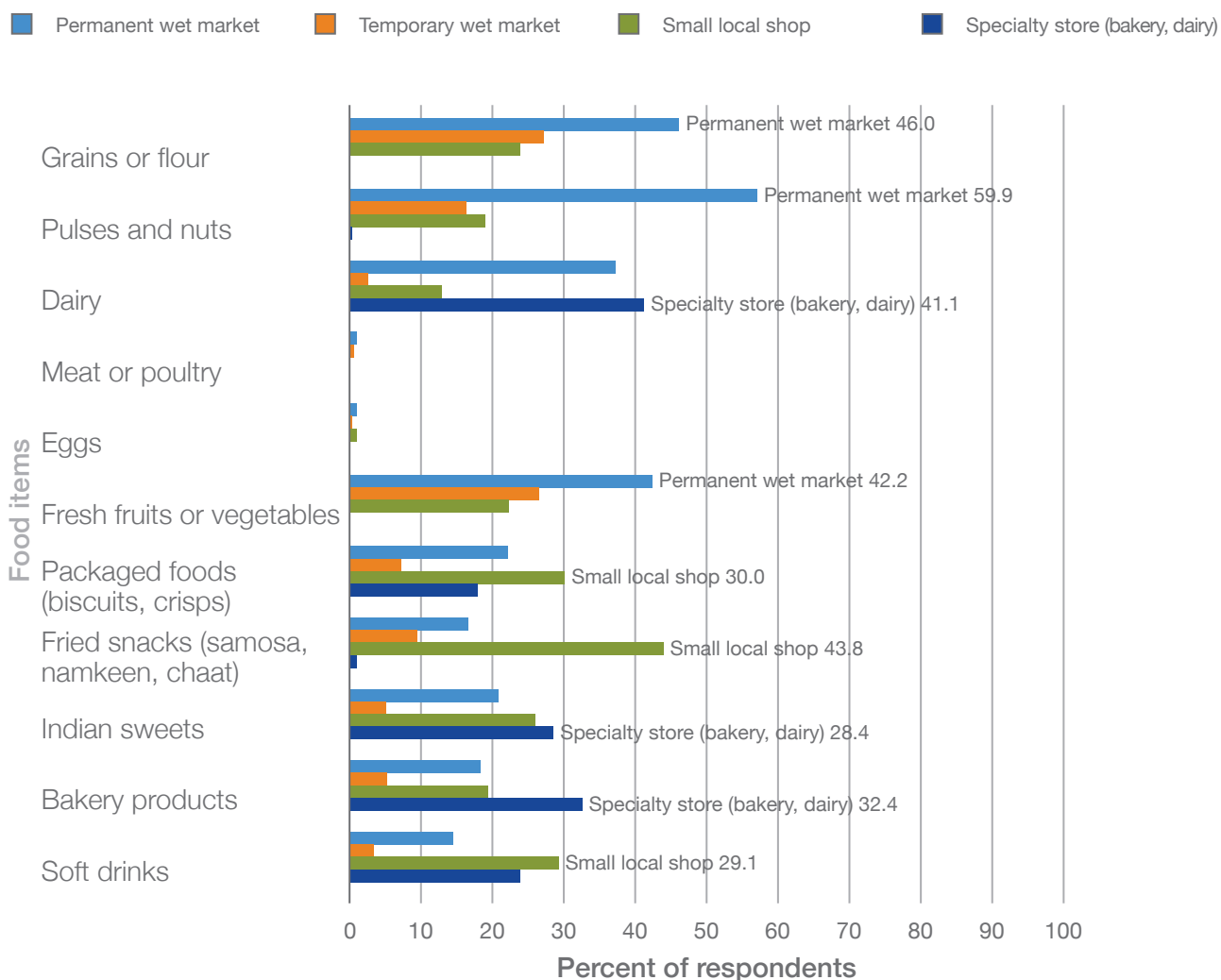
Source: Authors' own elaboration.

Various types of retailers were preferred for different food items (Figure 16). Grains, including flour were mostly purchased in permanent wet markets (46 percent), followed by temporary wet markets (27 percent) and small local shops (24 percent). Similarly, for pulses and nuts, the preferred location of purchase were permanent wet markets (57 percent), followed by small local shops (19 percent) and temporary wet markets (16 percent). Fresh fruits and vegetables were mostly purchased at wet markets – both permanent wet markets (42 percent) and temporary wet markets (26 percent) – as well as in small local shops (22 percent). Dairy products

were purchased primarily in speciality stores (41 percent), permanent wet markets (37 percent) and small local shops (13 percent). These small local shops were also the main source of purchase for packaged foods, such as biscuits and crisps (30 percent), fried snacks (44 percent) and soft drinks (29 percent). Speciality stores were preferred for the purchase of bakery products (32 percent) and Indian sweets (28 percent). Purchases made through Internet (e-commerce), street vendors, government ration shops and mobile door-to-door vendors were reported to be negligible.

**FIGURE 16.**

Distribution of food purchases, by type of retailer (N=449)



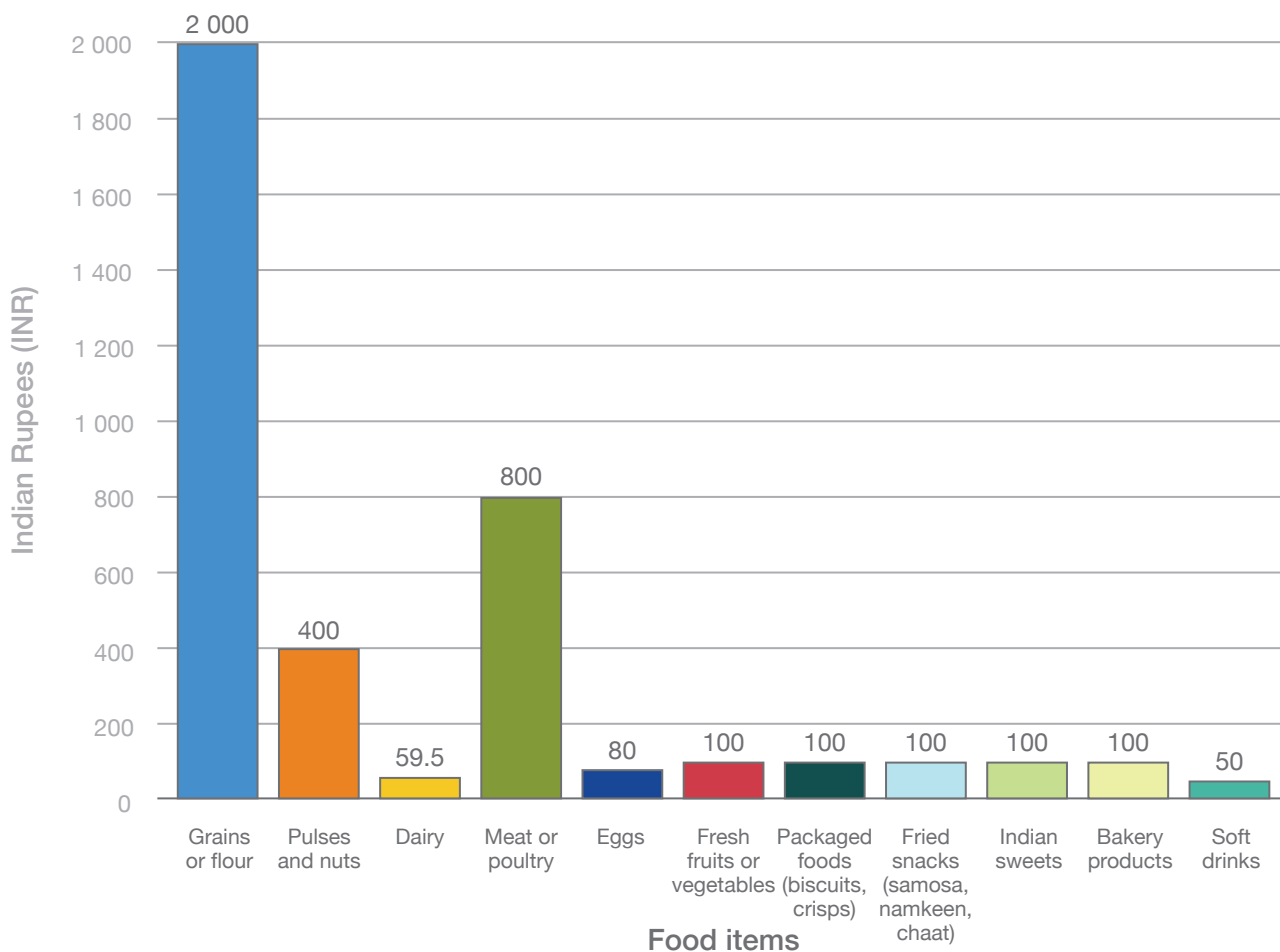
Source: Authors' own elaboration.

On each occasion, consumers' maximum expenditure was made on staples, followed by flesh foods and pulses and nuts (Figure 17). The maximum median amount spent on major food items was follows: grains, including flour – INR 2 000; meat or poultry – INR 800; and pulses

and nuts – INR 400. for fresh fruits or vegetables, packaged foods (biscuits, crisps, etc.), fried snacks (*samosa, namkeen, chaat*, etc.), Indian sweets and bakery products, the amount was INR 100.

**FIGURE 17.**

Median money spent by consumers on each occasion, by food items



Source: Authors' own elaboration.

### 3.3. Desirability and acceptability of food

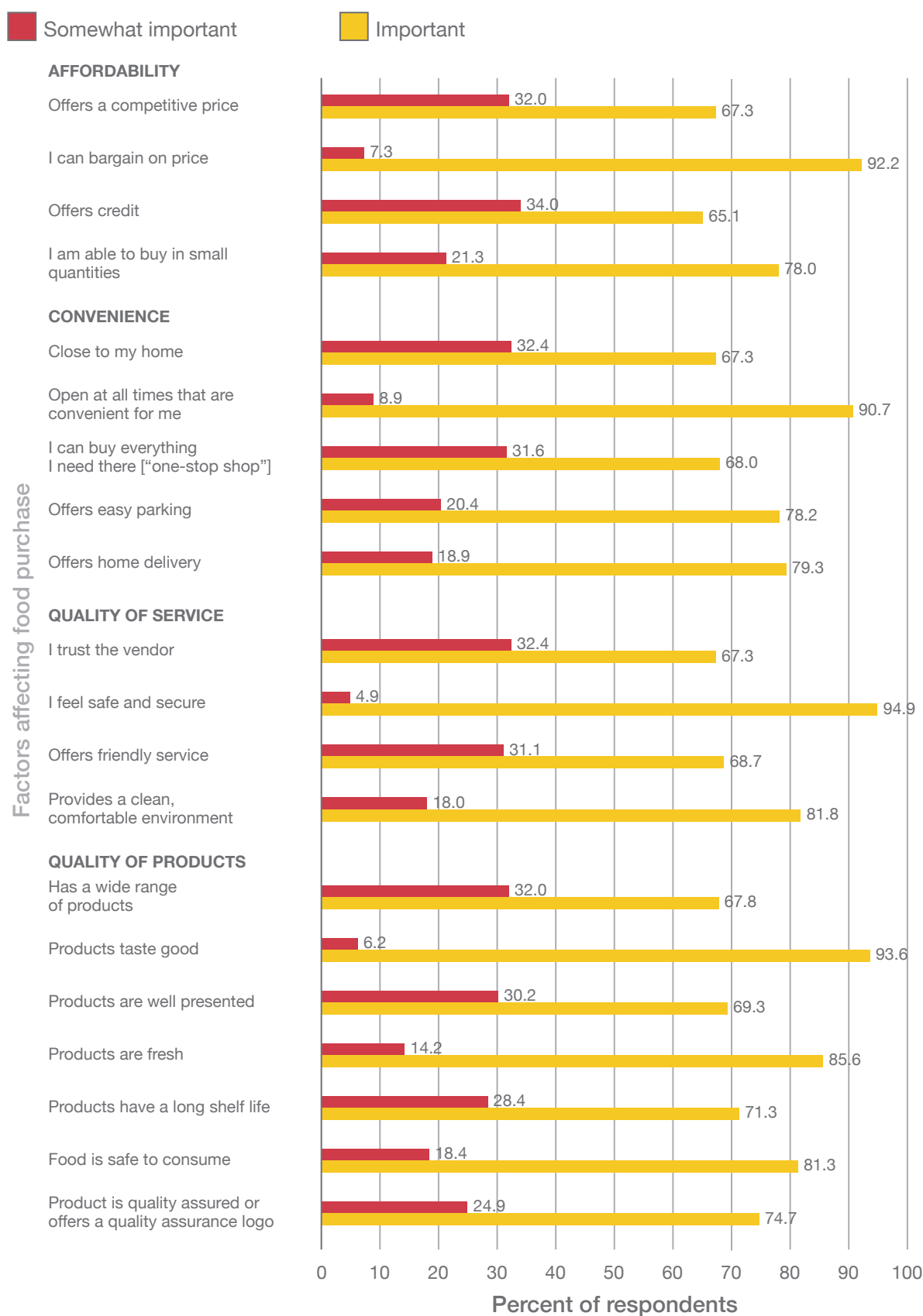
Respondents were asked to identify their preferences when making food purchases across the following four factors: affordability, convenience, quality of service and quality of products. Under food affordability, most consumers preferred the possibility to be able to bargain on the price (92 percent), buy in small quantities (78 percent) and from retailers who offer them a competitive price (67 percent).

In terms of convenience, consumers preferred to buy from outlets that were open at suitable

timings (91 percent), offered home delivery (79 percent) and had easy parking options (78 percent). Most consumers considered quality of service as an important factor when making purchases, valuing the feeling of safety and security (95 percent) and the presence of a clean and comfortable environment (82 percent). In terms of the quality of products, consumers valued products that tasted good (94 percent), were fresh (86 percent), and were safe to consume (81 percent).

**FIGURE 18.**

Distribution of factors affecting consumers' food purchase patterns (N=449)



Source: Authors' own elaboration.





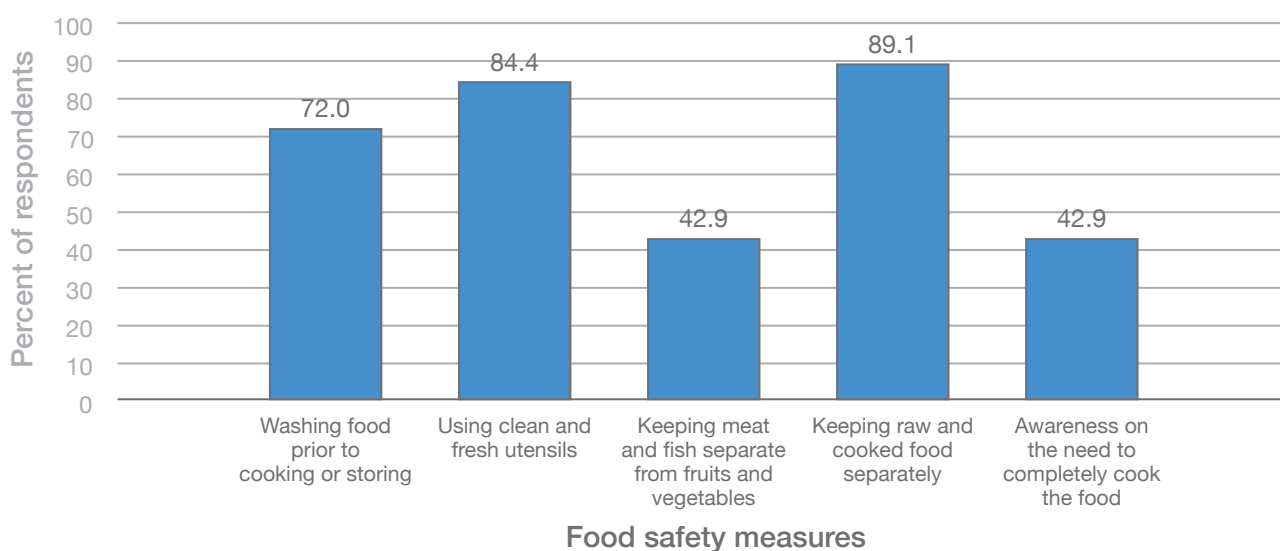
### 3.4. Food preparation

A high proportion of respondents (97 percent) did food shopping on their own, with very few sharing the responsibility with their spouse (1.3 percent). Similarly, 97 percent of the respondents did food preparation on their own, while 1.6 percent reported sharing the responsibility with their family members. Both food shopping and food preparation were done predominantly by women.

Most respondents noted high adherence to the food safety practices of washing food prior to cooking or storing, using clean and fresh utensils, and keeping raw and cooked foods separately (Figure 19). Conversely, 43 percent of consumers mentioned adherence to keeping meat and fish separate from fruits and vegetables, and 43 percent were aware of the need to cook the food completely.

**FIGURE 19.**

Food safety practices at the household level (N=449)



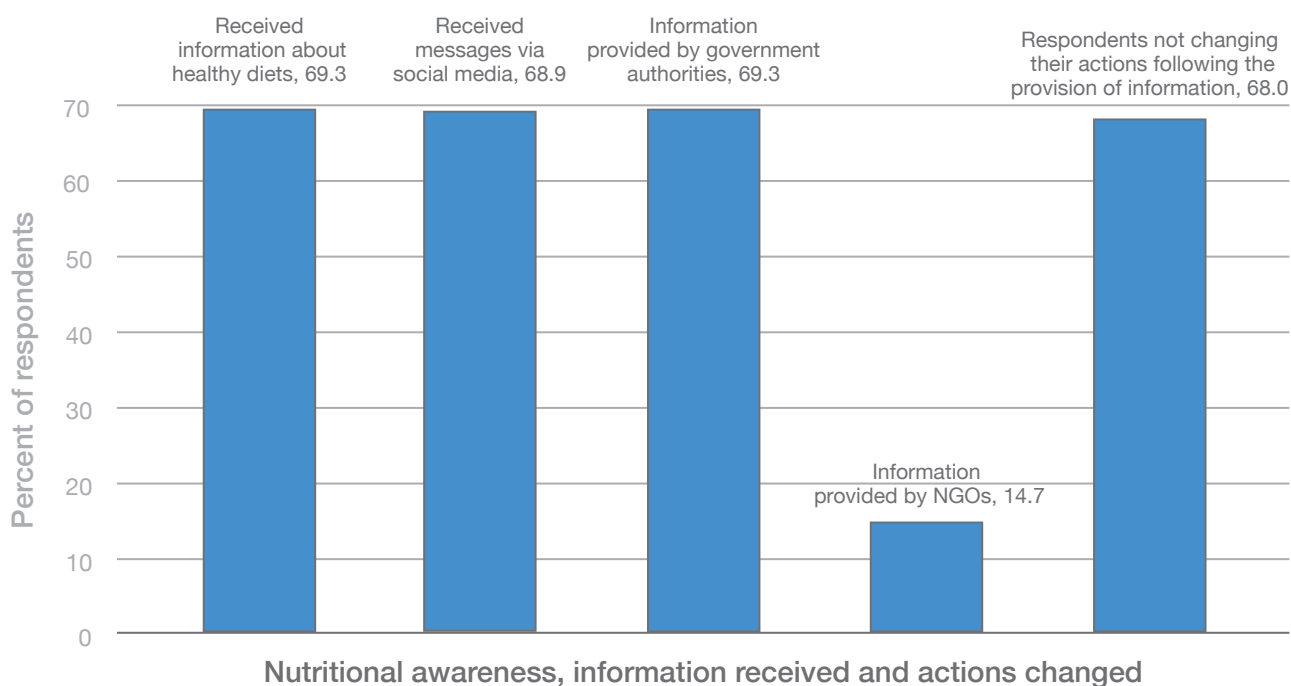
Source: Authors' own elaboration.

Most households (69 percent) mentioned that they had received information on nutrition and healthy diets in the previous twelve months (Figure 20). The main sources of the nutritional information were social media (69 percent) and

government authorities (69 percent). An almost equal proportion of respondents (68 percent) reported taking no action after receiving this information.

**FIGURE 20.**

Distribution of nutritional awareness, information received about healthy diets and actions changed by the consumers (N=449)



Source: Authors' own elaboration.

### 3.5. Consumption patterns

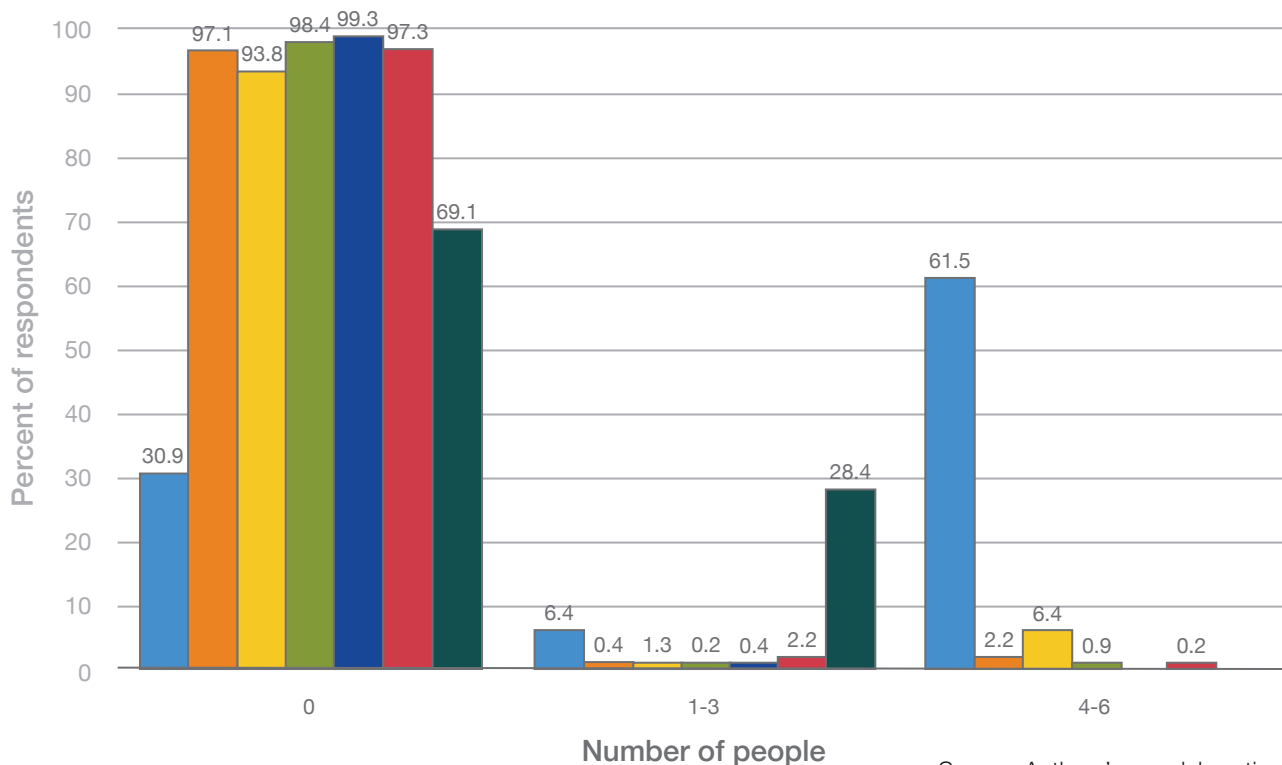
When asked about the dietary patterns of their family members, 61.5 percent of the participants reported having four to six members who were completely vegetarians (did not eat meat or fish); 31 percent reported having zero completely vegetarians in the household (Figure 21). Ninety-seven percent of respondents reported having 0 mainly vegetarian family members in their household (who eat fish but not meat). Ninety-four percent reported having 0 vegans, who do not eat products derived from animals,

among their households' family members. Ninety-eight percent of respondents reported having 0 non-vegetarians (individuals who eat both fish and meat) in the household. In terms of special diets, the majority of the households reported having zero individuals consuming a special diet for weight loss (99 percent) and medical reasons (97 percent). Twenty-eight percent of the respondents reported having one to three family members observing a special diet due to religious reasons.

**FIGURE 21.**

Dietary patterns of households (N=449)

- Completely vegetarian  
(do not eat meat or fish)
- Mainly vegetarian  
(eat fish but not meat)
- Vegan  
(do not eat products  
derived from animals)
- Non-vegetarian  
(eat both fish and meat)
- Trying to lose weight
- Special diet for  
medical reasons
- Special diet for  
religious reasons



Source: Authors' own elaboration.

Participants were asked to specify the reasons for not consuming food purchased for the household, based on the following five factors: lack of storage facilities, poor food quality, food spoilage before consumption, prepared too much and other relevant factors. The majority of consumers reported lack of storage facilities as the main reason for not consuming food.

Food not consumed was generally put in the household waste, fed to animals or given to someone else. For instance, for grains, including flour, that were not consumed, more than 46 percent reported discarding them in the waste, 30 percent reported feeding them to animals and 20 percent reported giving them away to others. This trend was generally seen in other food groups as well.



# MARKET

**S** **A** **L** **E**

**SPECIAL**  
*Price*

GROCERY STORE

DAIRY

**50%**  
OFF

**SALE**

**DRINKS**

FRUITS & VEGETABLES



# OVERVIEW OF FOOD ENVIRONMENTS IN AHMEDABAD

**TABLE 3.**

Overview of food environments in Ahmedabad

## Availability and accessibility of food

- The assessment revealed that 109 food items were sold by retailers.
- Wheat and rice were the main staples sold, while *tur* and *mung dal* were the main pulses available for consumers.
- Several retailers sold packaged foods (biscuits and crisps) and fried snacks (*samosas*, *namkeen*, *chaat*, etc.).
- For staples, the main source of purchase for retailers were wholesalers (87 percent) and traders (13 percent).
- Milk and milk products were mostly procured from wholesalers – 86 percent and 100 percent, respectively.
- Retailers procured fresh fruits and vegetables from wholesalers. Wholesalers were also the main source of purchase for packaged foods, snack foods, eggs, and meat and poultry.
- Most of the food products (99 percent) across all food groups were sold primarily to consumers.

## Marketing and regulation

- Among 55 retailers, only 8 stated that fresh fruit or vegetable produce bins were available outside the premises.
- Eighteen percent of retailers – all formal retailers – advertised their food products outside their outlet (e.g. at the door, windows, walls, fences and parking lots).
- Thirty-two percent of the retailers were observed to advertise their products at the entrance and checkout sections. Twelve percent advertised at the ends of aisles.
- The most common food items advertised were crisps and biscuits. The most desired areas to advertise were doors, windows, walls, fences and parking lots (46 percent).

## Food quality and safety

- A very high proportion of retailers (85 percent and above) highlighted food safety and quality as important factors when choosing potential suppliers. Convenience (80 percent) and affordability (75 percent) were also noted to be important.
- Retailers identified the following as major problems in interactions with suppliers: involvement of multiple intermediaries, high transport cost, long delivery time, high price per unit, poor communication and price volatility.
- Out of 55 retailers, only three (5 percent) reported having received formal training in food safety management provided by their companies, associations or family members.
- Only six (11 percent) operated under a food safety or quality assurance programme; however, an overwhelming majority of the retailers reported there being no barriers to operating formal food safety programmes.
- To reduce loss of food products across food groups, retailers noted sourcing good-quality food (74 percent) and improving packaging (61 percent) as the most common strategies they employed.

Source: Authors' own elaboration.





## 4. FOOD ENVIRONMENTS

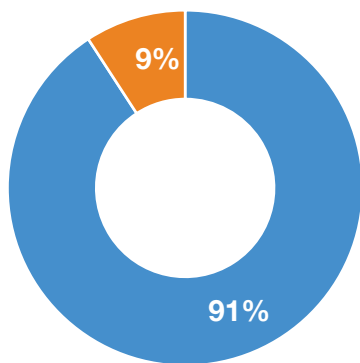
In this assessment, retailers were divided into two main types: formal retailers and informal retailers. Formal retailers were those having permanent establishments with licenses to sell their goods in local markets or malls. Informal retailers were those who did not have a license nor a fixed place to sell their products.

A total of 55 retailers were surveyed in ten wards of Ahmedabad.<sup>4</sup> Fifty (91 percent) were formal retailers and 5 (9 percent) were informal retailers (Figure 21). Approximately 36 percent of formal retailers were from Navarangpura Ward.

**FIGURE 22.**

Distribution of type of retailers interviewed for the assessment (N=55)

■ Formal retailers (n=50) ■ Informal retailers (n=5)



Source: Authors' own elaboration.

All formal retailers interviewed as part of the assessment had permanent structures. In this study, permanent structures are defined as those shops registered for goods and service tax and that have been established in a fixed place. Temporary structures, instead, are those situated in no allocated place.

<sup>4</sup> The retailer interviews were conducted during the period of 23 October 2020 to 7 December 2020.

Out of 55 retailers, only 6 (11 percent) – all of which formal retailers – were members of a trade association. These trade associations were reported to provide the following services: extension and technical production advice, market information, sourcing of inputs, mechanization services, publicity and advocacy, assistance with licenses and compliance with regulations, and negotiations with authorities.

### 4.1. Availability and accessibility of food

Table 4 presents an overview of the food groups and food items sold by retailers in Ahmedabad. The assessment revealed that 109 food items were sold by retailers. Wheat and rice were the main staples sold, while tur dal and mung dal were the main pulses available for consumers. Several retailers sold packaged foods (biscuits and crisps) and fried snacks (*samosas*, *namkeen*, *chaat*, etc.).

**TABLE 4.**

Distribution of food items and food groups, overall (N=109 food products)

Food groups	Food items	Frequency (%)
Staples	Wheat	11 (18.3)
	Rice	10 (16.7)
Pulses	Tur dal	9 (15.0)
	Mung dal	8 (13.3)
Vegetables	Onion	5 (8.3)
	Potato	5 (8.3)
	Tomato	3 (5.0)
	Other vegetables	3 (5.0)
Fruits	Banana	5 (8.3)
	Papaya	4 (6.7)
	Pomegranate	-
	Other fruits	5 (8.3)
Milk	Milk	7 (11.7)
Milk products	Paneer	4 (6.7)

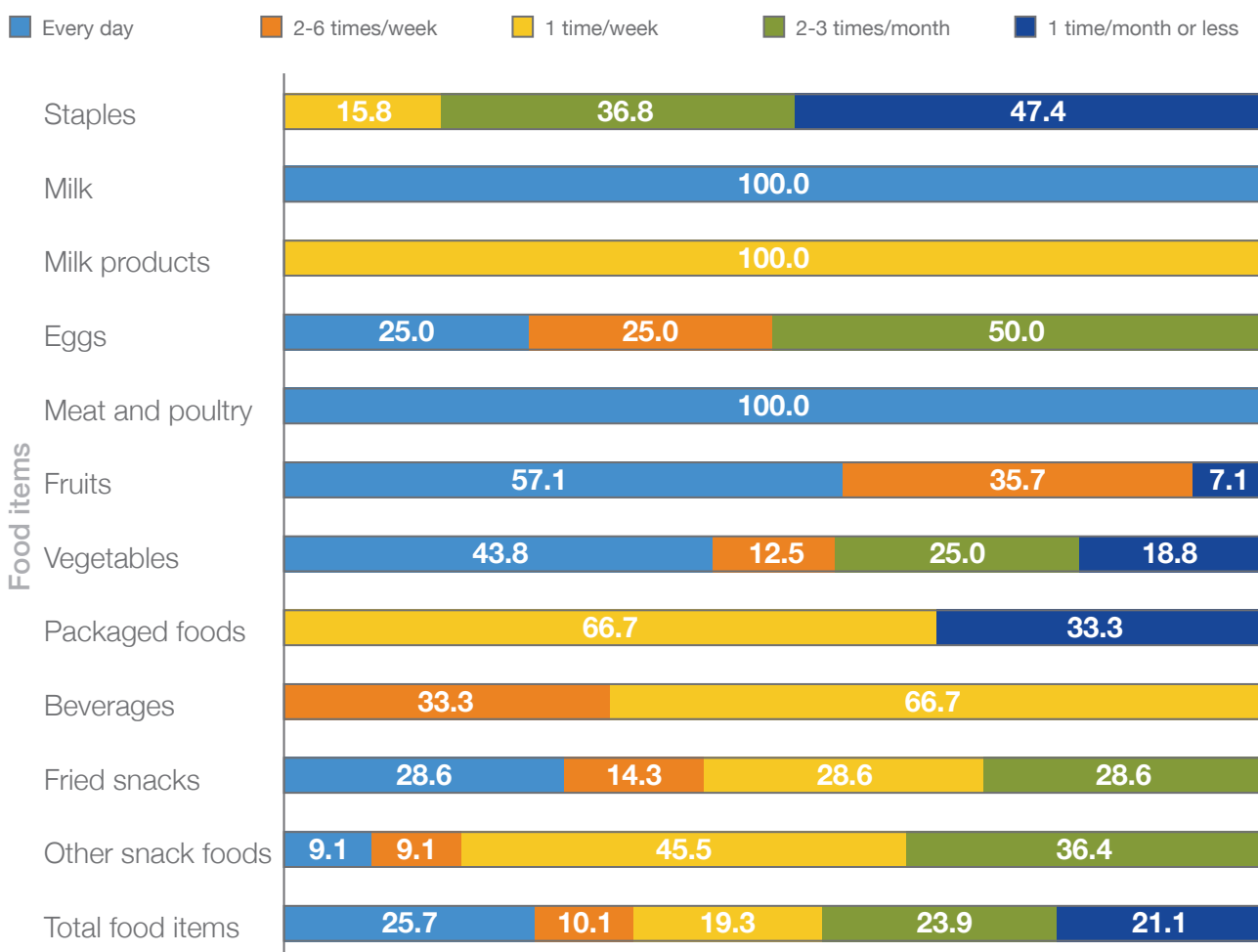
Food groups	Food items	Frequency (%)
Meat and poultry	Meat and poultry	2 (3.3)
Eggs	Eggs	4 (6.7)
Packaged foods	Packaged foods (biscuits, crisps, etc.)	3 (5.0)
Fried snacks	Fried snacks ( <i>samosas, namkeen, chaat</i> )	7 (11.7)
Other snack foods	Indian sweets	6 (10.0)
	Bakery products	5 (8.3)
Beverages	Soft drinks	3 (5.0)

The majority of the retailers selling milk, fruits, vegetables, meat and poultry reported repurchasing these food items on a daily basis (Figure 23). Retailers selling milk products, soft drinks and snack foods reported purchasing these items on a weekly basis, and retailers selling staple foods repurchased them on a monthly or a bimonthly basis.

Source: Authors' own elaboration.

**FIGURE 23.**

Distribution of food items and repurchasing frequency by retailers (N=109 food products)



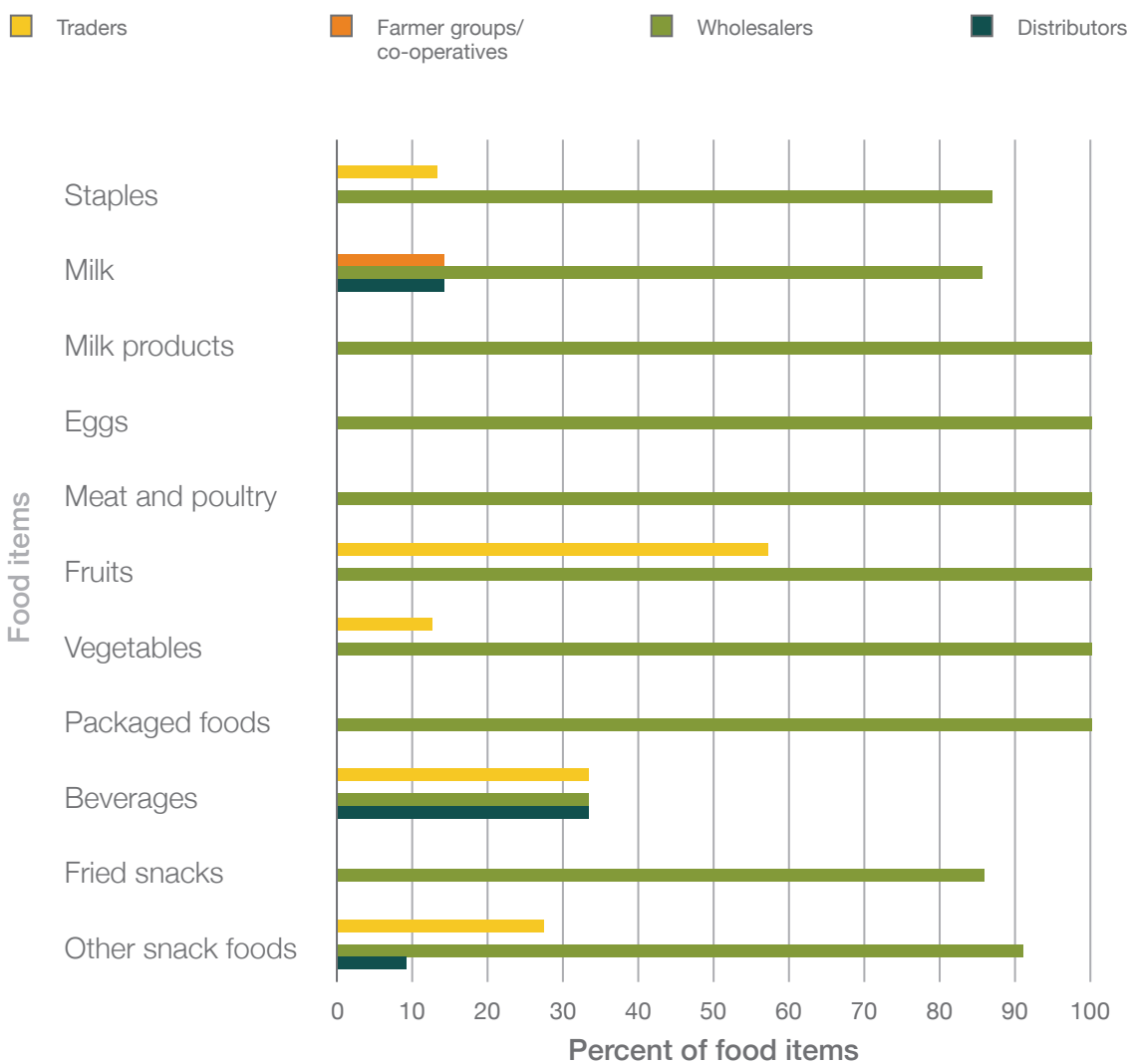
Source: Authors' own elaboration.

For staples, retailers' main source of purchase were wholesalers (87 percent) and traders (13 percent) (Figure 24). Milk and milk products were mostly procured from wholesalers – 86 percent and 100 percent, respectively.

Retailers procured fresh fruits and vegetables from wholesalers. Wholesalers were also the main source of purchase for packaged foods, snack foods, eggs, and meat and poultry.

**FIGURE 24.**

Distribution of retailers' main sources of food purchase, by food system actor (N=109 food products)



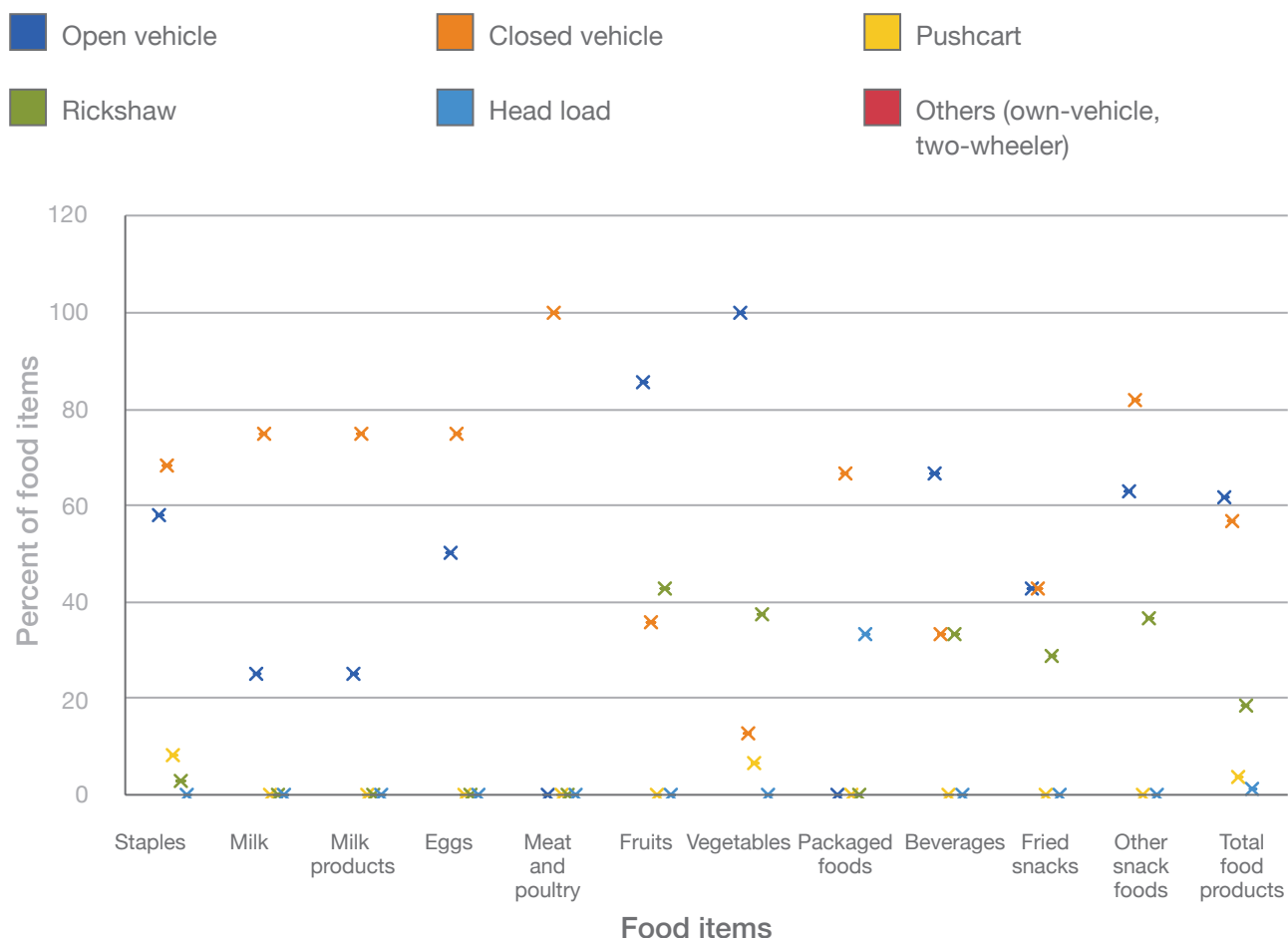
Source: Authors' own elaboration.

Both closed and open vehicles were used to transport food products to the retailers. Staple foods, milk, meat and poultry, and soft drinks

were mostly transported through closed vehicles. Fruits and vegetables were transported in open vehicles, as well as in rickshaws.

**FIGURE 25.**

Mode of transportation of food items from suppliers to retailers (N=109 food products)

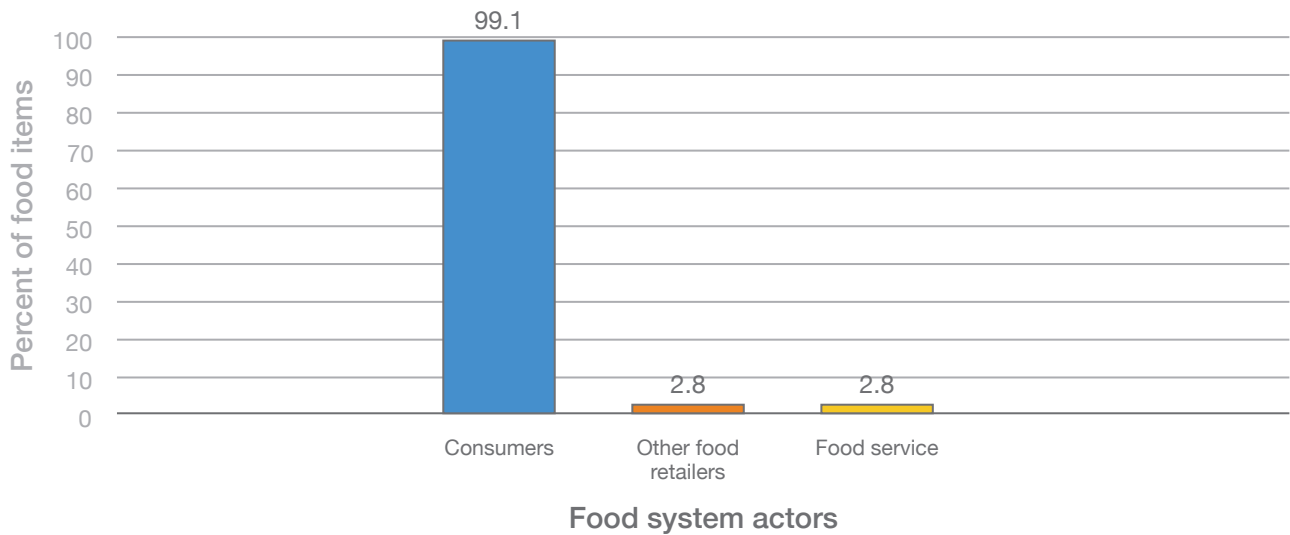


Source: Authors' own elaboration.

As expected, retailers sold the greatest amount of food products (99 percent) across all food groups primarily to consumers (Figure 26).

**FIGURE 26.**

Distribution of the food products sold to food system actors by retailers (N=109 food products)



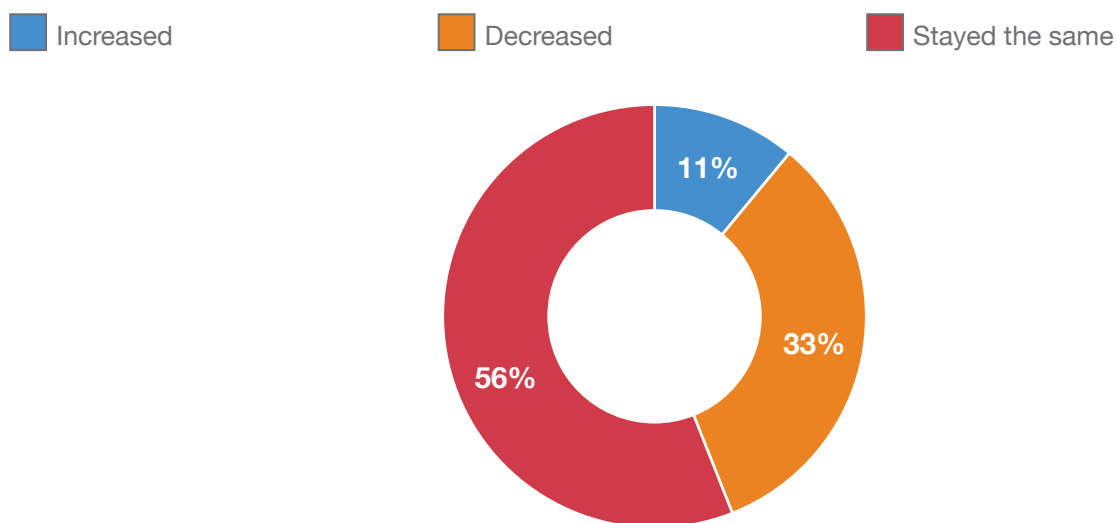
Source: Authors' own elaboration.

Retailers were asked for their opinions regarding sales expectations. They reported making consistent sales every year for more than half of the food products. However, changes in sales

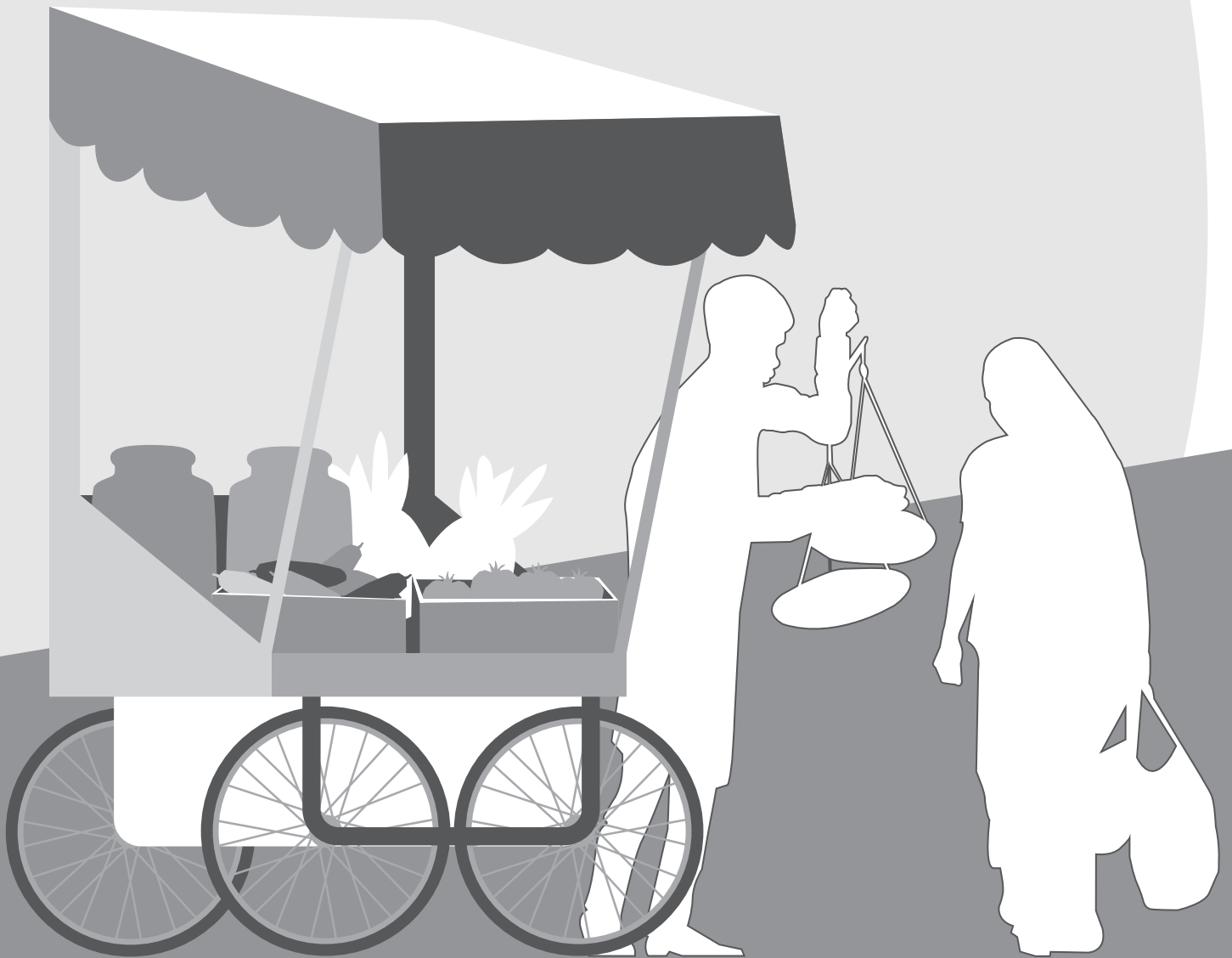
expectations were seen in one third of the food products during the lockdown required due to the COVID-19 pandemic.

**FIGURE 27.**

Distribution of retailers' sales expectations for the same time the following year (2021) (N=109 food products)



Source: Authors' own elaboration.

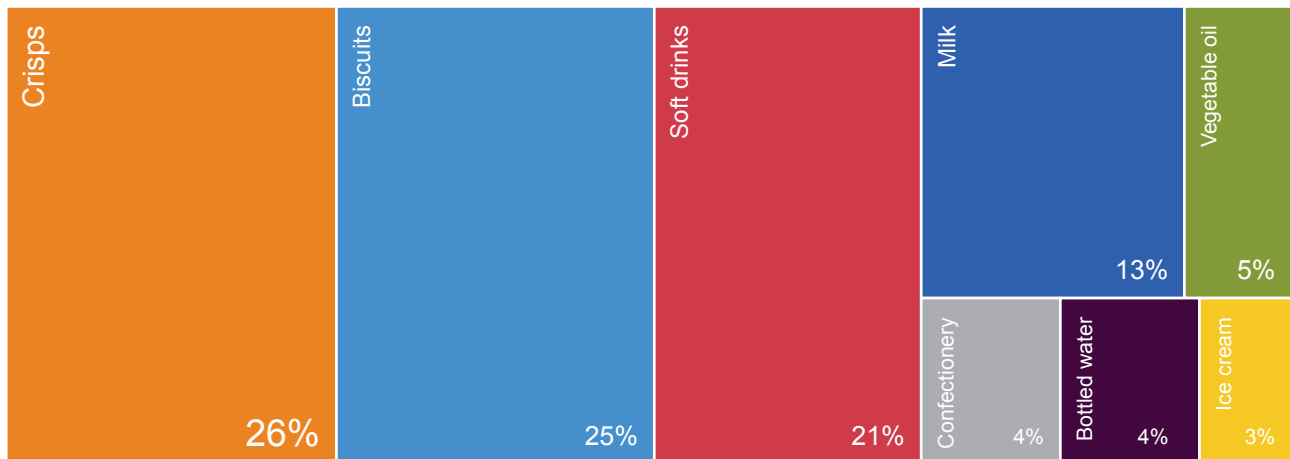


## 4.2. Marketing and regulation

Among formal retailers, the most common food items advertised were crisps (26 percent) and biscuits (25 percent); Figure 28 provides further details.

**FIGURE 28.**

Percent distribution of common food items advertised by formal retailers (N=77 food products)

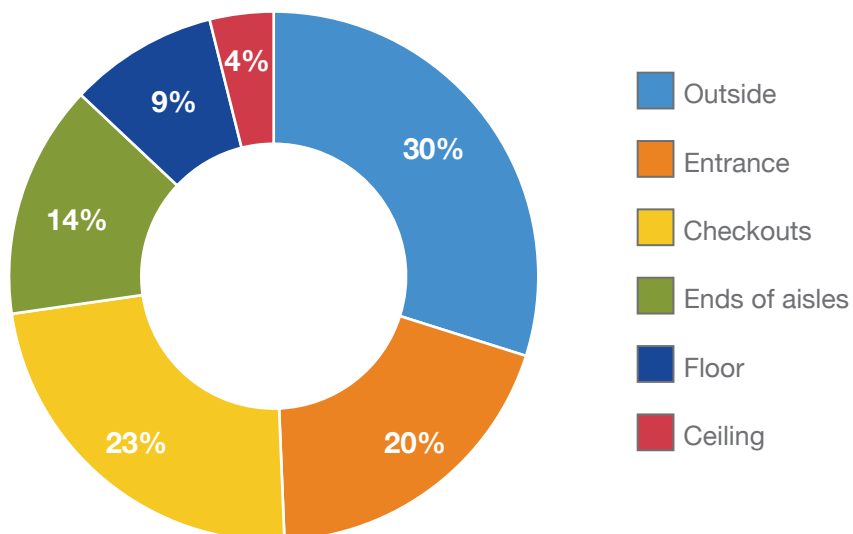


Source: Authors' own elaboration.

The most desired areas to place advertisements were outside the retail outlet, e.g. doors, windows, walls, fences, and parking lots (30 percent; see Figures 29 and 30).

**FIGURE 29.**

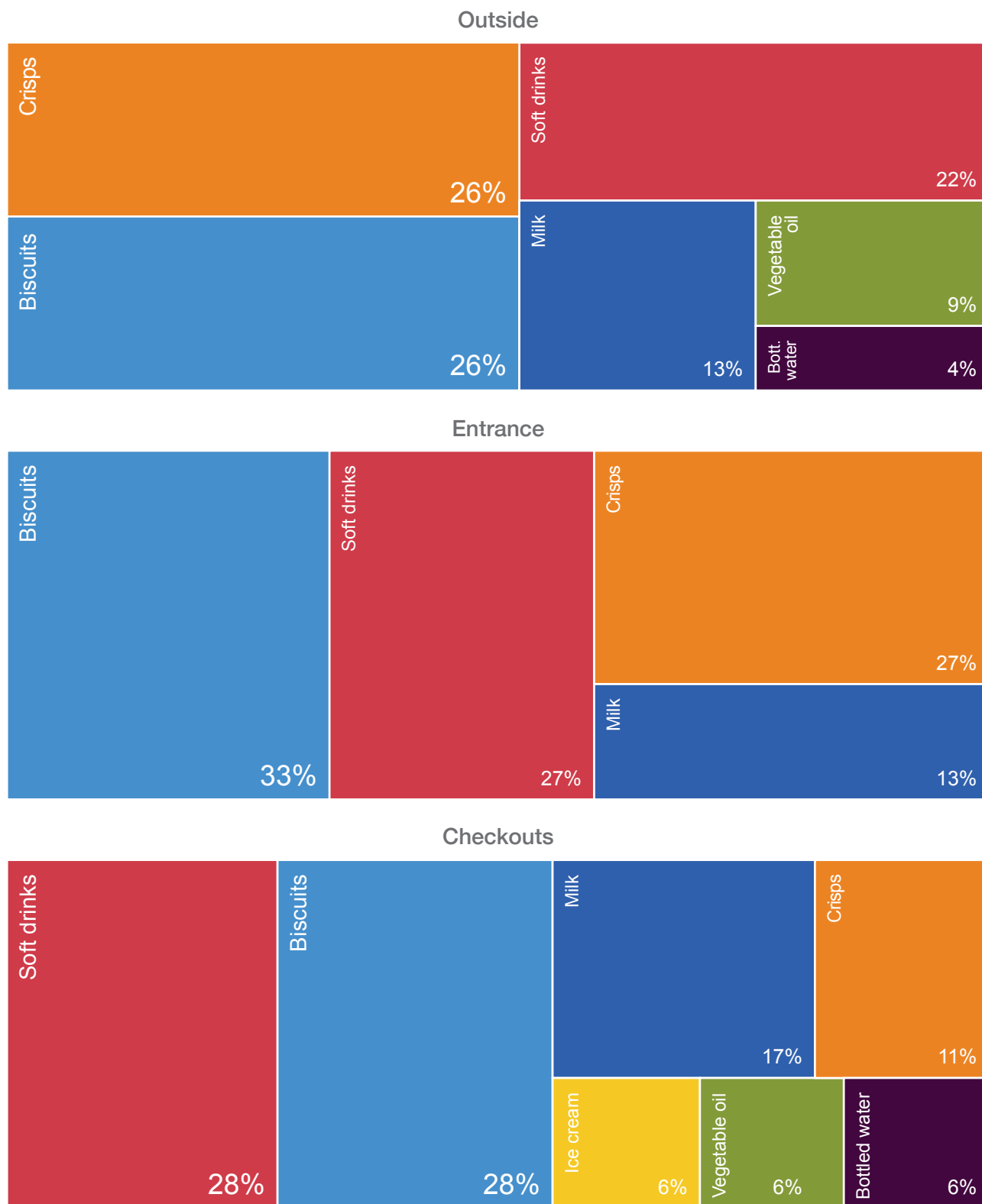
Distribution of total food and beverage products advertised by formal retailers (N=77 food products)



Source: Authors' own elaboration.

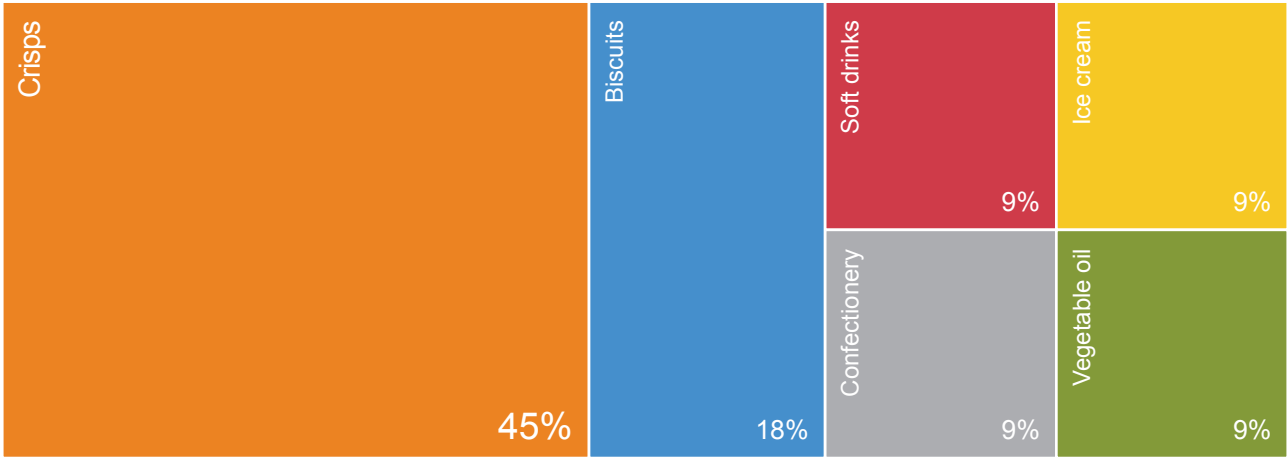
**FIGURE 30.**

Distribution of food and beverage products advertised by formal retailers, by place of advertisement (N=77 food products)

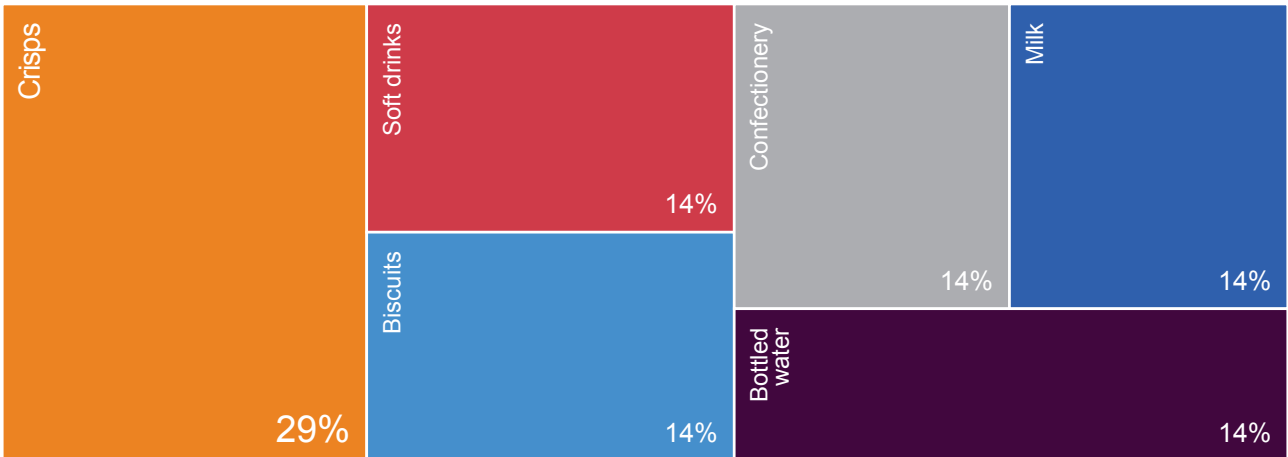




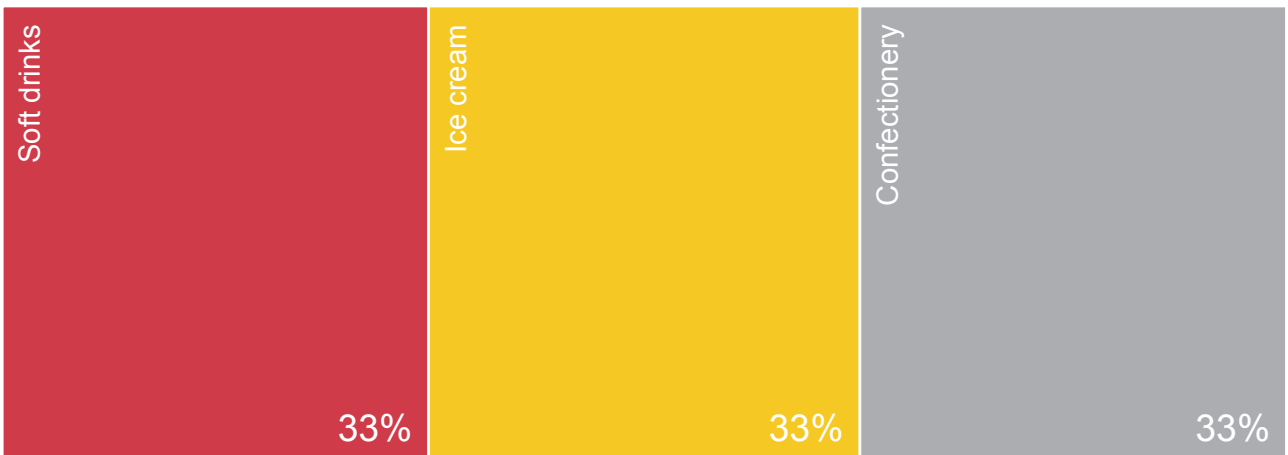
Ends of aisles



Floor



Ceiling



Source: Authors' own elaboration.

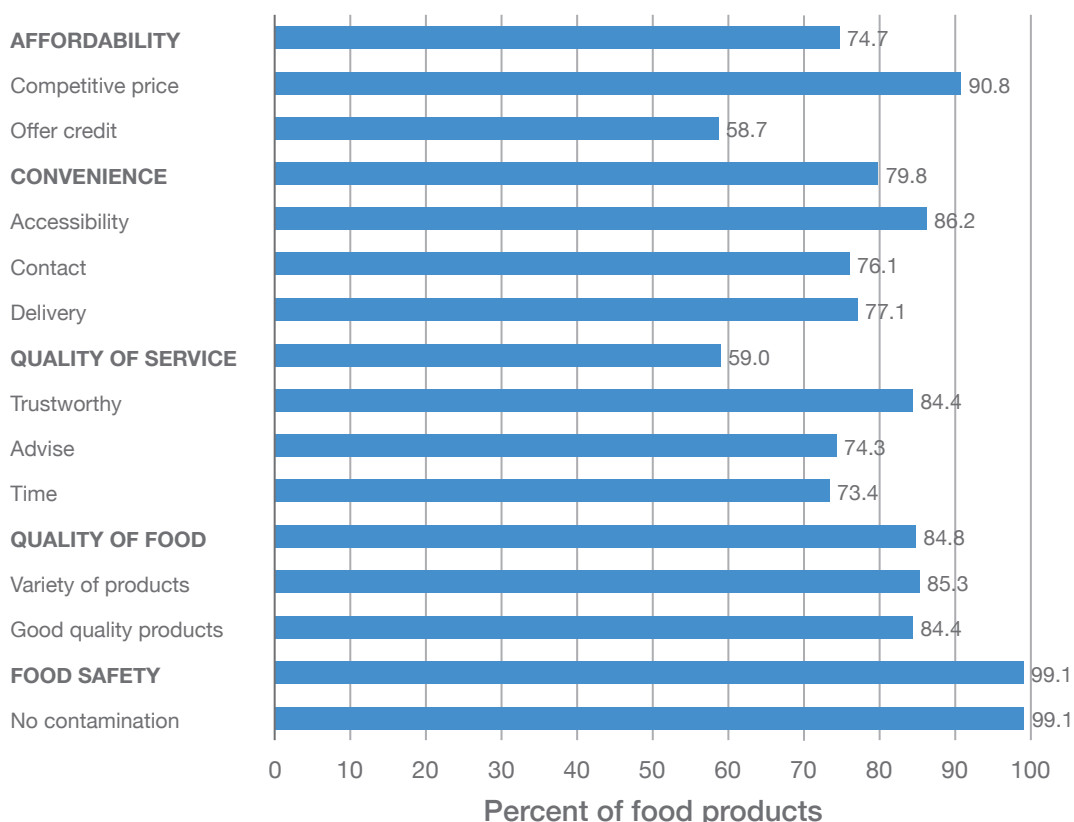
### 4.3. Food quality and safety

Given that retailers mostly sell to consumers, their preferences in terms of food quality and safety are critical in understating the food environments. For this reason, retailers were asked to identify their preferences when selecting food items to sell. A very high proportion of retailers (85 percent and above) highlighted food safety and quality as important factors when choosing potential suppliers (Figure 31). Convenience (80 percent) and affordability (75 percent) were also noted to be important. Under food safety and quality, retailers valued suppliers who could provide

a wide range of products, and of consistently good quality and without contamination. As for convenience, ease of access and proximity to the supplier, the ability to contact them at any time and the possibility of delivery were noted as important considerations. Under food affordability, retailers valued the possibility of being able to obtain a competitive price and credit from the supplier. Under quality of service, retailers deemed it important for the supplier to be trustworthy, proactive in communicating any supply problems and time-sensitive.

**FIGURE 31.**

Percent distribution of food quality and safety concerns reported by retailers (N=109 food products)



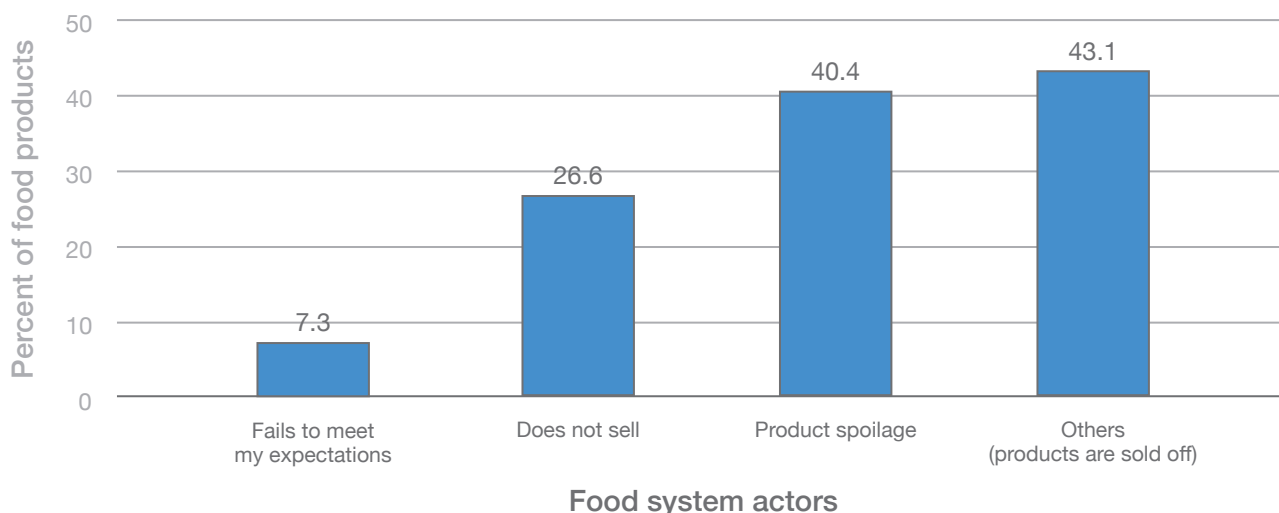
Source: Authors' own elaboration.

Retailers identified the following major problems in their interactions with the suppliers: involvement of multiple intermediaries, high transport cost, long delivery time, high price per unit, poor communication, and price volatility. However, retailers reported selling most of the food products that they purchased.

For the food products that were not sold, the most common reason was noted to be product spoilage (40 percent). Moreover, most of the food products that were not sold were discarded as waste (49 percent) (Figure 32), with some retailers reporting that they used the unsold products for home consumption and or as fodder, in case of staples; some reported returning the products back to the suppliers.

**FIGURE 32.**

Percent distribution of reasons for food not being sold (N=109)



Source: Authors' own elaboration.

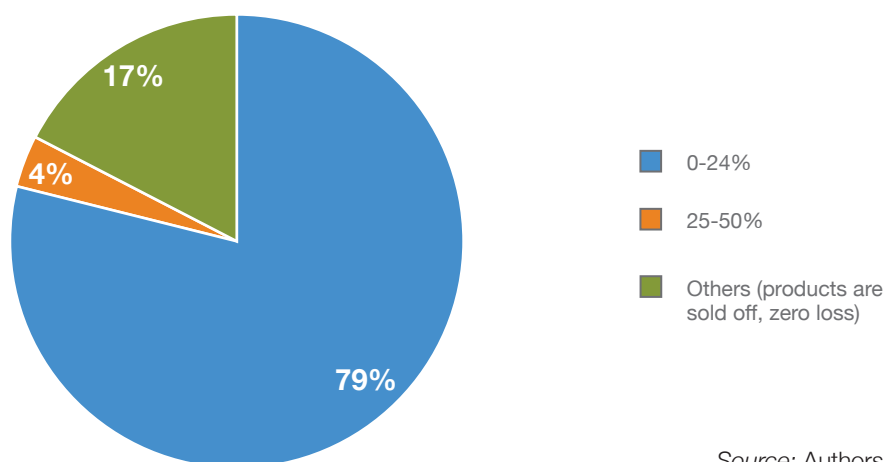
Out of 55 retailers, only three (5 percent) reported receiving formal training in food safety management provided by their companies, associations and family members. In addition, only six (11 percent) operated under a food safety or quality assurance programme; however, an overwhelming majority of the retailers reported there being no barriers to operating formal food safety programmes.

Retailers self-reported food losses across most food groups as being in the range of 0 percent to 24 percent (Figure 33). To reduce loss of food products across food groups, retailers noted that sourcing good quality food (74 percent) and improving packaging (61 percent) were the most

common strategies they employed (Figure 34). For staple food products, the most sought-after strategies by retailers to reduce food loss were making improvements in packaging (84 percent), sourcing of good-quality products (74 percent), and making efforts to reduce damage caused by rodents, insects and other pests (74 percent). For fruits, the most common strategies included sourcing good-quality products (93 percent) and improving transport (79 percent). For vegetables, popular strategies included sourcing good-quality products (75 percent), improving packaging (50 percent) and reducing damage caused by rodents, insects and other pests (50 percent).

**FIGURE 33.**

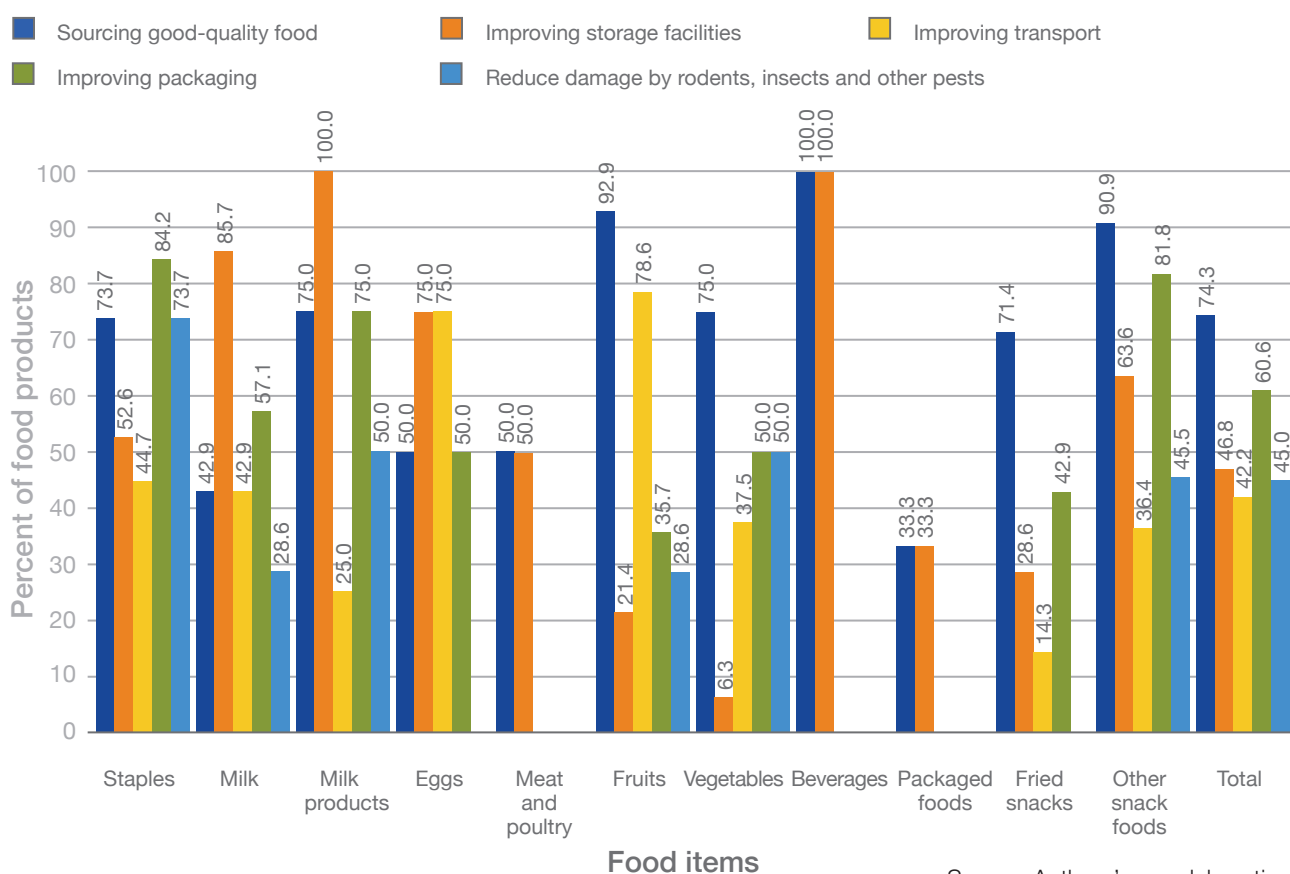
Self-reported food losses at the retail level (N=109)



Source: Authors' own elaboration.

**FIGURE 34.**

Distribution of strategies implemented by retailers to reduce losses of food products (N=109)

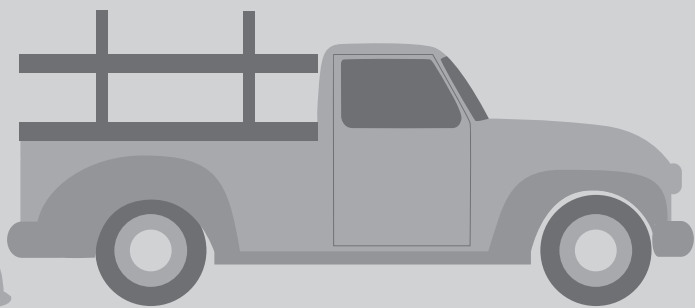
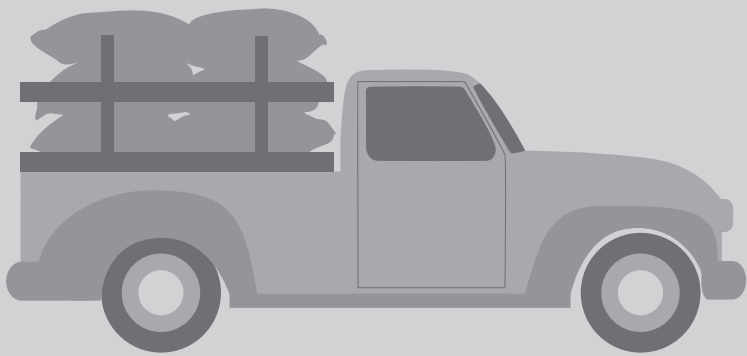


Source: Authors' own elaboration.

Retailers were asked about the services and infrastructure offered by municipal authorities. Transport infrastructure and waste collection services were considered “good” by 17 (34 percent) and 13 (26 percent) retailers, respectively. Several retailers highlighted

the following services as “poor”: food safety education and training, hygiene and food safety inspection, support for establishing new businesses, and registration and licensing of vendors.





# OVERVIEW OF FOOD SUPPLY CHAINS IN AHMEDABAD

- Traders and wholesalers noted facing price volatility with their suppliers for the majority of food products (84 products, or 50 percent) they handled. High prices were the second major problem encountered for 72 (43 percent) of the products.
- Traders and wholesalers mostly sold their products to consumers directly (66 percent), across the three food groups of staples, fruits and vegetables. Some also reported selling to wholesalers (33 percent) and food distributors (30 percent).
- Cleaning, drying, processing, storage, packaging and transport were the main post-harvest activities undertaken by traders and wholesalers.
- Out of 57 food traders and wholesalers, only 18 (32 percent) were members of a trade association.
- Out of 46, only 6 farmers (13 percent) were members of a farmer producer organization.
- All 46 farmers reported delivering the products to the buyer, using a truck, van or pick-up, as opposed to buyers collecting them.
- None of the farmers had a vehicle with cold storage. Thirty percent of the farmers reported having no problems with buyers.
- However, high cost of transport (61 percent) and delay in payment (57 percent) were reported as major problems encountered with buyers.

**TABLE 5.**

Indicative distribution of food products according to yearly supply and demand, as reported by traders (intermediaries) and wholesalers

Food groups	Supply		Demand	
	Low	High	Low	High
Staples	July	March	March	January February March
Fruits	June	February	February	January February March
Vegetables	June	January	March	January

Source: Authors' own elaboration.





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## 5. FOOD SUPPLY CHAINS

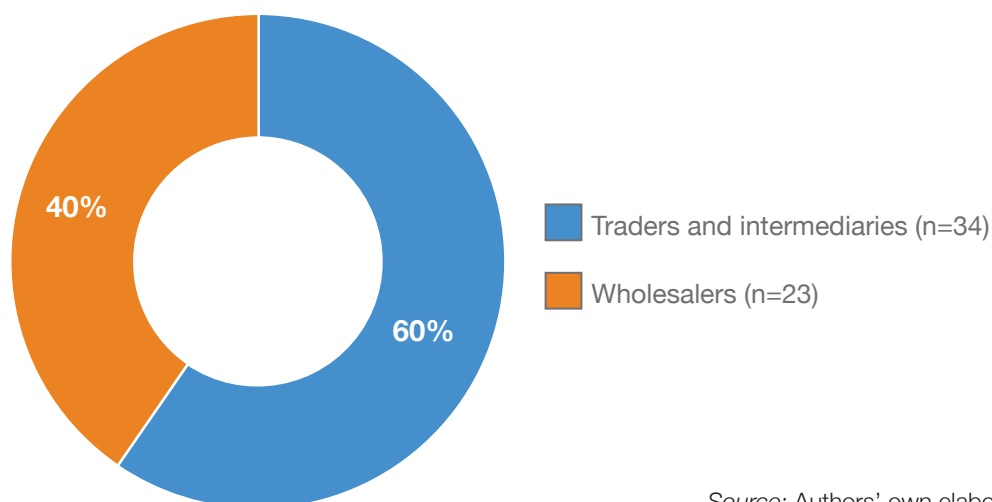
To understand food supply chains in Ahmedabad, 57 traders (and intermediaries) and wholesalers and 46 farmers were interviewed, both within and outside the city. The interviews with these food supply chain actors were mainly conducted around the three food groups of staples, fruits and vegetables.

Thirty-four traders (and intermediaries) and 23 wholesalers were identified in eight wards in the city (Figure 34).<sup>5</sup> These wards were Ellisbridge, Gandhinagar, Maskati, Navrangoura,

Paldi, Thaltej, Vishala and Behrampura. No processors were interviewed as part of the assessment. These food supply chain actors managed a total of 167 food products along the following food groups: staples (wheat, rice, and pulses [dals]), fruits (banana, papaya and pomegranate) and vegetables (onions, potatoes and tomatoes). Twenty-seven (47 percent) of these actors sold staples and 30 (53 percent) sold fruits and vegetables.

**FIGURE 35.**

Distribution of traders, wholesalers and processors interviewed for the assessment (N=57)



Source: Authors' own elaboration.

Farmers, farmer co-operatives, other traders and wholesalers were the main sources of purchase for food products. For staples, most of the food products (70 percent) were purchased from other traders, followed by farmer groups

and co-operatives (29 percent). For fruits, farmer groups and co-operatives were the main sources of products (50 percent). For vegetables, wholesalers were the main source of most of products (51 percent).

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<sup>5</sup> The interviews with traders and wholesalers were conducted from 17 November 2020 to 5 December 2020.

**FIGURE 36.**

Distribution of food system actors: buyers for traders, wholesalers and processors (N= 167 food products)



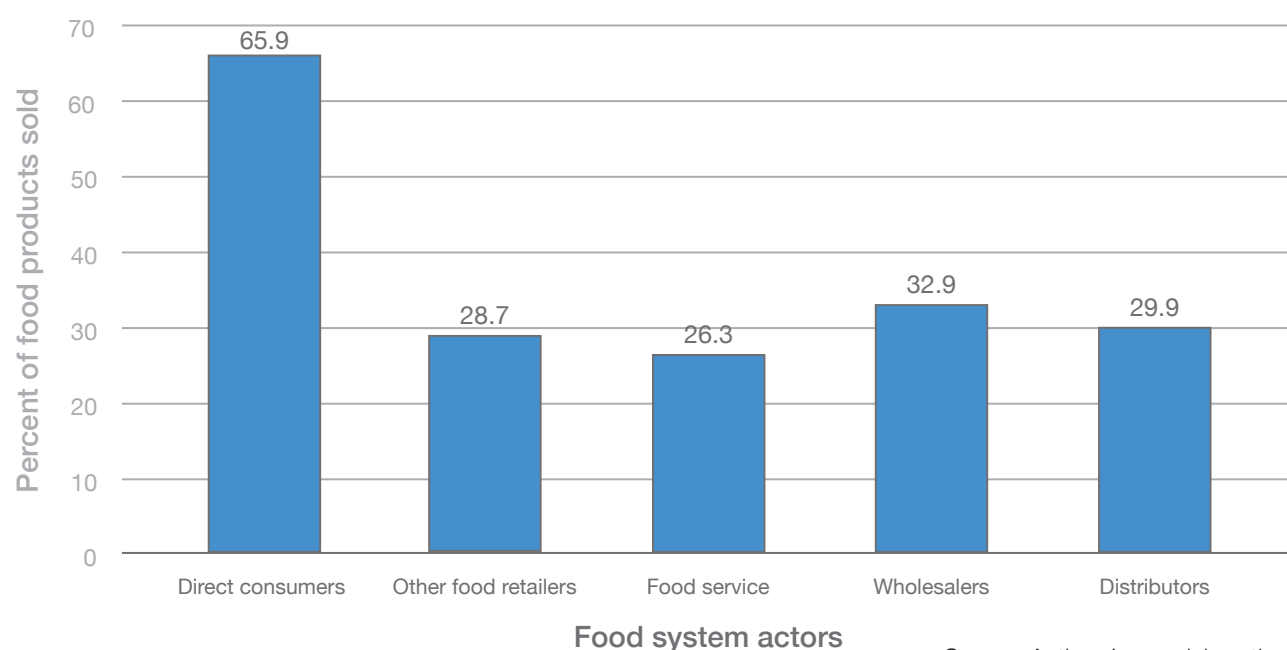
Source: Authors' own elaboration.

Traders and wholesalers noted facing price volatility with their suppliers for the majority of food products (50 percent) that they handled.

Traders and wholesalers mostly sold their products to consumers directly (66 percent) across the three food groups of staples, fruits and vegetables. Some also reported selling to wholesalers (33 percent) and food distributors (30 percent).

**FIGURE 37.**

Distribution of food system actors: buyers for traders, wholesalers and processors (N=167 food products)



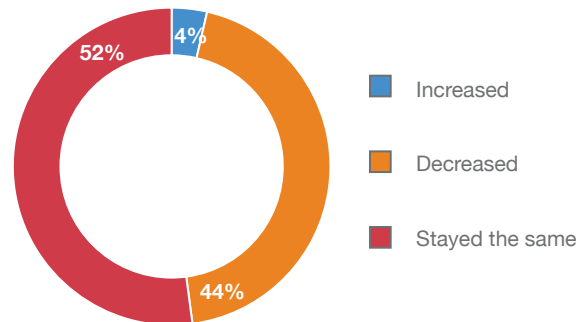
Source: Authors' own elaboration.

The retailers reported making consistent sales every year for more than half of the food products. However, changes in sales

expectations were observed during the lockdown for 46 percent of the products, due to the COVID-19 pandemic (Figure 38).

**FIGURE 38.**

Distribution of traders', wholesalers' and processors' sales expectations for the same time the following year (2021) (N=167 food products)



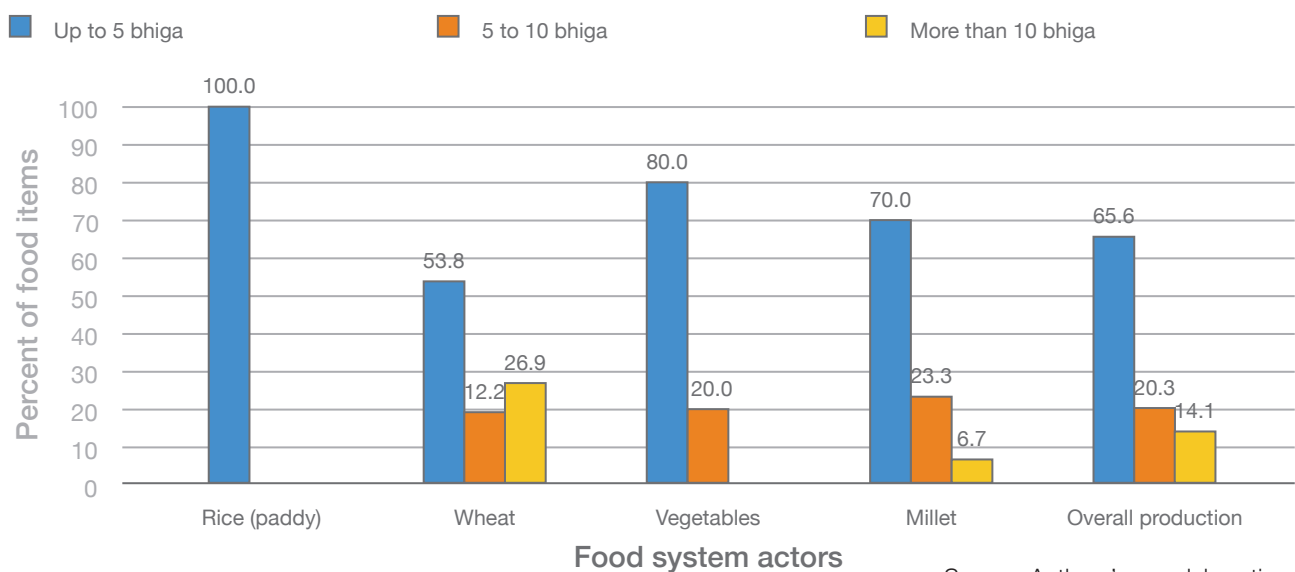
Source: Authors' own elaboration.

A total of 46 farmers were interviewed<sup>6</sup> within and outside Ahmedabad around the two food groups of staples (wheat, rice and millet) and vegetables grown during the *rabi* season<sup>7</sup>. Twenty-eight farmers (61 percent) grew at least one crop and 18 (39 percent) grew two crops, which were mostly millet (grown by 30 farmers),

wheat (26 farmers), rice (three farmers) and vegetables (five farmers). Sixty-six percent of the farmers cultivated up to 5 *bhiga*<sup>8</sup> of land, and 20 percent cultivated 5 to 10 *bhiga* land for crops. Approximately 61 percent of the farmers reported selling three quarters of their crops, and 39 percent sold all the crops grown during *rabi*.

**FIGURE 39.**

Crops cultivated during the *rabi* season, according to farm size (N=45)



Source: Authors' own elaboration.

<sup>6</sup> The interviews with farmers were conducted from 5 to 9 December 2020.

<sup>7</sup> The winter season, from November to April.

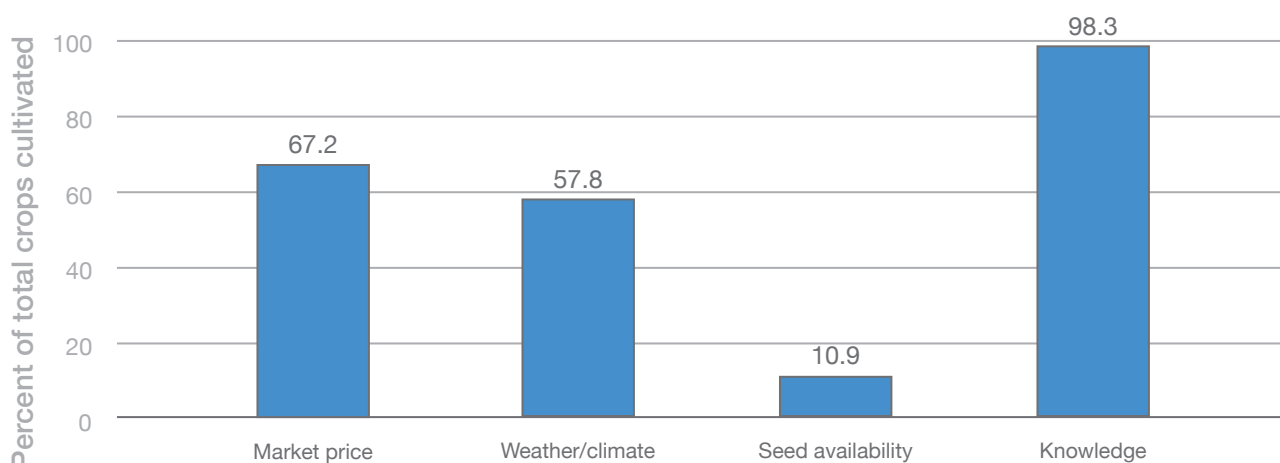
<sup>8</sup> One *bhiga* is equal to approximately 0.25 ha.

The crops unsold during the *rabi* season were mostly used for home consumption by all farmers, followed by donating them to others. All farmers sold their crops to the Agricultural Produce Market Committee. Ninety-eight percent of the farmers cultivated the crops because of their knowledge, followed by 67 percent who

cultivated because of the market price, and 58 percent who planted due to climatic and weather-related factors. Knowledge emerges as a major reason for crop cultivation, which means that the role of agriculture departments in disseminating technical information is very important.

**FIGURE 40.**

Reasons for cultivation during *rabi* season (N=45)



Source: Authors' own elaboration.

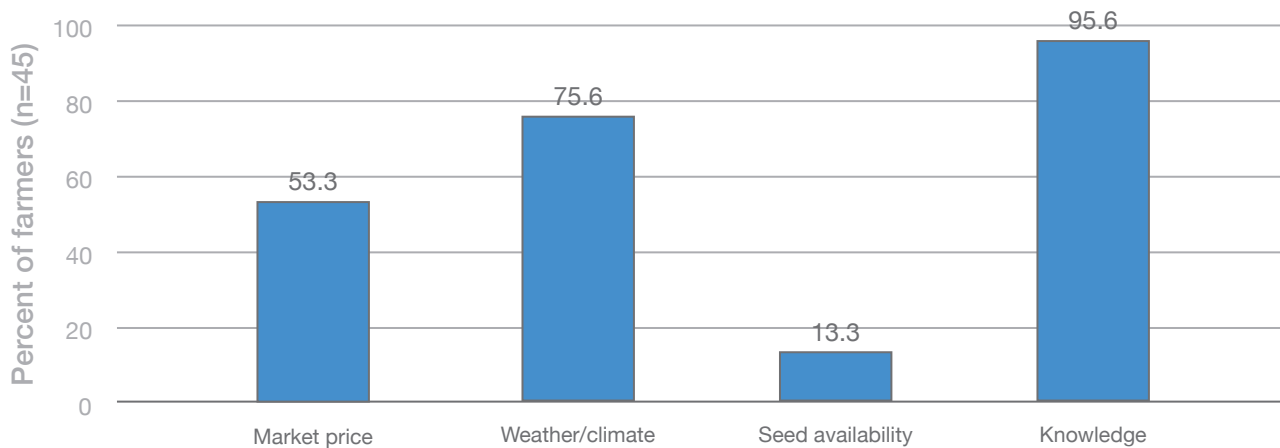
During the *kharif* season,<sup>9</sup> all farmers grew only rice (paddy). Fifty-six percent of the farmers sold all the crops, and 44 percent sold three quarters of their crops.

The crops unsold during *kharif* were mostly used for home consumption by all farmers, while more than 50 percent of the farmers gave them

away as donations. All farmers sold their crops to the Agricultural Produce Market Committee. Ninety-six percent of the farmers cultivated the crops because of their knowledge, followed by 53 percent who cultivated because of the market price and 76 percent who planted due to climatic and weather-related factors.

**FIGURE 41.**

Reasons for cultivation during *kharif* season (N=45)



Source: Authors' own elaboration.

<sup>9</sup> The rainy season, from May-June to October.

## 5.1. Access to services

Out of 57 food traders and wholesalers, only 18 (32 percent) were members of a trade association; nine (27 percent) were traders (and intermediaries) and 19 (83 percent) were wholesalers. These trade associations mostly offered traders and wholesalers the following services: extension and technical production advice, market information, sourcing of inputs, mechanization services, publicity and advocacy, assistance with licenses and compliance with regulations, and negotiations with authorities.

Out of 46 farmers, only 6 (13 percent) were members of a farmer producer organization. These organizations provided services to farmers related to market information; source of inputs; services on aggregation, grading and packaging; publicity and advocacy; and assistance with licenses and compliance with regulations.

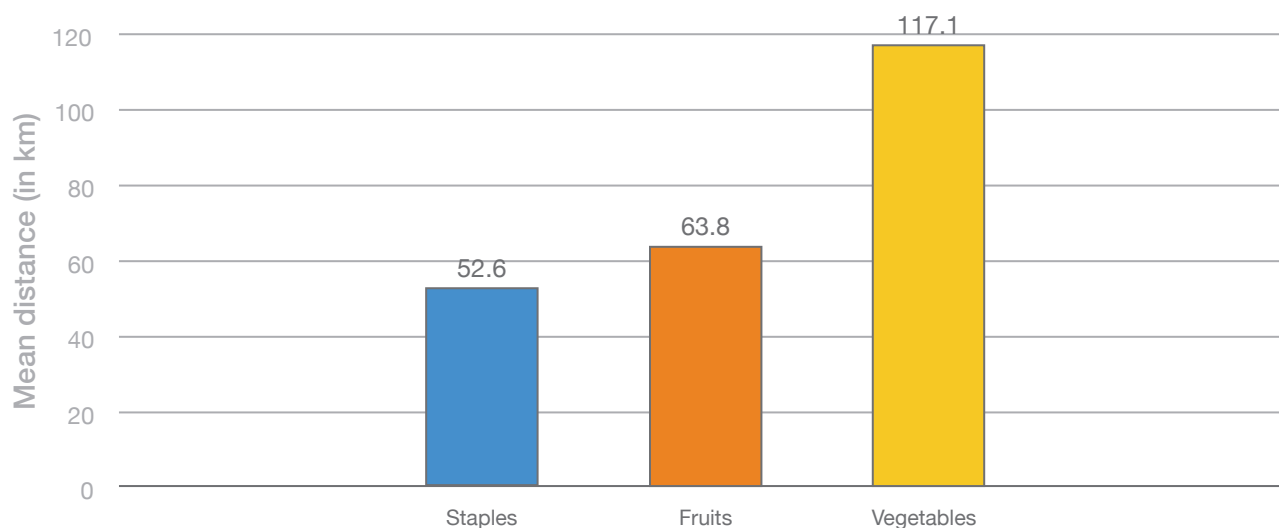
## 5.2. Post-harvest, processing and distribution

The majority of food products across the three food groups of staples, fruits and vegetables (83 percent) were delivered to the traders and wholesalers using open vehicles. Food items belonging to the staple food group were mostly transported using an open vehicle (73 percent).

The mean distance between the supplier of staple items and the trader and wholesaler was 53 km. For the transport of fruits from the supplier, open vehicles were used (92 percent), and the mean distance was noted to be 64 km. As for vegetables, again mostly open vehicles were used for transportation (95 percent), and the mean distance from the source was noted to be 117 km.

**FIGURE 42.**

Mean distance (in km) with suppliers by food products



Source: Authors' own elaboration.

The analysis revealed that only 40 (24 percent) of all the food products managed by traders and wholesalers were transported and distributed through cold storage.

Cleaning, drying, processing, storage, packaging and transport were the main post-harvest activities undertaken by traders and

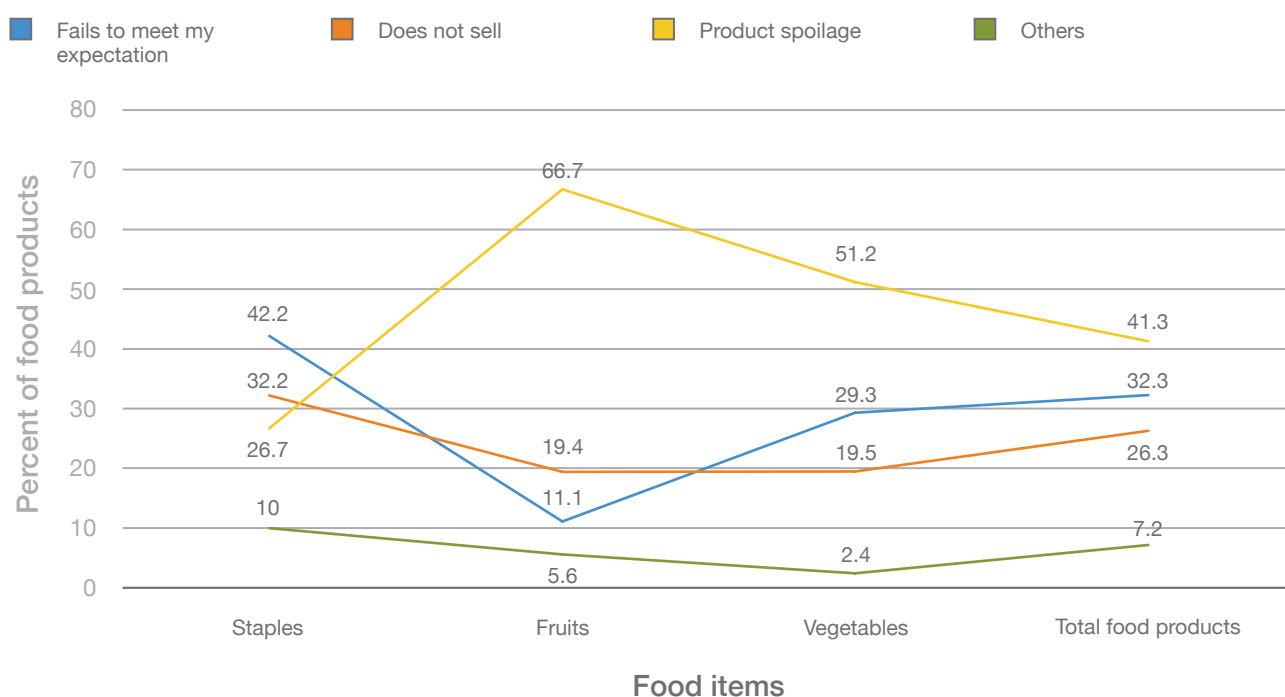
wholesalers. For products within the food groups considered in the assessment – staples, fruits and vegetables – wholesalers bore most of the costs associated with post-harvest activities and handled most of the volume, among the food supply chain actors interviewed in the assessment. These supply chain actors

mentioned that product spoilage was the most common reason for not selling food products, across food groups, affecting 69 (41 percent) of the products. Among food groups, the reason for most staple commodities not being sold

was failure to meet expectations; this applied to 38 (42 percent) products. Product spoilage was the main concern for fruits, reported in 24 cases (67 percent), and in vegetables, in 21 cases (51 percent).

**FIGURE 43.**

Percent distribution of reasons for food groups not being sold by traders and wholesalers (N= 167)



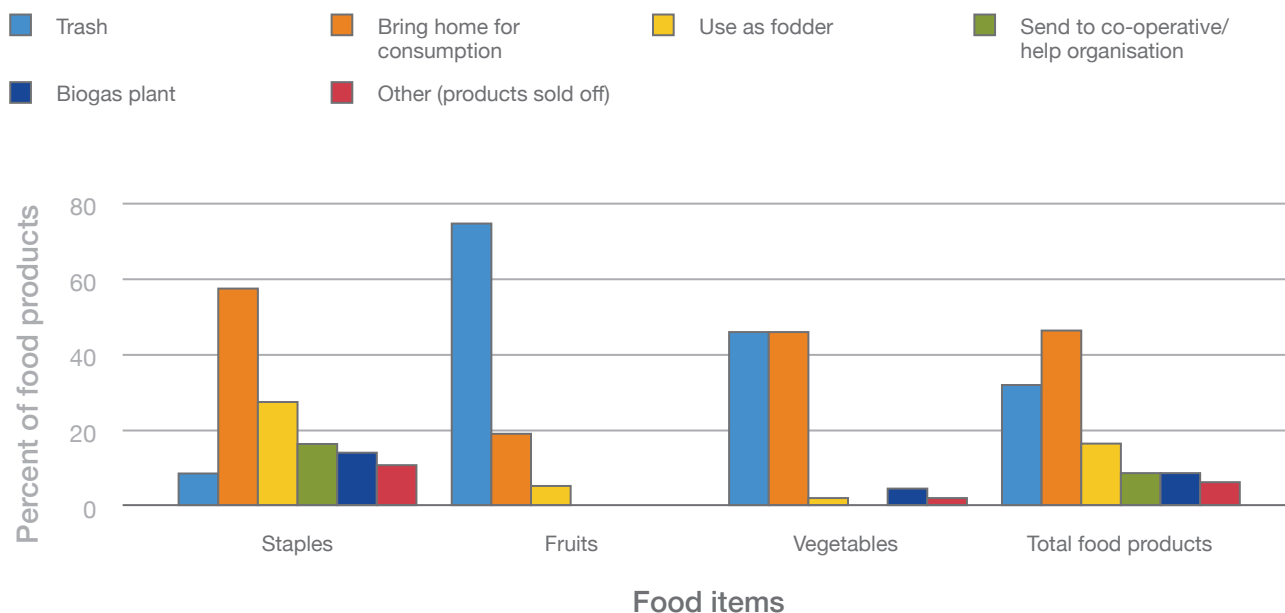
Source: Authors' own elaboration.

Most of the food products across the three food groups that were unsold were brought home for consumption (47 percent) by traders and wholesalers. In the case of staples, products that went unsold were brought home for consumption (58 percent). Fruits that were not sold were mainly discarded as waste (75 percent); vegetables, instead, were either

taken home or discarded as waste (46 percent). The most desired strategy to reduce losses across food groups was sourcing good-quality food (69 percent), improving transport infrastructure and facilities (50 percent), and reduction of damage caused by rodents, insects and pests (47 percent).

**FIGURE 44.**

Percent distribution of activities for food groups not being sold by traders and wholesalers (N=167)



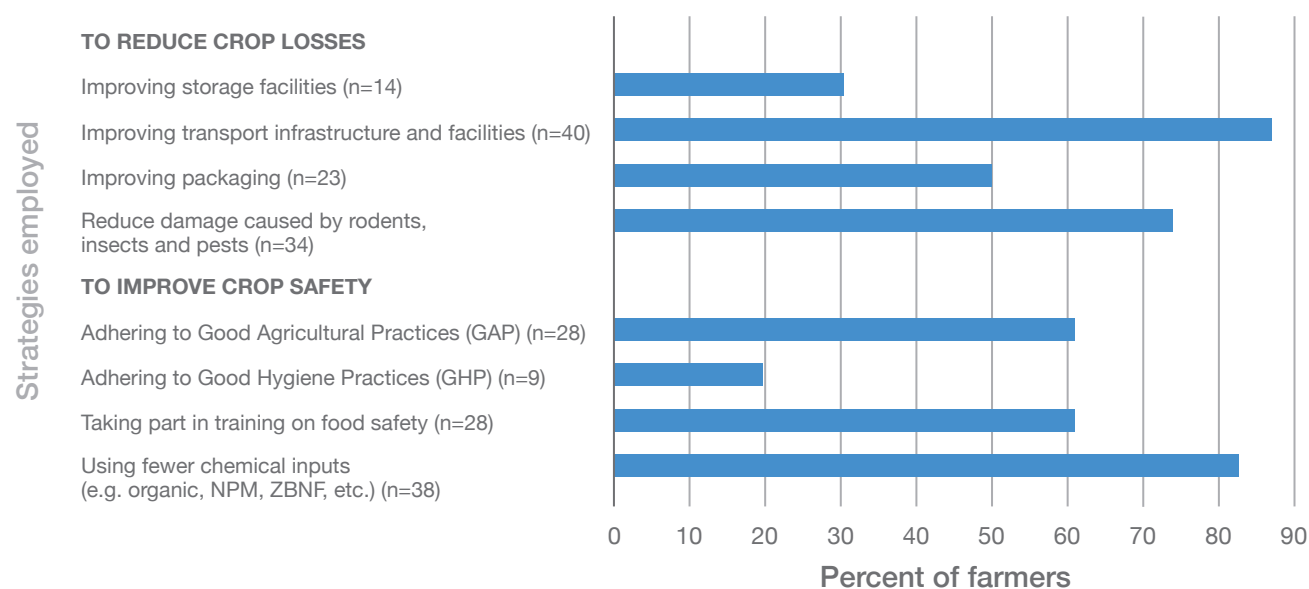
Source: Authors' own elaboration.

When farmers were asked about their strategies to reduce crop losses, 87 percent reported improving transport infrastructure facilities, followed by reduction in damage caused by rodents, insects and pests (74 percent). When asked about their strategies to improve crop

safety, 83 percent reported using fewer chemical inputs (organic, zero budget natural farming, etc.), and more than 60 percent reported adherence to Good Agricultural Practices and taking part in trainings on food safety.

**FIGURE 45.**

Strategies employed by farmers to reduce crop losses and improve crop safety (N=45)



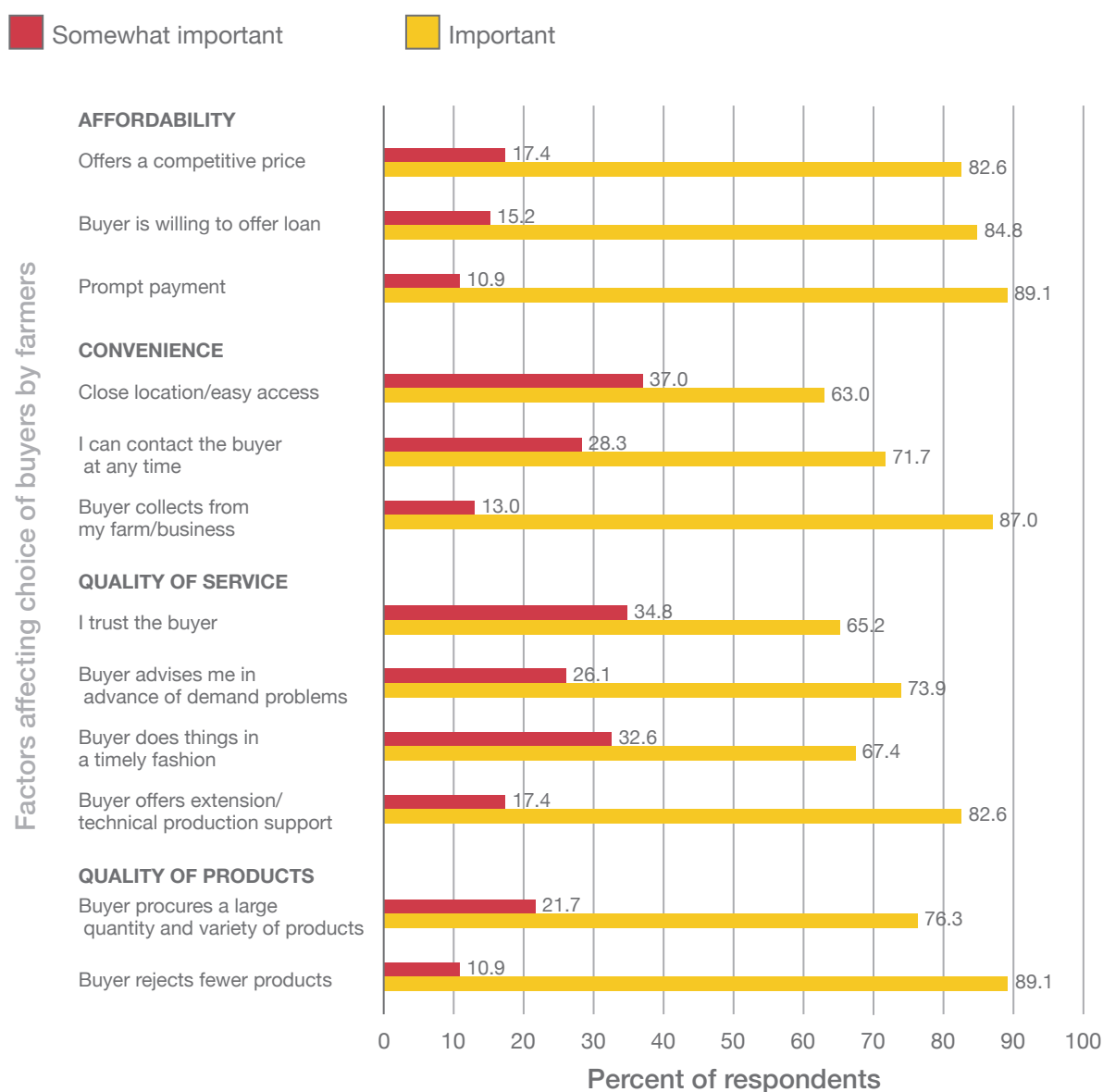
Source: Authors' own elaboration.

All 46 farmers reported delivering their products to buyers, using a truck, van or pick-up, as opposed to buyers collecting them. None of the farmers had a vehicle with cold storage. Thirty percent of farmers reported having no problems with the buyer. However, high cost of transport (61 percent) and delay in payment (57 percent) were reported as major problems encountered with buyers.

On asking about the key factors considered important while choosing a potential buyer, prompt payment and the ability to obtain loans were reported to be the most important factors. Additionally, farmers gave preference to buyers who collected product from the farm, offered extension and technical production support and rejected fewer products.

**FIGURE 46.**

Percent distribution of important factors farmers consider when choosing a buyer (N=45)



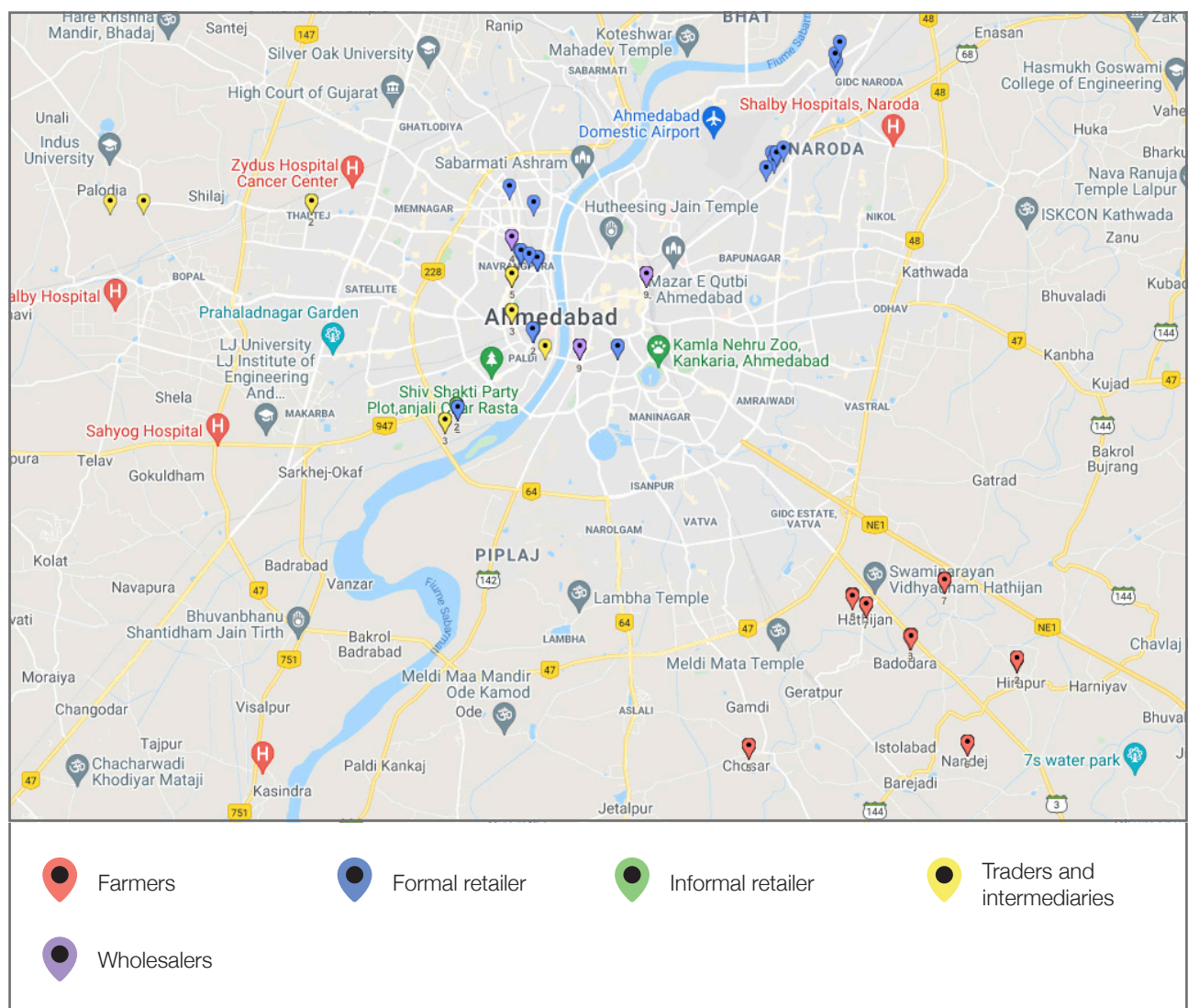
Source: Authors' own elaboration.



## 6. GEO-MAPPING OF KEY FOOD SYSTEM ACTORS AND AVAILABILITY OF KEY FOOD GROUPS IN AHMEDABAD

**FIGURE 47.**

Distribution of farmers, traders, wholesalers and retailers in Ahmedabad, by survey type

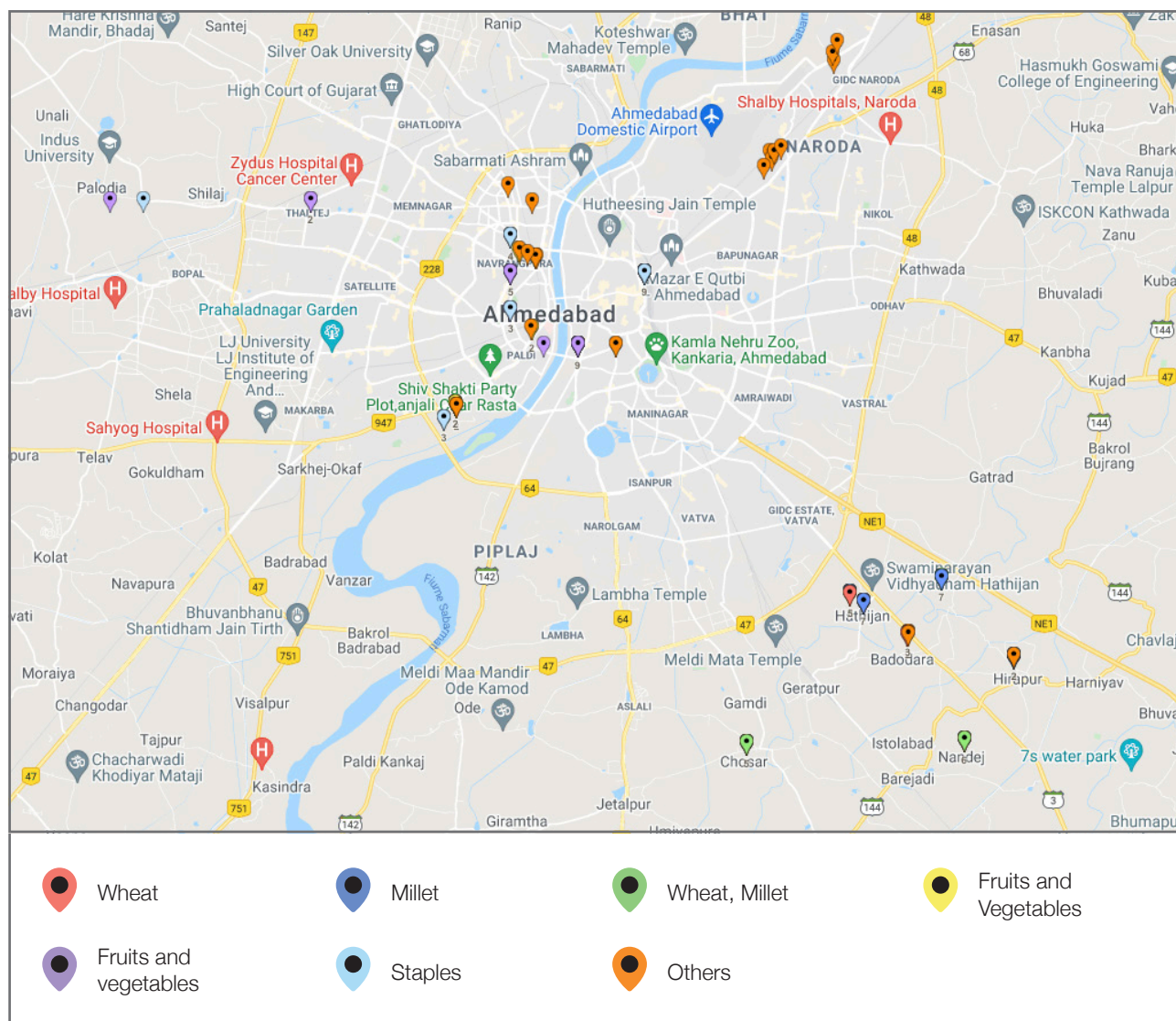


Source: SurveyCTO & Batchgeo, 2020.

Note: The geo-mapping was captured through the SurveyCTO Android Application & Batchgeo. SurveyCTO collects GPS coordinates using the device's built-in GPS function.

**FIGURE 48.**

Distribution of farmers, traders, wholesalers and retailers in Ahmedabad, by food group



Source: SurveyCTO & Batchgeo, 2020.

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