NUTRITION RESEARCH FACILITY
Knowledge and Research for Nutrition

What interventions to support agroecological food systems could be implemented to combat multiple forms of malnutrition?

A case study of Senegal

Comprehensive report

July 2025

About the Nutrition Research Facility

The Knowledge and Research for Nutrition project of the European Commission (2020-2026) aims to provide improved knowledge and evidence for policy and programme design, management and monitoring & evaluation in order to reach better nutrition outcomes.

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List of Acronyms

Acronym	Description
AFN	Alternative Food Network
ANSD	Agence Nationale de la Statistique et de la Démographie
CFSI	Comité français pour la solidarité internationale
CICODEV	The Pan-African Institute for Citizens, Consumers and Development
CIGA	Comité d'initiatives pour la gouvernance alimentaire
CoHD	Cost of a healthy diet
CSA	Comité pour la Sécurité alimentaire et la résilience
EU	European Union
FAO	Food and Agriculture Organisation of United Nations
FENAB	Fédération Nationale pour l'Agriculture Biologique
F&V	Fruits and vegetables
Grdr	Grdr Migrations-Citoyenneté-Développement
INKOTA	Information, Koordination, Tagungen
LARTES	Laboratoire de Recherche sur les Transformations Économiques et Sociales
LIC	Low-income countries
NGOs	Non-governmental organisations
NRF	Nutrition Research Facility
PGS	Participatory Guarantee System
RS	Research Study
SSA	Sub-Saharan Africa
WRA	Women of reproductive age

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Executive summary

Agroecology is a holistic approach that draws on ecological and social justice principles with the potential to transform agri-food systems towards improved health, sustainability and resilience (FAO, 2018; Bezner Kerr et al., 2022; Snapp et al., 2021). A recent review found that agroecological practices could improve income, food security and dietary diversity, primarily for smallholder farming households (Bezner Kerr et al. 2021). There is less evidence for whether agroecological approaches can deliver positive nutritional outcomes in urban areas, particularly for low-income households. This study examines the question: **what agroecological food system interventions could be implemented to address multiple forms of malnutrition?** This study focuses on food system dimensions beyond the farm, including marketing, distribution and consumption in urban and peri-urban areas. We thus focus on aspects of agroecology transitions such as food governance, addressing social inequities in food systems, and building connectivity between farmers and consumers.

The study has 3 sub-questions: i) How do the main marketing circuits of locally-produced agroecological fruits & vegetables work? ii) What are the factors influencing the consumption of agroecological fruit and vegetables? ii) What are the potential impact pathways of interventions supporting agroecology on nutrition? The focus is specifically on low-income women of reproductive age in urban areas due to the high prevalence of multiple forms of malnutrition in this population.

The research design was an exploratory case study, with Dakar, Senegal as the location, due to the prevalence of both overnutrition and undernutrition, and due to the presence of a dynamic network of local civil society-led projects in support of agroecology, including support to domestic market outlets. A literature review and preliminary fieldwork identified 16 agroecological market-related initiatives in Dakar and region. We developed an analytical grid to characterise and assess the markets. Four market initiatives were selected for our focus of study based on the following criteria: urban or peri-urban, agroecological food products sold, including fruits and vegetables and low-income consumers purchase food at this market. Semi-structured interviews (n=13) were carried out with actors involved in agroecological food markets, including farmers, traders, market vendors and development partners (bilateral cooperation agencies, international organisations). In-depth interviews (n=39) for the consumer portion of the study were held with consumers of agroecological foods (n=12), consumers who do not eat agroecological foods (n=17) and resource people (n=10). Three focus groups with consumers in the sites were held with women of reproductive age. A structured survey was carried out with 180 consumers in 5 market sites. Qualitative and quantitative analysis was done to identify key themes and patterns from the mixed methods research.

Agroecological market initiative findings

Results show that the agroecological market initiatives had existed for approximately 20 years, and while small-scale, were well-established, relying on direct sales and/or short chains, with development organisations supporting the initiatives in some cases. This approach allows for a valorisation of produce through direct and frequent communication between consumers and vendors (who might also be producers), but also sharing values and knowledge around food and health. No labels or signs were used to indicate agroecological methods. Trust and reputation were thus at the core of the relationship, which depends on vendors' capacity to genuinely respond to consumers' concerns. While there were collective efforts for access to training and infrastructure such as arable land or water access, market transactions were individually rather than collectively managed. The initiatives promoted values such as health, freshness, lack of chemicals and good storage capacity. Cultural values were also present: the market initiatives provided culturally relevant foods, such as mint, spices and locally-grown grains such as rice and fonio.

Consumers of agroecological foods

Consumers: Women who were purchasing from the agroecological foods bought a diverse range of food types on a regular basis and had high levels of dietary diversity. Based on the consumer survey, women consumers of agroecological products had higher than average levels of education compared to national rates, and the majority were overweight (36.9%) or obese (23.4%) - at much higher prevalence than Dakar's average. One-third of them reported suffering from a diet-related disease such as diabetes or cardiovascular disease. In the in-depth interviews, women reported that they consumed agroecological products either as a preventative measure for diet-related diseases, or after having been diagnosed with an NCD, with some having a family history of NCDs. The main motivations for consumers to purchase agroecological food

products were health reasons (89.4% of respondents), taste of the food (62.8%) and avoidance of pesticides and/or chemical fertiliser (33.9%). Consumers noted several barriers to eating more agroecological foods, including availability of the markets, distance to the markets and seasonal availability of diverse food products. Consumers' trust was based on interpersonal interactions with producers and sellers.

Cross cutting findings

While there is interest in providing agroecological foods to low-income consumers, both surveyed producers, vendors and consumers identified a problem of **low volumes of produce**, with a limited **land area** for production, and a limited **number of producers** committed to agroecological production

A second challenge was **seasonal availability** of the produce, and related tensions over prices, particularly discussed by vendors in short circuits. During the high production period, vendors must compete with low prices in the conventional market, while during the rainy season, there may be limited availability of produce and producers may want to sell to more remunerative conventional markets in Dakar. Most consumers who bought agroecological food products reported no difficulties, but those who did express difficulties named availability of products as the most common problem (21.1%), followed by distance to market (12.8%). The rainy season was the period most frequently cited by consumers as a time when agroecological products are less available. There was considerable variation in the distance that consumers had to travel to the agroecological markets, with some regions reporting markets to be close or fairly close, while others reporting the markets to be far or very far. Most women (68.7%) walked to buy agroecological products.

A third and related challenge was that of **affordability** of agroecological products. While agroecological prices tended to be more stable, because they were more based on production costs than market dynamics, they could be higher at different types of the year than conventional prices. The difference varied depending on the season and the product. The setting of prices was a complex issue, since agroecology aims to support decent livelihoods for producers while ensuring affordable healthy food for consumers. Despite this challenge, farmers and vendors used several strategies to increase economic access to agroecological products for consumers, including limiting the price, having a fixed, stable price, or selling smaller amounts to low-income consumers or lowering prices.

Another challenge for agroecological markets is the widespread idea that organic food (often used interchangeably with agroecological food), is for the rich, which means that even if the products are made physically accessible and affordable, the most disadvantaged may not buy from these markets. This image appears to be a major obstacle to increasing the consumption of agroecological produce among the poorest population. At the same time, most women consumers (67.8%) surveyed considered agroecological food products affordable, with 28.9% stating that a financial effort was needed to obtain these foods. The agroecological markets provided culturally relevant products that most consumers purchased for their health and taste. They also noted that the agroecological foods lasted longer than conventional products and often did not need refrigeration.

The importance of vendors and producers developing a relationship of **trust** with consumers was a consistent theme, which included regular exchanges about production processes, quality and prices. **Health** was a major motivation for both producers and consumers of agroecological foods, with three distinct health concerns: food safety (avoiding agrochemicals), preventing non-communicable diseases, and ensuring healthy, nutritious diets. More than half of the women consumers reported changing their eating patterns since they began consuming agroecological products, including eating more vegetables (53.3%), more fruit (25%) and using less bouillon with high salt (48.3%).

The key role of **local and national authorities** was another important theme for all four agroecological initiatives, including providing human resources for capacity-building, market sites, land for agroecological production and supporting committees for food systems governance.

We found at least seven possible pathways to connect agroecology to nutrition in this case study, some of which are the same as rural areas, others of which are new: 1) Agrobiodiversity, 2) Livelihoods/Social Empowerment; 3) Local knowledge systems, 4) Participation/connectivity; 5) Cultural foodways; 6) Reduced exposure to pesticides and 7) Rights-based approaches. While many of these pathways are the same in rural people, the participation/connectivity and reduced exposure to pesticides are different for urban consumers.

Recommendations of context-specific interventions to support agroecological food systems that have the potential to combat multiple forms of malnutrition:

The following five agroecological food system interventions to combat multiple forms of malnutrition are recommended as a result of this study, (although not applicable to every context): 1) Increased support for agroecological producers in the urban/peri-urban context in low-income areas, including capacity-building, farmer experimentation, support for cooperatives and awareness-raising about the pesticides and agroecological production; 2) Support for short agroecological food chains through measures such as small-scale infrastructure (e.g. storage, cold rooms); small-scale kiosks or mobile markets in low-income neighbourhoods, support for collective actions on price-setting mechanisms, and public procurement; 3) Raising public awareness of agroecological links to health, culture and livelihoods through various media campaigns and events; 4) strengthening urban food governance and policy through urban food councils, a national action plan and events to share information across relevant networks and finally 5) Supporting research on agroecology, including those that focus on nutritional impacts and interventions in the urban context.

This case study of agroecological markets and consumers in Dakar and environs provides insights for intervention design to support agroecological food systems for low-income urban consumers. While not generalisable, the proposed conceptual framework using Dakar Senegal as a case study addresses research gaps on the agroecology – nutrition nexus by exploring what types of intervention that support agroecological food systems could improve food behaviours and diets of economically and nutritionally vulnerable women in urban areas. While most research focuses on the perspective of producers and how to reach remunerative markets, this research takes a counterpoint and discusses the conditions under which a win-win situation can be found to favour access to and consumption of agroecological products by economically vulnerable consumers, particularly women.

1. Background and objectives

Malnutrition is a global challenge, with persistent levels of undernutrition and micronutrient deficiencies, and rising rates of overweight, obesity and diet-related diseases such as diabetes (GNR, 2022). Transforming food systems is therefore recognised to be needed to deliver healthy and nutritious food, hence, to reduce the multiple forms of malnutrition (HLPE, 2017; Crenn et al., 2023). In low-and-middle income countries (LMICs), fast urbanisation and changing diets are fuelling the increase of overweight/obesity. The most recent HLPE report notes that most food insecure households at the global level reside in urban and peri-urban areas, and there is an urgent need to address urban and peri-urban food systems with regard to equitable access to healthy, nutritious food for low-income households (HLPE, 2024).

Furthermore, food systems in LMICs are vulnerable to climate change and must adapt to be more resilient to both long-term climate pressures and climate shocks. Overall, agri-food systems (agricultural systems embedded in food systems) must become both more climate and nutrition-sensitive. The most recent publications on the climate change-nutrition nexus showed that such agri-food systems would need more diversified cropping systems (Bezner Kerr et al., 2022; Snapp et al., 2021).

Agroecology is a holistic approach to food systems, which includes ensuring that people have healthy, nutritious diets, which combines social and ecological principles and operates at multiple scales of the food system (Figure 1). There is considerable evidence that agroecological approaches serve as a pathway to improved nutrition, with more studies about rural farm households (Bezner Kerr et al., 2021). Although existing research highlights the positive outcomes of agroecology for nutrition in rural contexts, most of the focus has been on how agroecological *practices* (e.g. crop diversification, agroforestry) used at the farm or field scale impact household outcomes, rather than higher levels of agroecological transitions. Other dimensions of agroecology such as fair markets, governance and direct producer-consumer relationships are far less studied. While there have been several studies about agroecological markets, sometimes called 'nested' or 'peasant' markets, thus far most studies have been in Europe, Latin America or Asia (e.g. van der Ploeg et al., 2022). Fewer studies have been carried out in Africa.

While there is robust evidence of agroecological practices improving food security and nutrition in rural households, there is less research on whether agroecological markets reach low-income urban consumers, including those increasingly exposed to low-priced, highly processed unhealthy foods and at risk of diet-related chronic health problems such as diabetes. Research gaps identified by Bezner Kerr et al., (2019, 2021) thus include: 1) the understanding of impact pathways between agroecology and nutrition; 2) the impact of agroecological practices on human nutrition outcomes such as non-communicable diseases and 3); consideration of other dimensions of agroecology, especially socioeconomic dimensions such as marketing and direct producer-consumer relationships when adopting a food system approach.

A critical challenge for agroecological food systems to improve nutrition of the poorest consumers and those most at risk of malnutrition is the physical and economic access to agroecological products. Indeed, agroecological products may not be affordable or found in food environments of those who would need them most, including women living in poor urban neighbourhoods, and likely affected by multiple forms of malnutrition. Therefore, there is a need to identify interventions and pathways through which agroecological food systems could benefit economically and nutritionally vulnerable women in urban areas. The experience in Brazil of public purchases from family farmers to supply markets where low-incomes households buy their food and thereby to improve food and nutrition security of both family farmers and consumers is one inspiring example (Wittman and Blesh, 2017).

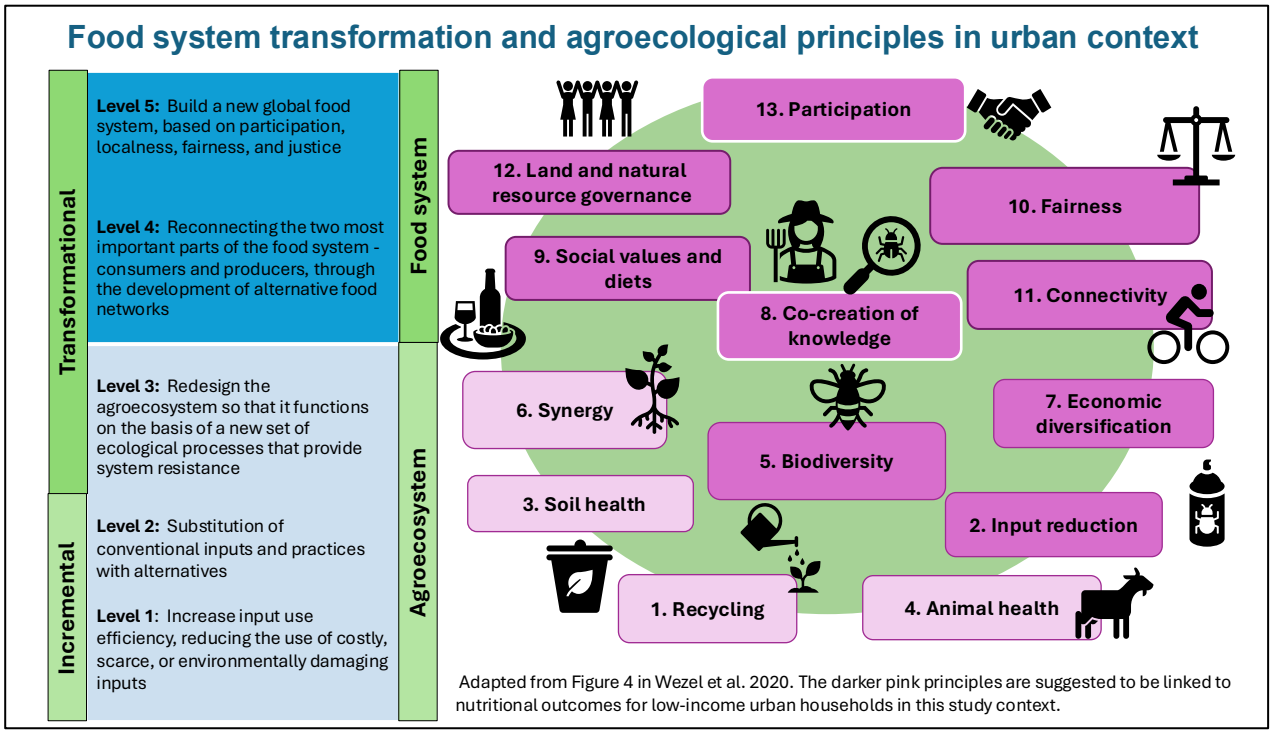

Figure 1: Agroecological principles, transitions and links to nutrition in an urban context

Based on this background, the present research study (RS) explores how agroecology could contribute to nutrition outcomes for low-income women of reproductive age, living in urban areas and likely affected by multiple forms of malnutrition. The RS focuses on fresh fruits and vegetables grown with agroecological practices. More precisely, the RS aims to address the following research question: "**What interventions to support agroecological food systems could be implemented to combat multiple forms of malnutrition**?". This research question is broken down into three sub-research questions:

1) What are the main marketing circuits of locally-produced agroecological fruits and vegetables?

2) What are the factors influencing the consumption of agroecological fruits and vegetables?

3) What are the potential impact pathways of interventions supporting agroecology on nutrition?

This RS aims to go **beyond interventions to support agroecological practices and food production**, and rather consider downstream activities, from marketing, distribution and consumption in urban and peri-urban areas. We thus focus on 'Level 4' (Gliessman, 2016) [1] of agroecological transitions, to shed light on other dimensions of agroecology, such as food governance, addressing social inequities in food systems, and building connectivity between farmers and consumers (Vaarst et al., 2018; Wezel et al., 2020).

The RS is supported by the Nutrition Research Facility (NRF) within the Knowledge and Research for Nutrition Project funded by the European Union (2020-2026), which aims to provide improved knowledge and evidence for policy-making processes in nutrition. The RS arose from consultations with the French Ministry for Europe and Foreign Affairs regarding their international cooperation strategy for nutrition. The focus was to explore agroecology-nutrition linkages in light of French priorities like climate change, gender, the first thousand days, and food systems. The French representatives also expressed interest in extending their current support from undernutrition issues towards the multiple forms of malnutrition. The RS was conducted in the context of the Nutrition for Growth Summit (N4G) that France organised in March 2025 and the reflection around the renewal of its Strategy on Food security, nutrition and sustainable agriculture which ended in 2024. The 19 developing countries that France has prioritised in its international cooperation

[1] Gliessman's five levels of food system change include: "*Level 1: Increase the efficiency of industrial and conventional practices in order to reduce the use and consumption of costly, scarce, or environmentally damaging inputs... Level 2: Substitute alternative practices for industrial/conventional inputs and practices… Level 3. Redesign the agroecosystem so that it functions on the basis of a new set of ecological processes* and *Level 4. Re-establish a more direct connection between those who grow our food and those who consume it*." (Gliessman 2016:187).

strategy – all based in sub-Saharan Africa (SSA) except Haiti - are all experiencing multiple forms of malnutrition, especially among women of reproductive age in urban and peri-urban areas.

2. Senegal as a case study

Senegal was chosen as a case study for this RS for two main reasons: i) the persistence of malnutrition, with relatively high prevalence of child stunting while overweight (Séye, 2024) and obesity is rapidly increasing among adult population; and ii) the existence of a dynamic agroecological social movement. Although Senegal has made significant progress in reducing undernutrition and has a lower rate of stunting compared to other African countries, it is still high: 17.9% of children under five years are stunted (the average for the Africa region being 30.7%) (GNR, 2022). Micronutrient deficiencies are also a persistent issue, especially for women of reproductive age, with 52.7% of women aged 15 to 49 years affected by anaemia in 2019 (GNR, 2022) while the Western Africa average is 48% in 2019 (Senegal - Food Systems Dashboard).

Concurrently, the prevalence of overweight and obesity has increased sharply over the last two decades. Overweight/obesity affects 29% of women aged 15 to 49 years who are non-pregnant and/or non-breastfeeding, 18.5% being overweight and 10.5% obese (SECNSA, 2019: 94). Women living in urban areas are disproportionately affected, with the region of Dakar having the highest prevalence of overweight/obesity (41.1%): 23.4% are overweight and 17.6% are obese (SECNSA, 2019). Similarly, low-income women are particularly exposed to overweight/obesity (Mabiama et al., 2022). Diet-related non-communicable diseases (DR-NCDs) are therefore a major issue in Senegal. In 2018, it was estimated that DR-NCDs account for 42% of all deaths in Senegal (WHO, 2018). The 2015 WHO STEPS survey[2] indicates that 29.8% of the population suffer from raised blood pressure, especially women (34.7% compared to 24.5% for men), and 19.2% have high cholesterol levels (22.5% in urban areas compared to 16.1% in rural areas). The Global Nutrition Report (GNR) reveals that diabetes affects 8.3% of adult women and 8.7% of adult men (GNR, 2022).

While the cost of a healthy diet (CoHD) is lower than the level of food expenditures in Senegal (Bai et al. 2023), these multiple forms of malnutrition are in part the result of a lack of consumption of healthy foods. In terms of access to food, the Food Consumption Score (FCS)[3] indicates an adequate food consumption for 90.3% of households nationally, with higher figures in urban areas (93.7%) compared to rural areas (85.7%) (SECNSA, 2019).

Dietary diversification remains a challenge in Senegal, especially for the poorest households who consume about eight different food groups over a week, compared to ten for the wealthiest households out of 12 food groups (Thériault et al., 2024[4]). The last Demographic and Health Survey (ANSD and ICF 2023) also reveals that only 62.8% of women aged 15 to 49 years meet the minimum dietary diversity for women (MDD-W). In the region of Dakar, this figure is only slightly higher, with 66.9% of women reaching the M-DDW. In addition, recommended food groups are not adequately consumed by women nationally: green leafy vegetables, for example, were consumed by only 39.7% of women over the last 24 hours (ANSD and ICF 2023). In the Dakar region, this proportion is even lower than at the national level (32.4%) while the proportion of women consuming sweet foods (30%) and fried foods (23.2%) is higher than the national average (24.9% and 17.6% respectively) (ANSD and ICF 2023). The Global Diet Quality project - Senegal profile (2021) also shows that only 54% of the total population consumes fruits, while sweet foods are consumed by half of the population (51%) and deep-fried foods by nearly a third of the population (31%), especially in urban areas (deep-fried foods consumed by 38% of urban people compared to 20% of rural people).

The food consumption frequency carried out by Thériault et al. (2024) confirms that energy, sugary, salty and fatty foods are more often consumed than nutrient-dense foods over a week: sweet/grains/oil/fats are

[2] Sénégal Enquête STEPS 2015, Note de synthèse. The Global Nutrition Report (2022) indicates slightly different figures: 30.4% of women and 29.7% of men affected by raised blood pressure in 2015.

[3] The FCS is a proxy of household food intake or caloric consumption. It is a composite score measuring the quality of the household diet based on households' dietary diversity, food consumption frequency, and the relative nutritional value of the different food groups on a 7-day recall. This indicator is usually used in food security and nutrition surveys for early warning systems in Sahelian and West African countries, according to the CILSS Harmonised framework methodology.

[4] The authors used data from the 2018-19 Living Standard Measurement Survey (LSMS) and maximum of 12 food groups over 7 days as 24h recall data were not available.

consumed between 6 to 7 days a week while vegetables are consumed around 5 days a week, and fruits 4 days, below the WHO recommendations (see Figure 2). In addition, the consumption of fruits and vegetables differs according to the income and education level; the wealthier and more educated households consume more fruits and vegetables (Marivoet et al. 2021,[5] Faye et al. 2023). The conversion of households' food expenditures into micronutrients quantities suggests that most households don't achieve the recommended micronutrient intake, especially for calcium, iron and vitamin B12 (Marivoet 2024).

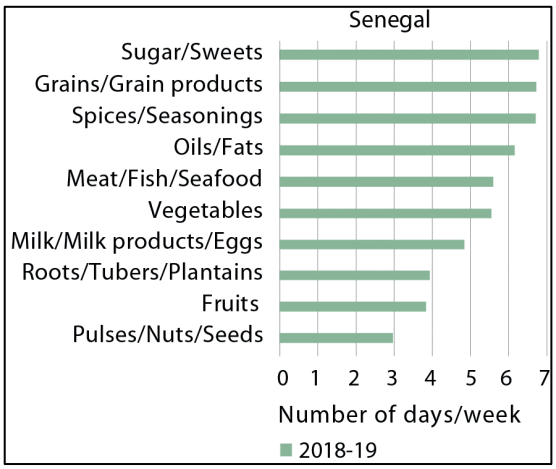

Figure 2: Frequency of consumption of food groups in rural and urban areas in Senegal, in number of days per week (2018-19)

Source: LSMS data, in Thériault, V. et al. (2024).

The higher consumption of unhealthy foods compared to healthy foods in urban areas (though urban people also consume more healthy and diversified foods than rural people) refers to the so-called "nutrition transition". In Senegal, this is related to the industrialisation of lifestyles, valuing of stoutness and abundance and generating an obesogenic food environment (Cohen et al., 2019). Cohen et al. (2019) also highlight that there is an ideal conception of the "modern urban lifestyle" in Senegal associated with Western culture, especially among young urban/suburban adults who have a tendency for daily snacking. Urban households are not uniformly affected by this supply of highly processed foods in their food environment, with a more frequent supply in poorer neighbourhoods than in better-off, as shown in other Senegalese cities (GRDR 2023).

The case of Senegal is also particularly relevant because of the political support given to agroecology. The "*Dynamique pour une Transition Agroécologique au Sénégal*" (DyTAES) is a structured multi-stakeholder movement created in 2019, which brings together NGOs, farmer unions, research institutions, government actors, donors, private sector, etc. Though not exempt of internal power relationships, divergencies of view on what agroecology is and how to promote it, as well as limitations such as aid dependency (Marfurt et al., 2023; Boillat et al., 2021; Milhorance et al., 2022), this broad coalition of actors has gained legitimacy and effectiveness in advocating for agroecology. From the government side, there has been an increased institutional commitment in favour of agroecology since the presidential decision in 2019 to make agroecology one of the government's priorities, among the five major initiatives of the Plan Senegal Emergent (PSE) 2019-2024 (Milhorance et al., 2022; Leippert et al., 2020). In 2021, the Ministry of Agriculture and Rural Equipment (MAER) also decided to devote 10% (now 15%) of the budget allocated to fertiliser subsidies to organic fertilisers. This decision and the explicit mention of the promotion of agroecology in several policy documents, including the PSE, are generally seen as a significant political push for agroecology and gives Senegal a particular position in the West African region (Milhorance et al., 2022); though the maintenance of a productivist and technicist orientation of the agricultural policy creates confusion and ambiguity (Bottazzi & Boillat, 2021; Milhorance et al., 2022).

[5] Using a demand model, Marivoet et al. estimated the income elasticity in urban areas across all cities, i.e. the way in which consumption of the various food groups varies according to changes in household income. With an estimated elasticity of 1.49, fruit consumption increases, in percentage terms, more than income (luxury goods). The elasticity of vegetables and tubers is estimated at 0.97, showing an increase in consumption of the same order of magnitude as income.

On the ground, many projects in support of agroecology have emerged over the past decade (Dugué Kettela et al., 2017; Grandval, 2011; Temple, 2017). These initiatives are led by farmers, civil society organisations, international agencies and, more recently, governmental and intergovernmental institutions (Boillat and Bottazzi, 2020; Debray, 2015; Debray et al., 2019; DyTAES, 2020; Loconto and Fouilleux, 2019; Touré and Sylla, 2019). While the promotion of agroecological markets is one area for action of DyTAES, initiatives in this domain are rare (16 out of 106 initiatives, according to Grimaud 2020 in Milhorance, et al. 2022). In addition, Boillat et al. (2022) found that only five out of 20 studied organisations – most of them part of the DyTAES – pursue activities that reconnect consumers and producers through alternative food networks (e.g. participatory certification, access to healthy food for consumers or nutrition education). In addition, DyTAES recommendations do not directly address "food democratisation" through agroecology, that is, issues of urban economically and nutritionally vulnerable people's limited access to healthy food and their low participation and control over the food systems.

The present study aims to contribute to filling this gap and raises the need to explore the agroecological approach in a way that benefits both family farmers and urban consumers, especially the most vulnerable so that they can gain control over what they eat. Beyond contributing to discussions within the context of N4G and expectations from the French Ministry for Europe and Foreign Affairs, this study aims at contributing to the reflection of the DyTAES regarding food systems, and specifically the promotion of agroecological products in value chains and consumption (DyTAES, 2020).

In this study, agroecology is not restricted to specific agricultural practices. Though organic agriculture is usually considered by the different stakeholders involved in the DyTAES as being part of agroecology, there is deliberately no firm definition that would restrict or standardise the scope of agricultural practices. In addition, the DyTAES movement emphasises both the ecological and social principles of agroecology as it is suggested since the 2019 HLPE report. Concretely, this means that agroecology refers to a bundle of practices intentionally implemented by farmers to protect the agroecosystems and ensure quality food.

3. Methodology

Data collection was organised into two main components: i) a "market component" to document the functioning and the challenges of existing agroecological markets initiatives in urban and peri-urban areas of Dakar; ii) a "consumer component" to characterise the socioeconomic and dietary profiles of women consumers of agroecological products, to understand acquisition practices of agroecological products and their motivations, and to identify their constraints in accessing agroecological products. The RS used a mixed-methodology combining qualitative and quantitative tools.

3.1. Market component

First, **a literature review** was conducted to develop an analytical grid highlighting the diversity of marketing options for agroecological products and helps to assess their ability to provide agroecological products to urban dwellers, especially low-income women. We collected three types of academic and grey literature: literature on the interface between value chains and nutrition, literature on the marketing of agroecological products in Low-Income Countries (LIC), and literature on food chain analysis in general.

The literature review resulted in the development of an analytical grid that was used to characterise existing agroecological market initiatives and select the most interesting ones for further analysis. A total of **16 initiatives** were identified based on: exploratory fieldwork conducted by the first author in June 2024, which consisted in interviewing key informants and visiting some agroecological markets initiatives; an extensive Internet search; the use of the personal network of one of the authors who worked for three years in Dakar on food value chain governance and food system analysis. After analysing the 16 initiatives, two initiatives were selected for more in-depth study through qualitative interviews based on the following criteria:

- products are sold in urban/peri-urban,
- products are claimed to be agroecological or organic,
- low-income consumers use this market/ are some of the clientele.

The two case studies of market channels that meet at least two out of the three criteria and that represent the diversity of initiatives met (direct sales vs short distribution channels) were:

1) the *Micro-Jardin HLM Patte d'Oie* this is a table-top garden in the heart of Dakar, run by women who produce herbs, mint and vegetables without chemical pesticides and sell them mostly directly to consumers or retailers/street vendors.

2) the *organic market of Thiès*, which is a weekly market in Thiès where vendors – who might be farmers as well – sell fruits, vegetables and traditional cereals produced following the organic specifications by farmers surrounding the city of Thiès or in the Kaffrine region (for cereals).

Two other initiatives supported by the Pan-African Institute for Citizens, Consumers and Development (CICODEV) were also visited as a counterpoint and not as case studies per se because they were at the launch stage or under reorganisation. These initiatives involved women farmers growing vegetables in a collective garden. The case of CIGA in Bambilor (peri urban) is presented as a second case study representing initiatives that use short distribution circuits (See below). This case is also interesting since it also supplies school canteens. The case of Thiaroye Gare uses a specific approach in the nexus agriculture-nutrition-health offering interesting counterpoints under the direct sales initiatives type (see below).

Second, **twelve semi-structured interviews** were conducted with key actors involved in the selected contrasting marketing channels of agroecological fresh fruits and vegetables, during a mission in Dakar from September 30th to October 5th 2024. Three categories of actors were met: farmers, vendors and supporting actors (e.g. NGOs). The actors have been identified from the key informant interviews conducted during the exploratory mission of the SNKE and based on the snowball technique, from phone calls made to leaders of these initiatives the week before the fieldwork. Interviews were conducted either in Wolof or in French.

We developed an interview guide which addressed the following topics: (1) the history, motivations and objectives of the agroecological initiative, (2) the concrete organisation of marketing channels, (3) product differentiation in the market, (4) the interface with customers and (5) the challenges faced and any recommendations (See **Annex 4 Interview guide**).

The research protocol has been submitted and approved by the Institutional Review Board for Human Participant Research of Cornell University. The objectives of the study as well as the rights of the respondents and the duties of the research team in terms of data protection were explained to each respondent and a consent form was signed by each. At the end of the interview, they were given an information sheet with project information and the research team's contacts (See **Annex 3 Information sheet and consent form**).

All the interviews, including those with the key informants involved in the analysed initiatives that were conducted during the exploratory fieldwork, were transcribed and analysed through a thematic analysis. In addition, online interviews with a representative from the program "*Promotion de l'agriculture familiale en Afrique de l'Ouest*" (Pafao) were carried out. Indeed, Pafao is an initiative that was created in 2009 by the Fondation de France et le *Comité Français pour la Solidarité Internationale* (CFSI), to strengthen peasant family farmers and small-scale processors, traders, caterers to feed urban and rural areas in West Africa, in a sustainable way. Every year, they provide financial support for projects focusing on the relocation of food production in the interests of food sovereignty. The compilation of data used is reported in **Annex 2 List of stakeholders interviewed**.

3.2. Consumer component

The methodology used for the consumption component is mixed, with qualitative and quantitative surveys. The qualitative survey is based on a series of semi-structured interviews (Savoie-Zajc, 2009), focus groups (Kitzinger et al., 2004 and Geoffrion, 2009) and direct observations of 56 people, including female consumers (12), non-consumers (17) and resource persons (10), and 17 participants in the three focus groups. The quantitative survey was carried out with 180 women consumers of agroecological products in six locations (Patte d'oie and Amitié 2; Bambilor and Toubab Dialaw in the Dakar region; the weekly market in Dixième and Pout Diack in Thiès). Initially, three sites were selected (Patte d'Oie, Bambilor and the weekly market in the tenth district of Thiès). The inclusion criterion of women aged 18 to 49, however, did not allow the sample to be reached at the sites initially selected. The snowball method was adopted to identify women

consumers of agroecological products aged between 18 and 49 in other sites that were more or less similar in terms of their location in working-class or socially mixed neighbourhoods.

The survey target

The survey was conducted with women of reproductive age who consumed agroecological products and, to a lesser extent, with those who did not. Questions were asked about their socio-economic profiles, their eating habits in general, their consumption of agroecological products, their health and medical history, their motivations, their access to agroecological products (physical and economic accessibility to agroecological products), their purchasing and consumption behaviour, their relations with producers/sellers and their prospects for the development of agroecology. Additional interviews were conducted with sellers, NGOs supporting the production and consumption of agroecological products, and authorities responsible for nutrition, food security and agriculture, for triangulation purposes.

Table 1: Breakdown of the qualitative sample size according to point-of-sale origin

Types of participants	Focus groups	Consumer interviews	Non-consumer interviews	Resource persons	Total Interview
Patte d'Oie/Amitié 2	5	4	5	4	13
Thiès/Pout Diack	5	4	6	3	13
Toubab Dialaw/Bambilor	7	4	6	3	13
Total	17	12	17	10	39

Table 1 shows the distribution of the qualitative sample according to origin. We conducted individual interviews with three target groups: consumers selected during the administration of the questionnaires on agroecological products, non-consumers and resource persons. We also conducted a focus group of 5 people at each site, at Patte d'Oie/Amitié 2 and Thiès/Pout Diack, and 7 at Toubab dialaw/Bambilor. The table below shows the number of interviews carried out, by target group and by area. We interviewed 13 people at each site, in addition to those who were met during the focus groups. In the Patte d'Oie/Amitié 2 area, we conducted 4 interviews with consumers of agroecological products, 5 with non-consumers of agroecological products and 4 with resource persons. The resource persons included an agent from the town of HLM Patte d'Oie, a development worker from HLM Patte d'Oie, a female producer and an agroecological engineer.

In Thiès/Pout Diack, we spoke to 4 consumers of agroecological products, 6 non-consumers and 3 resource persons. We specifically interviewed the president of the Centre d'écoute et d'encadrement pour un développement durable (CEEDD), the project's monitoring and evaluation manager (SPG) and an agricultural technician in charge of projects at AGRECOL Afrique. Finally, for Toubab Dialaw/Bambilor, we conducted 4 interviews with consumers, 6 interviews with non-consumers and 3 interviews with resource persons. These included the president of the food governance initiative committee (CIGA) in Bambilor, a female producer and a nutrition officer for children aged 0-5 years.

Table 2: Breakdown of the sample according to origin by sales outlet

Point of sale	n	Urban (%)	Rural (%)
Patte d'Oie/Amitié 2	60	93.3	6.7
Thiès/Pout Diack	60	50.0	50.0
Toubab dialaw/Bambilor	60	90.0	10.0
Package	**180**	**77.8**	**22.2**

Table 2 shows the distribution of the sample according to place of origin.

The distribution of the sample according to place of origin shows that the outlets in Patte d'Oie/Amitié 2 and Toubab Dialaw/Bambilor are mainly frequented by women from urban areas (93.3% and 90% respectively), while Thiès/Pout Diack has a balanced distribution between urban and rural areas (50% each). Overall, 77.8% of respondents live in urban areas and 22.2% in peri-urban and rural areas.

3.3. Limitations of the study

The RS has some limitations that are linked to the specific international agenda for which it was conducted, and the relatively limited number of agroecological markets initiatives in urban or peri-urban areas in Senegal.

First, the RS was conducted under tight time constraints (9 months) to deliver relevant results for the N4G Summit at the end of March 2025. Within this time constraint, it was impossible to build evidence of the impact of agroecological markets on women consumers' nutrition using impact methodology such as randomised-control trials or quasi-experimental protocols. This RS is an **exploratory study** that will identify *potential* impact pathways of agroecological market initiatives on nutrition in urban and per-urban areas and relevant interventions which could build on these impact pathways to improve nutrition. We focused on contrasting cases of agroecological markets, in only one country with limited field work, thus this study is not representing all the potential organisational innovations in agroecological marketing channels. The literature review, however, as well as the interview with one representative of the Pafao programs enabled us to identify promising initiatives in other countries in Sub-Saharan Africa.

Second, there was difficulty to reach the targeted number of women consumers in some of the identified markets, which led us to enlarge the geographical scope of the RS to one rural area (Pout Diak). In addition, we don't have insights on the overall diversity of agroecological consumers since the specific targeted population for the consumer survey was 18-49 years old women, and many agroecological consumers were over 50 years old.

Third, the study was implemented in the low season of vegetable production in Senegal, preventing or limiting direct observations. Finally, price records are partial and not well documented in the specific case studies.

4. Results: Agroecological market initiatives in Senegal

4.1. Literature review on alternative food networks across LMICs

The literature on agroecology has fewer studies on marketing channels of agroecological products than other aspects of agroecological transitions, such as the plot and farm level (Bezner Kerr et al. 2021, Sirdey et al. 2023). Africa is particularly understudied, with only an emerging literature, for example on participatory guarantee system efforts in Morocco (Lemeilleur and Sermage, 2020) or on the diversity of local organic markets in Kenya (Tankam, 2017). Some studies were nevertheless identified that helped to build an analytical framework for the case of Senegal.

Alternative Food Networks (AFNs) are specific organisations based on the partnership and social cooperation between consumers and small-scale farmers, with the aim to reconnect consumption and production by using short distribution channels. In the literature, they are shown to have various organisational features

(Duncan and Pascucci, 2017) and are usually more complex and have longer distribution channels, although they remain relatively small-scale organisations (e.g. Fiore et al. 2024). Several other studies looked at agroecological market systems from different angles, such as: to what extent "nested" agroecological markets in China, Europe and Brazil are major vehicles of, and for, transformative struggles (van der Ploeg et al., 2022); the tensions between urban food policy and agroecological farming in Spain (López-García, D. and Carrascosa-García, 2024); farmers' markets and participatory guarantee systems as a way to expand agroecology in Brazil (Valencia et al., 2019) or in Vietnam (Grovermann et al., 2024); how Community Supported Agriculture (CSA) fosters the adoption of agroecological practices (Fiore et al. 2024); how agroecological women's associations have developed farmers' markets in Ecuador (Borja et al. 2024); certification and marketing schemes in France, Brazil and Argentina (Le Velly et al. 2023).

In LMICs, FAO/INRA (2016) and FAO/INRA (2018) reviewed 15 case studies, including 6 in Africa, aiming at supporting "sustainable agriculture", including agroecology, through access to markets in various geographical contexts and showed various types of marketing channels. In urban areas, they included: direct sales (e.g. farmgate sales or farmers markets), short value chains with one intermediary (e.g. cooperative shops, or group sales), long value chains that end at supermarkets or wholesalers, online marketing channels (e.g. social networks to centralise orders from consumers or sell vegetables boxes through weekly commands), and public procurement programs. Public procurement is often highlighted as a means to support agroecological transitions among farmers and provide good quality products to targeted beneficiaries (children for instance) (e.g. Sampson et al. 2021).

The type of marketing chains is important to consider if the aim is to improve the nutrition of low-income populations in cities, because it determines the food environments, in particular physical access, affordability and information sharing regarding food quality (Turner et al. 2018; HLPE 2024). Previous research suggests that four specific features of marketing chains are important to consider:

- **The type and location of final retail outlet** is key because different types of outlets are used by different segments of the population. Low-income populations usually use open daily markets, shops, kiosks of street vendors located in their neighbourhoods rather than outlets such as supermarkets (Gómez and Ricketts 2013; Moustier et al. 2023), which are almost exclusively used by middle or high-income populations in Dakar (GRDR, 2010). As an example, fortified products may rarely reach the most nutritionally vulnerable people because they are not found in the "informal food system" channels (Mkambula et al. 2020, Humphrey and Robinson 2015). In addition, the distance from households' homes to retail outlets matters with 95% of food purchases made within 1 kilometre of the households in urban areas in Senegal (Thériault et al. 2024).

- **The length of the food chain (number of intermediaries)** can foster or prevent information exchanges (regarding quality, prices, culinary practices, etc.) and influence the price setting. One challenge with agroecological approaches is the focus on fairness within the food system, and thus the need to strike a balance between remunerative producer prices and affordable prices to ensure that low-income households can afford healthy agroecological foods. The literature highlights that direct sales from producers to consumers (e.g. farmers markets), or short distribution channels (in terms of distance and number of intermediaries) are a way for both improving producer margins and lowering consumer prices as well as to promote the local economy (April Lalonde et al. 2020, Bezner Kerr et al. 2022, Kremen et al. 2012, Jacobi and al. 2020, Sampson et al. 2021, Pafao 2017, FAO/INRA 2018). Such marketing chains may also facilitate the redistribution of value along the supply chain and renew trust between producers and consumers (Kremen et al., 2012), because these markets are not only a space where products are exchanged but also values and knowledge (Loconto et al. 2018). Consumers have a key role in these systems to influence the way the products are produced and marketed (Loconto et al. 2018): direct exchanges (which can use digital tools, Wittman et al. 2020) enable them to "assess" producers' degree of responsibility and raise their concerns (April Lalonde et al. 2020, Bezner Kerr et al. 2022, Kremen et al. 2012, Jacobi and al. 2020. Sampson et al. 2021, Loconto et al. 2018).

- **The governance across the chain, or modes of coordination** between farmers and vendors, when channels are mediated (not direct sales from farmer to consumer), is critical. Governance can be defined as "the authority and power relationships that determine how financial, material and human resources are allocated and flow within a chain" (Gereffi, 1994). Reducing power asymmetries is central in agroecology. We might therefore expect that agroecological channels be governed by

some forms of coordination where actors pursue common objectives such as market access, quality rise, price-setting or higher bargaining power (Markelova, & Mwangi 2010).

Instead of imbalanced coordination such as captive governance (when farmers are highly dependent on a client and face significant costs if they want to switch),[6] or market governance (i.e. spot transactions where actors easily and frequently switch to new partners), agroecological channels might be characterised by relational governance. In the latter, transactions are governed by trust and reputation, and actors are independent but closely related through spatial and relational proximity, acquittance and regular exchanges (Gereffi et al. 2005). This situation might also be qualified as vertical collective action (between actors along a chain), complementary to horizontal collective action between peers (Trienekens 2011, Ahoudjo 2021).

According to FAO/INRA (2016), horizontal and vertical collective action may generate trust among actors and create the enabling conditions for a successful marketing of agroecological products (also relevant for conventional products). The network of organisations supported by the Pafao program is an example of these enabling conditions, which include: (i) supply diversification and stability to meet the demand; and (ii) production and marketing planning to overcome difficulties linked to seasonality of production and prices (especially for fruits and vegetables). Indirect actors (such as NGOs or local authorities) can play a key role in contributing to these conditions by organising market exchanges, the production schedule, training and research programs (Loconto et al. 2018). In some agroecological markets, they can also play a specific role in sharing information among actors, while not actively organising market exchanges (e.g. *information-rich market networks* identified by Loconto et al. 2018 in Bolivia, Kazakhstan, Namibia).

- **The differentiation process** is a way to recognise the increased quality associated with agroecological products. Three elements usually make up the differentiation process: (i) the qualification/definition of quality, i.e. rules that define product quality, (ii) the guarantee of quality, i.e. systems that ensure the rules are respected by the producers, processors and/or traders, and (iii) the signal of quality. The qualification process of agroecological products may rely on both a set of practices at the plot and farm levels, the way products are sold (marketing partnerships), relational governance, and cultural values around food production, trade and consumption. Guarantee systems can refer to self-certification or no certification (when products are sold in a trust relationship), third-party certification (i.e. external control and delivery of the certificate) and, in between, participatory guarantee systems (PGS),[7] which are increasingly used globally to guarantee agroecological quality. Once defined and guaranteed, the quality can be communicated to the other actors in the market either through a label, a brand, or a dedicated physical market for instance.
- **Addressing low-income households**: within certification systems, PGS are considered more appropriate than third party certification for agroecology (because of the social principles of agroecology) and for low-income diversified small-scale producers (Lemeilleur and Allaire 2019) and a trustworthy mechanism for public procurement (FAO/INRA 2018). In addition, PGS, which involves both farmers and consumers, are helpful in sharing thoughts about trade-offs and synergies between different categories of benefits of agroecological markets and thus increasing collective knowledge (Wittman et al. 2020). Notably, the network of organisations supported by the Pafao program, observed from a crosscutting analysis of 30 programs in six West African countries that consumers of certified agroecological products are often from upper-income households, even for PGS-based certification (Pafao report 2024).

4.2. Inventory of 16 initiatives

We developed an analytical grid based on this literature, in order to characterise agroecological market initiatives identified in Senegal and assess to what extent they are likely to contribute to the consumption of

[6] Captive governance is observed when the product specifications are complex and farmers' competence is low, thus requiring intervention and control from the client (on production practices, logistics, prefinancing etc.) and making suppliers "captive" (Gereffi et al. 2005).

[7] PGS are "locally focused quality assurance systems. They certify producers based on active participation of stakeholders and are built on a foundation of trust, social networks and knowledge exchange" (IFOAM Official definition 2008).

agroecological products by economically and nutritionally vulnerable women. The grid includes the following elements:

- General information: Name, location, type of products, networks
- Characteristics of the marketing channels: Production areas; Intermediaries / Length; Consumption areas; Retail outlet; Consumers
- Differentiation process: qualification, certification, labelling/signalment if any
- Governance: in particular regarding price setting mechanisms and degree of horizontal/vertical collective action
- Nutrition potential: Availability/Physical access; Economic access / affordability; Empowerment / nutrition awareness

Table 3 presents the synthesis of the inventory of 16 initiatives according to their location, the type of channels and the differentiation process. Four are in rural areas and 12 are in peri-urban and urban areas. There is a diversity of types of marketing channels. The two main ones are direct sales from farmers to consumers (6 initiatives) and short-chains with one intermediary (6 initiatives). There are also two long-chains with two intermediaries or more. Among these initiatives, only one sells certified products (Sell Sellal) based on a Participatory Guarantee System (PGS) called BioSenegal. Therefore, most of these initiatives can be considered as agroecological initiatives without any guarantee system, while one site is transitioning towards more agroecological practices and another initiative mostly focuses on local (i.e., traditional Senegalese) rather than agroecological foods. Based on our data collection, 8 initiatives are likely to reach low-income consumers, of which 6 are in urban or peri urban areas (Table 1). These 8 initiatives are less frequented by high-income consumers, including two using online marketing channels (one directly from producers and one with an intermediary).

Table 3: Synthesis of the inventory according to their location, type of channels and likelihood to reach low-income consumers (Source: authors)

Market type and urban/rural	**Rural**	**Peri-urban**	**Urban**
Direct sales	Baba Garage* Guelack Pout Diak*	Women group linked to Ferme des 4 chemins* Mampuya	Thiaroye Gare* Patte d'Oie* Passion Nature#
Short distribution channels (one intermediary)	Club Med Cap Skirring	Bambilor* Calebasse Verte	Sell Sellal *(certified products by BioSenegal)* Bertha market# Organic market of Thiès*
Long distribution channels (two intermediaries or more)			Lendeng* *(transition towards agroecology)* Soreetul *(focus on local products)*
* likely to reach low-income consumers; #: using online distribution			

We build on a "case study" research approach to understand "how" initiatives work and "why". The choice of cases is therefore crucial: they may not be representative of current initiatives in Senegal, but chosen for their relevance, in this case their likelihood in achieving both objectives of promoting agroecology and benefiting low-income women in the city. Although there is a dynamic civil society movement supportive of agroecology in Senegal, it was not easy to find initiatives that meet our criteria, in particular initiatives that both reach low-income women and are based in the cities.

Eventually, considering also the consumer survey constraints (see the methodology), two initiatives are finally presented in each of the two main types of channels, i.e. direct sales and short distribution channels. In addition, three initiatives have been used as complementary case studies, either they were used as study sites for the consumer survey or because they propose an interesting and complementary perspective.

4.3. Description of selected agroecological initiatives

4.3.1. Direct sales initiatives

Micro-garden of HLM Patte d'Oie

The micro-garden at HLM Patte d'Oie[8] is run by a women's economic interest group (GIE) called the "*GIE des femmes du micro jardinage d'HLM HLM Patte d'Oie*". These women were initially supported by Dakar city, the neighbourhood committee and the FAO. Since 2002, a series of four programmes have been run to train and support the women to produce spices, herbs and vegetables on raised beds (or table tops or pots) in the heart of Dakar. About thirty women are active now, although they were 100 women at the start. Most of them stopped their activity due to illness, death of the oldest women or personal choices, and the remaining women decided to extend the number of tables they have rather than include new members. Some daughters/granddaughters of former beneficiaries have 'inherited' these tables. Despite this shift, most of the women in the garden are now elderly (up to 60).

The main products are mint and other herbs/spices (rosemary, aloe vera, basil, lemon balm, etc.), as well as vegetables such as beetroot, turnips, lettuce and eggplants; with higher availability in the dry season and lower production in the rainy season. Most women focus on mint[9] because it is a low-risk, high-income crop, unlike vegetables, which are vulnerable to attack from rats and whiteflies.

Figure 3: Raised tables in HLM Patte d'Oie, Dakar

These women are frequently asked to train others on micro-gardening practices. The practices are in line with the micro-gardening training courses attended at the start of the project and are not described as 'organic' but as agroecological, even though no pesticides are used and only the micro-macro[10] mineral solution used as a substrate is a chemical input. They receive no financial or material support, apart from Dakar city's staff who come on a regular basis to help them, for instance, with the renovation of the tables.

[8] HLM Patte d'Oie is the name of one neighbourhood of Dakar City

[9] Mint can be harvested around 40 days after planting, and then every five days

[10] The macro is composed of MKP, calcium nitrate, and potassium nitrate. The micro is made up of magnesium nitrate, magnesium sulphate, copper sulphate, zinc sulphate, boric acid, ammonium molybdate and sequestrene. Mamadou Sarr, « Approches didactiques de la problématique de l'eau en milieu formel et non formel au Sahel », *VertigO - la revue électronique en sciences de l'environnement* [En ligne], Hors-série 1 | décembre 2003, mis en ligne le 15 décembre 2003, consulté le 10 octobre 2024. URL: http://journals.openedition.org/vertigo/1964 ; DOI : https://doi.org/10.4000/vertigo.196

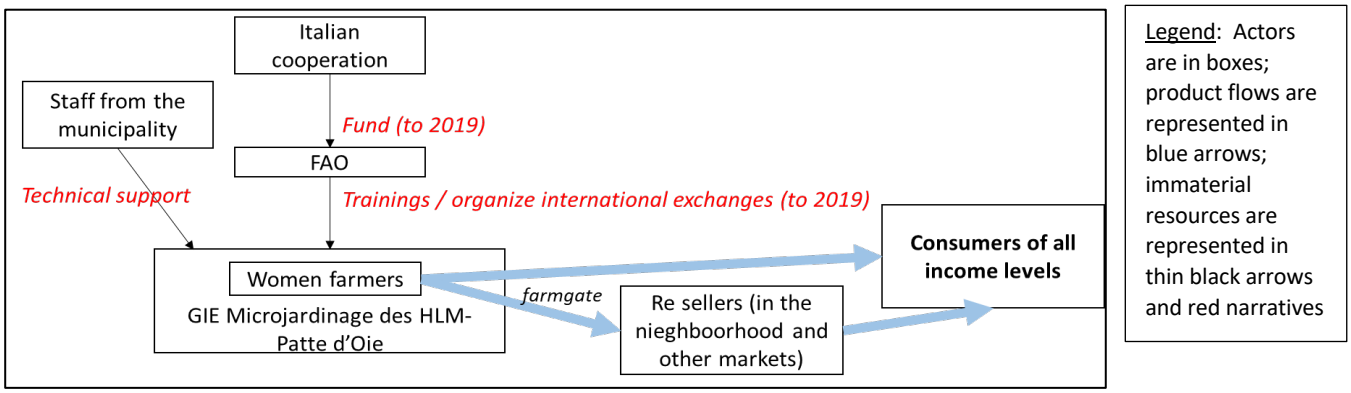

Figure 4: Diagram of HLM-Patte d'Oie initiative (Dakar) .

Their organisation combines individual and collective management (Figure 4). Each woman daily works individually, building her own tables, managing her own supply of inputs to set up the nurseries (seeds, wood, substrate made from groundnut hulls, rice husks, laterite and a mix of nutrients in a mineral solution called micro-macro) and selling individually to their respective clients, with their own price setting mechanism. In parallel, they manage collectively productive investments and some labour (such as renovating the water pump or paying young people from the neighbourhood to do the watering), along with collective savings (in the form of a *tontine,*[11] with a daily contribution from the women, the amount in the fund being paid in turn to one of the women in the group (each week).

Agroecological products are bought by consumers, vendors, street caterers (e.g. juice producers and sellers), through direct sale to customers who come to the garden or with a prior order, or by delivery (by motorbike), in small (herbs for 500 F CFA) or large quantities (e.g. a whole table). The large majority of their vegetable production is self-consumed, and a very small portion is sold. The president of the GIE estimates that they sell between 15 to 25 tables of mint each week, and between 60 and 90 pots of fresh herbs/spices per week.[12] Some tables are also grown to order. Some tables are installed at the customer's premises, where they can then cut and sell the herbs as they grow. This approach enables these clients to do their own small business (Figure 4).

Toubab Dialaw

The Ferme des 4 chemins is a 4 hectares school farm, a demonstration farm, very diversified and integrated (market gardening, field crops, fruits, seed production and exchanges, fish farming, beehives) which welcomes and trains a diversity of people. The philosophy is to embrace all the agroecological principles (autonomy, recycling, connectivity, diversity, healthy diets, etc), to produce, trade and consume healthy products with zero chemical inputs and demonstrate that agroecology is viable. The four "Chemins" or pathways refer to four critical dimensions of agroecology: education, environment, health and sustainable development. Beyond their activity of training and hosting seminars, they sell vegetables via a WhatsApp group, directly on farm and through a monthly market organised on the farm and called "Marchés Biodialaw", where the other producers are welcomed (Figure 5). They set fixed prices according to production costs and not depending on seasonal production.

Seven years ago, the leader of this demonstration farm was trained and now supports a group of 100 women in agroecological production. They received a one hectare of protected land with access to water and produce agroecological products for seven years. They are organised in four groups of 25 women which organise production and sales. Beyond self-consumption, sales are made through the marketing channels

[11] A *tontine* is a traditional collective savings scheme. Each member contributes a sum of money (usually small) to the tontine treasurer. Depending on the rules set by the tontine members, the fund is redistributed to one of the members for individual expenditure at a predetermined frequency or it can be used for collective expenditure.

[12] This roughly represents 40 kilos of mint and 40 kilos of spices per week, according to her. The quantity varies widely along the year and even within each month (with more sales in the first part of the month compared to the end of the month)

used by the Ferme des 4 chemins (Whatsapp group and Marchés Biodialaw) and through local sales at the Toubab Dialaw market (daily market). For the last channel, women buy vegetables from the collective at a lower price than their selling price and resell them individually at the market on their behalf.

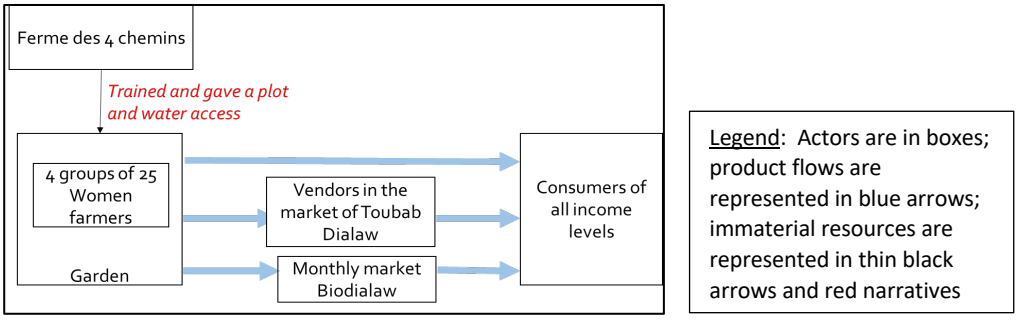

Figure 5: Diagram of Toubab Dialaw initiative

Two other initiatives that mostly use direct sales have been visited as part of the consumer survey to complement the targeted sample, respectively in the region of Thiès and the city of Dakar. Located some fifteen kilometres east of the city of Thiès, **Pout Diack** is a village in the rural commune of Notto Diobass (region of Thiès). A garden divided into plots – with access to a well - was set up within the church to enable women to develop their farming activities, in particular a women's group organised under a Groupement de Promotion Féminine (GPF). They are often supported by the *Centre d'écoute et d'encadrement pour un développement durable* (CEEDD) with free training in ecological and organic farming, as well as provided with seeds and equipment (such as rakes, wheelbarrows). The women sell the vegetables both directly to consumers and through vendors.

The ***Amitié 2*** training centre is located next to the Grand Dakar city council and was built in 2000. As the micro-garden at HLM Patte d'Oie, they benefited from a program of cooperation between the city of Milan and the city of Dakar. This project aimed to promote micro-gardening and empower women, but also pupils or students. In addition to the garden, there was also the installation of growing tables at household level, to enable families to grow the produce they consume themselves. They grow herbs, spices and vegetables in an agroecological way. They don't use pesticides, and even if they are used to add the micro and macro fertilisers, they have been making their own compost for the past two years. This site was visited as part of the consumer survey to complement the sample for the city of Dakar.

Finally, it is worth mentioning the initiative set in **Thiaroye Gare** (Pikine department, Dakar region) with the support of CICODEV and funding from INKOTA from the end 2024 – just like the Bambilor case study (see below). A group of women (*Union des groupements de femmes pour le développement de la ville de Thiaroye Gare* (UGFDTG)) has a very small piece of land at the level of the military camp of Thiaroye since 2015 (less than 200 m^2) where they grow vegetables with agroecological practices. Their main outlet is a stall at the large conventional market of Thiaroye, located very close to the production site. We didn't include this initiative in the set of case studies since production is still tiny and most of the sold products are conventional ones previously bought in the wholesale market. This initiative is interesting to consider for our study in relation to the agriculture-nutrition-health nexus as most of the women involved in the agroecological vegetables garden are also leaders in their community in relation to health centres, and in charge of raising awareness among women of reproductive age about health and nutrition.

4.3.2. Short channel agroecological initiatives

The organic market of Thiès

The organic market of Thiès is held every Friday (from 14h to 18h) and Saturday (from 8h to 17h) for about 20 years in the street called "La 10ème" in the city of Thiès, the third largest city of the country located 70km away from the capital, Dakar. Around ten women vendors sell fresh fruit and vegetables, fresh herbs, dried herbs, processed local cereals, oils and fish products. The women retail vendors sell between approximatively 150-200 kg of fruits and vegetables per week in low season and 300-500 kg per week in high season, which means between 12 and 20 T per year. There are many more vendors and products during the organic fairs that are organised three times a year, attracting much more producers, vendors and processors from other regions.

Figure 6: The organic market in Thiès (October 2024, photo by authors)

Around ten organic vegetables farmers are supplying the market. Some women vendors are also farmers. The specifications for organic farming in Senegal, drawn up by the *Fédération Nationale pour l'Agriculture Biologique* (FENAB), are used as a reference. A participatory guarantee system Nat-bi was set up a few years ago. Although training and information have been shared, the PGS is expected to be active from 2025.

Market vendors buy their supplies individually from farmers (sometimes with credit), although sometimes they buy a bag and share it. Since the Covid19 period, the number of visitors and the size of the market has decreased and never recovered totally, and some consumers have become accustomed to having their produce delivered to their homes (Figure 7).

The setting up of this market is part of a programme to support food system actors which is led by the NGO Agrecol Afrique for twenty years. The NGO aims to bring synergies between all their activities to promote food sovereignty and healthy food systems. In particular, the NGO has been supporting several programs in the field of organic farming, marketing and consumption and social and solidarity economy, including farmer training, an organic restaurant, processing units, and the weekly organic market. Today, only the organic market is still functioning. Agrecol Afrique plays an intermediary role between actors, for both price setting mechanisms, values promoted and access to inputs. To facilitate farmgate and retail prices setting, the NGO has set up a market information system (MIS) and recorded retail prices are shared between producers, sellers and consumers. The NGO also pre-finances the farming campaign, supplying the inputs (seeds, organic fertiliser) to farmers who pay back the money at the end of the season.

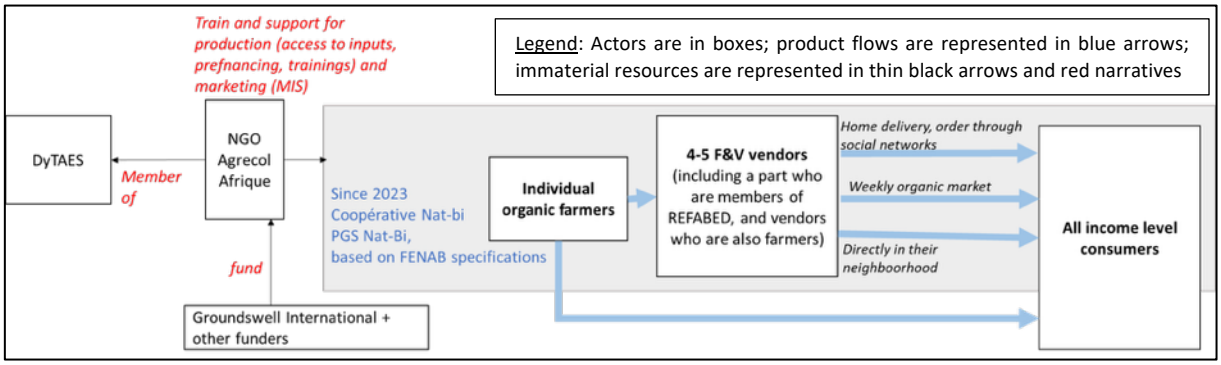

Figure 7: Diagram of the organic initiative in Thiès.

Comité d'initiatives pour la gouvernance alimentaire (CIGA) in Bambilor

The CIGA committee, set up by the Bambilor municipality[13] (Rufisque department, Dakar region), and made up of 6 thematic groups in charge of covering many areas of food systems, is implementing an agroecological garden initiative since 2021. The CIGA advocates for a holistic vision that consists of producing, marketing, preparing (in the central kitchen) and consuming agroecological products (through raising awareness of the importance of healthy diets for human health and nutrition).

A new support from the NGO Pan-African Institute for Citizens, Consumers and Development (CICODEV) and funding from INKOTA (*Information, Koordination, Tagungen*, a German NGO) from the end of 2024 should

[13] It is noteworthy that the entire Dakar region is now considered as urban.

help to expand and structure the initiatives. Bambilor is under land pressure. The initiative started with a small plot (2500 m² of which 1000 m² is under production) two years ago with the support of FAO, GRDR and CICODEV (Figure 8). A 1000 m^2 plot will be set up, equipped with three wells and a solar panel provided by the village youth centre, for a group of women to produce agroecological vegetables. The main production destination is the central kitchen supplying 4 school canteens (supported by the same projects), supplemented by the local market, farm gate sales, and traders selling in a large conventional market in the centre of Dakar (the Castor market). The vegetables harvested volumes were low at the time of this research in 2024, but are expected to expand with this new plot. CIGA plans to pay 30% of the profits to young people who gave the land and will work in the garden as well, 40% to the women who work in the field and 30% to the CIGA committee.

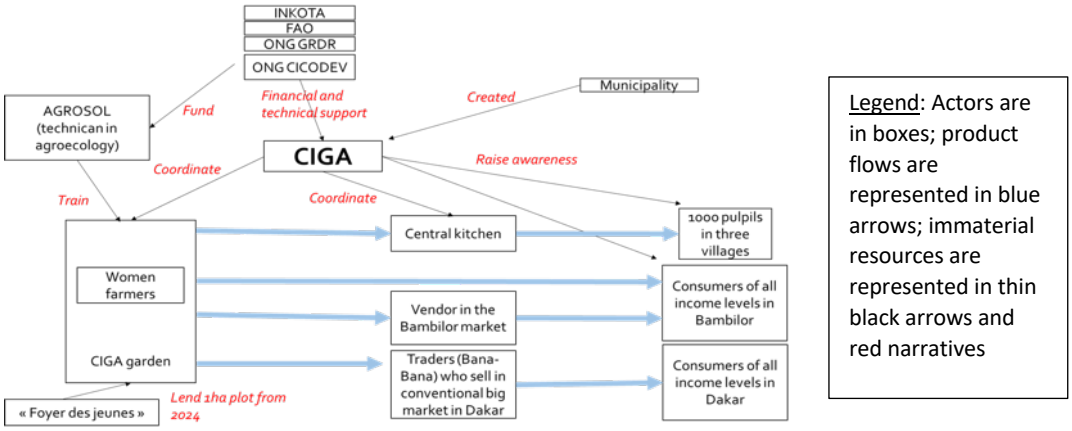

Figure 8: Diagram for the Bambilor initiative

The NGO CICODEV is part of the DYTAES actors who are the most involved on the consumer side, promoting healthy diets based on agroecology as a way to fight against non-communicable diseases (e.g., diabetes, hypertension) widespread in Senegalese cities. Their discourse builds on a right-based approach very aligned with food sovereignty and agroecology approaches. This initiative, however, has had a deep reorganisation during the project period (stop and change of plot for the gardening), which did not allow for assessment of the functioning of these agroecological products marketing channels or the consumers using the products. This initiative thus serves as a counterpoint or complement to the main 2 initiatives studied.

Figure 9 Sel Sellal market, June 2024 (photo by authors)

In addition, the initiative **Sell Sellal** was noteworthy to include because this is the only market that sells certified organic products to urban consumers. We did not include this initiative in the set of case studies since it was unlikely to reach low-income consumers given its location and prices[14] even if their initial goal was to make organic products accessible to all Senegalese (Gassama 2023). We used the retail prices set by this initiative over 12 months (September 2023 to October 2024[15]) to compare them to conventional prices (see section 6.2).

Sell Sellal is a cooperative established in 2013 to facilitate the marketing of organic products in Dakar, in two weekly organic markets (direct sales or pre-order through WhatsApp), visited by around 50 loyal customers (a mix of Senegalese and expatriate, both upper-income level accustomed to this label). Producers follow the specifications of the organic agriculture of the FENAB, building on a PGS and selling under the label BioSenegal. This initiative supplies from several producer organisations in the Niayes region, especially the *Federation des Agropasteurs de Diender* and *Woobin*. It has been supported by the NGO Enda Pronat for years but is now autonomous.

[14] This market is even perceived as a "white market" by agroecological farmers according to Marfurt et al. 2023 - Senegalese consumers also being seen as white because of their living style similar to expatriate white people.

[15] The prices presented here are the retail prices of the first market of each month (between the 1st to the 4th of each month)

4.4. Market initiatives: Main characteristics and common features

Table 4: Summary of main characteristics of Agroecological Market Initiatives and common features

	Direct sales, as the main distribution channel		**Short chain, as the main distribution channel**	
Initiative	**GIE of micro jardinage of HLM Patte d'Oie**	**Toubab Dialaw's women group**	**Thiès**	**Bambilor**
	Municipality of Dakar, FAO	Ferme des 4 chemins	NGO, Agrecol Afrique, REFABC, Cooperative Nat-bi, consumers	CIGA, GRDR, Municipality, INKOTA, CICODEV, Rufisque department, FAO
Farmers	Approx. 30 women farmers, more or less active	Around 100 women farmers, gathered under 4 small groups, in 1ha	Approx. 10 farmers, between 500 m2 to 3 ha each	Around 10 people so far. From End 2024: 40 women farmers + young people + CIGA members
Area / Volumes	Approx. 700 tables (around 1m² each) Sales of 15 to 25 tables of mint each week, and between 60 and 90 pots of fresh herbs. Each woman may sell between 30 000 and 100 000 FCFA per week	1 ha	Approx. 150-200 kg in low season and 300-500 kg per week in high season	Until now: 1000 m2. In 2023: Squash: 102 kg; Salad: 18 beds of 25 plants; Aubergine: 43 kg; Tomato: 96 kg; Peppers: 27 kg. From end 2024: 1ha
Products	Mint, spices, vegetables, ornamental plants and fresh herbs sold in pots	Vegetables, fruits, herbs	Vegetables, fruits, fresh herbs, mint, processed foods	Vegetables, herbs
Marketing Channels	Direct sales to consumers; Sales to resellers	Selling to local market, through the monthly market "Biodialaw" in the Ferme des 4 chemins and through a WhatsApp group	Home delivery with pre order in a WhatsApp group; Weekly local market; Pre order, home delivery and direct sales from farmers	Selling to the central kitchen to supply 4 school canteens, Farm gate sales, Local vendors (in Bambilor), Local trader who sell in Dakar (Market Castor)
Number of Consumers	Around 30 a day	Unknown	Around 40 boxes each week + market consumers (Direct observation of 15 clients during a Friday market, 6 men 9 women)	Few tens by day during high season (farmgate)

	Direct sales, as the main distribution channel		Short chain, as the main distribution channel	
Differentiation	Practices of *microjardinage* (No pesticides, but mineral substrate); No system of guarantee, No label, No specific sign as you enter the garden; The garden has gained good reputation through word of mouth	Agroecological practices No system of guarantee, No label, a specific sign as you enter the Ferme des 4 chemins "*Spreading the principles of permaculture and agroecology. Production of organic fruit and vegetables'*." And wide communication on the monthly Biodialaw market	Organic specifications from FENAB, Label and SPG Nat-bi (but not effective yet), No specific sign on the market. The market has gained good reputation through word of mouth	Agroeocological practices (No chemicals). No system of guarantee, No label, No specific sign as you enter the garden
Collective Action	Production and marketing individually. Collective action to access to water, access support from the municipality, Tontine	Production individually, and marketing collectively.	Cooperative Nat-bi created in 2023 with all actors supported by Agrecol Afrique (not only in Thiès region), producers, processors, vendors, consumers	Production and marketing in a collective way
Comments	Old women; Known as expert of micro gardening >> train others in the community	Holistic agroecological approach, but part of clients are upper income customers	Key role of Agrecol as an intermediary in giving farmers access to inputs, trainings and helping the commercialisation	Holistic and systemic project but in total reorganisation/upscaling. Canteens as main clients so far

Table 4 presents a summary of the four case studies of agroecological markets initiatives. Several common features have been highlighted:

- Most of these initiatives (e.g. Patte d'Oie, Thiès, Toubab Dialaw) have existed for about twenty years and continue. Although they are small-scale initiatives, they are long-established markets with a good reputation thanks to word of mouth, which meet a demand.
- None of the cases uses a label or sign to indicate the agroecological quality of their produce, nor an active participatory guarantee system, except Sell Sellal which markets products certified by the BioSenegal label. Transactions are therefore governed by trust and reputation, which suggests relational governance.[16] This approach is favoured by spatial proximity, direct and regular exchanges between actors (both between vendors and consumers and between vendors and farmers) to foster trust and guarantee quality. Yet, several initiatives perceive the participatory certification positively. In Thiès, they are building their own PGS and the farm visits included are seen as a way to further reinforce the trust between stakeholders (internally first, and then as strength to attract more consumers). The Bambilor initiative is also considering the option to get involved in the PGS BioSenegal supported by the FENAB. It

[16] We can consider relational governance where transactions are governed by trust and reputation. If the quality of a product is hard to codify into a standard and if the farmers have the capability to meet the requirements, knowledge are not concentrated in single actor and a mutual dependence is generated between the actors. Actors are independent but closely related. The transactions are facilitated by spatial and relational proximity between actors, acquittance and regular exchanges (Gereffi et al. 2005).

is seen as an opportunity to extend and diversify their sales to more consumers, who are further away from the producers both physically and in terms of relationships.

- Collective action between peers exists in all the initiatives mainly for access to services (e.g. training), inputs (e.g. organic fertilisers or seeds via Agrecol in Thiès), land and infrastructure (e.g. the market in Thiès, a water pump in Patte d'Oie and Toubab Dialaw, land in Bambilor) as well as for ensuring solidarity.
- In all these initiatives, however, except the marketing project of Bambilor, market transactions are individually run rather than run by the collective. Actors are highly free and open when it comes to choose their sales methods and all actors are flexible in terms of: quantity (small and big quantities), location (farmgate or garden, pre-order and pick up, delivery), customers (loyal, new, households, organic or conventional resellers), timing (pre-order by phone or direct) and payment (on delivery or by credit). This applies for both farmers and vendors. These modes of governance combining regular interactions and flexibility is very common in conventional channels for perishable products, sometimes called "short relational chains", where these products originate from urban or peri urban agriculture, with one or two intermediaries between farmer and consumers and where relationships between actors are characterised by long term acquaintance and regular interaction (Moustier et al. 2023). It shows that the actors' relationships are based on usual and widely shared coordination practices, instead of innovation.
- While the modes of coordination between farmers and vendors are quite usual, the values promoted in these initiatives are innovative: based on healthy production practices (zero or reduced chemical inputs), origin, and naturally-based diets. In addition, the intrinsic signs of quality reported by the actors whether they are farmers, vendors, or supporting organisations are always the same: freshness, no chemicals, taste, and good conservation capacity.
- Finally, in all the case studies an intermediary actor plays (or has played) a key role for the emergence and sustainability of the initiatives. That might be an NGO (e.g., Thiès) and/or a local authority (e.g., Patte d'Oie, Bambilor) supported by technical and financial partners.

5. Profiles, food acquisition practices, diets and motivations of consumers of agroecological products

The survey findings on the consumption of agroecological products by women of reproductive age in urban and peri-urban areas of Dakar and Thiès are presented in this section. The profile of the women who frequent the various outlets shows that they are predominantly from urban areas (77.8%). They are mostly married (73.3%) and women aged 35-45 are the most numerous (38.3%), followed by those aged 46-49 (30.6%) across all outlets. Younger age groups (18-24 and 25-34 years) represent a third of the total sample. Almost half (46.2%) of them have at least secondary education, while 32.2% have primary education.

5.1 Employment status of consumer respondents

The results show a high prevalence of informal employment among the women surveyed, with marked disparities between areas. In Patte d'Oie/Amitié 2, almost half the women (48.3%) were in informal employment, while 26.7% were unemployed. In Thiès, the profile is more diverse: 36.7% of women are not in work, 25% are in regular formal employment, and 35% are in informal employment. Toubab Dialaw/Bambilor stands out with a very high concentration of informal activities (76.7%) and a low proportion of women in formal employment (5% in regular employment).

Overall, across all zones, more than half of all women (53.3%) are in informal employment. The proportion of unemployed women was 22.8%, followed by those in regular formal employment (19.4%) and those in irregular formal employment (4.4%). These results highlight a predominantly precarious or informal occupational integration, underlining the persistent challenges of access to stable and structured employment for women in the various study areas. The results show that the majority of unemployed women identify themselves as housewives. This trend is particularly marked in Toubab Dialaw/Bambilor, where 100% of unemployed women said they are housewives. In Patte d'Oie/Amitié 2 and Thiès, this proportion remains high, at 75% and 77.3% respectively. As regards other activities, in Thiès, 13.6% of unemployed women were students, and 9.1% mentioned other statuses. In Patte d'Oie/Amitié 2, 25% of

unemployed women were involved in activities other than studying or domestic chores. Overall, 78% of unemployed women were housewives, 17.1% were students, and 4.9% fell into another category.

These results confirm that most unemployed women consumers in the areas studied are in domestic roles, with only a small proportion engaged in education or other unpaid activities (Figure 10).

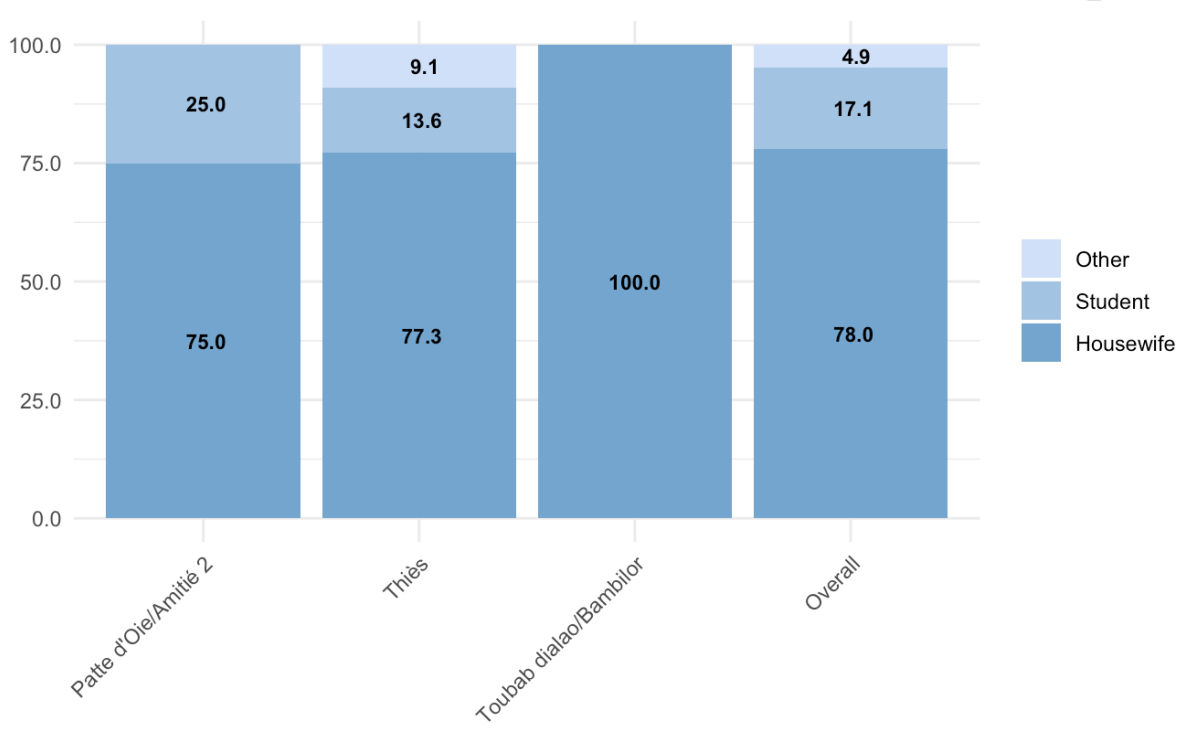

Figure 10: Proportion of unemployed women consumers engaged in different activities (%)

The consumers surveyed included a high proportion of self-employed women among those who were employed (Figure 11). In Toubab Dialaw/Bambilor, 82.5% of employed women consumers were self-employed, followed by Patte d'Oie/Amitié 2 with 77.3%. In Thiès, the proportion of self-employed women consumers was relatively lower (47.4%), with more salaried.

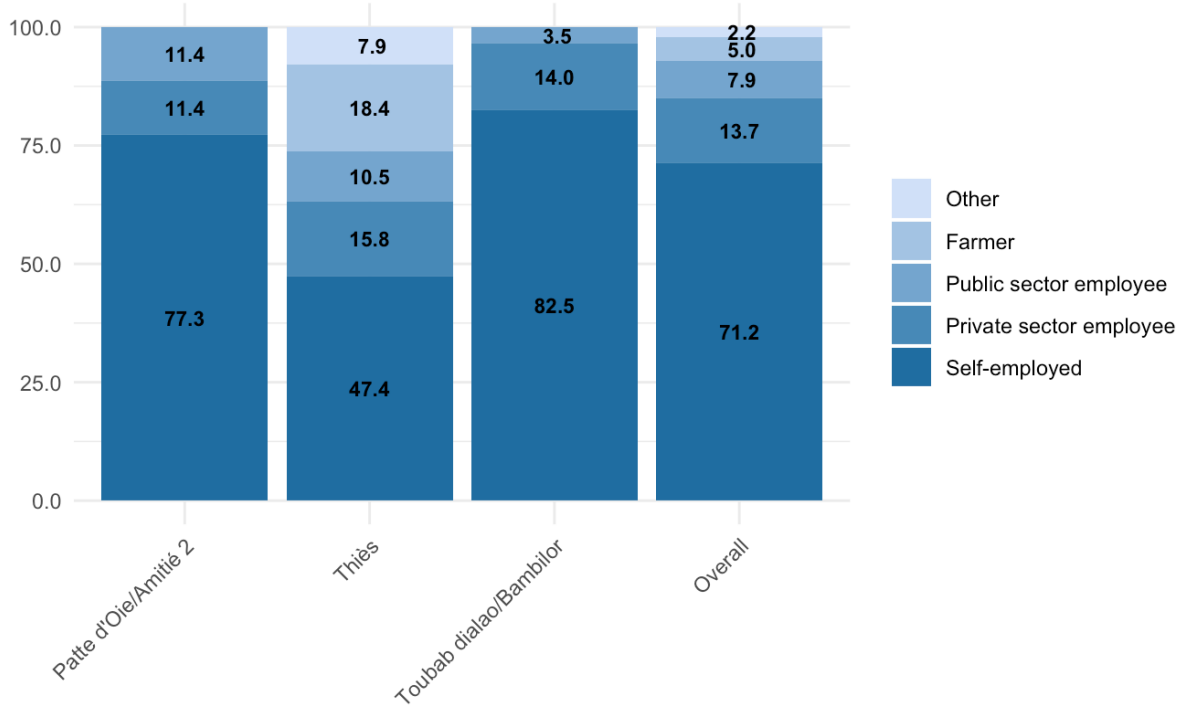

Figure 11: Main activities of employed women consumers (%)

In Thiès, activities of consumers surveyed were more diversified: 15.8% of women were employees in the private sector, 10.5% in the public sector, and 18.4% were farmers. In comparison, Patte d'Oie/Amitié 2 had lower proportions in the other categories (11.4% in the public sector and agriculture). In Toubab Dialao/Bambilor, only 3.5% of the consumers surveyed worked in categories other than self-employment, confirming an employment model that is highly concentrated on self-employment.

In all, 71.2% of employed women consumers were self-employed. Wage employment in the private (13.7%) and public (7.9%) sectors remains marginal, while agriculture accounted for 5% of declared occupations. These results confirm the importance of the informal and self-employed sector for women consumers although the diversity of jobs was more marked in Thiès.

Table 5 shows the different sectors that women consumers worked in, with a high concentration of women in certain sectors of activity, particularly trade and agriculture, while their presence in technical or specialist sectors is almost non-existent.

Table 5: Women consumers' sector of employment activity for those employed (%)

Sector of activity	Patte d'Oie/Amitié 2	Thiès	Toubab Dialaw/Bambilor	Total
Agriculture Livestock Fishing	2.3	28.9	10.5	12.9
Public works / construction	0.0	0.0	1.8	0.7
Trade	61.4	21.1	54.4	47.5
Teaching	6.8	2.6	3.5	4.3
Finance	2.3	0.0	0.0	0.7
Industry	0.0	0.0	1.8	0.7
IT	0.0	0.0	1.8	0.7
Housekeeper	2.3	0.0	10.5	5.0
Catering	4.5	15.8	3.5	7.2

Health	2.3	2.6	0.0	1.4
Others	18.2	28.9	12.3	18.7
Total	**100.0**	**100.0**	**100.0**	**100.0**

In Patte d'Oie/Amitié 2, over 61% of women worked in commerce, compared with 21.1% in Thiès and 54.4% in Toubab Dialaw/Bambilor. This predominance of trade is also found at the overall level, with almost half of women (47.5%) working in this sector. Agriculture, livestock farming and fishing account for a considerable proportion of jobs in Thiès (28.9%) and Toubab Dialaw/Bambilor (10.5%), but were almost non-existent in Patte d'Oie/Amitié 2. Other sectors, such as education, catering and health, were marginal. There was, however, a significant presence in the restaurant sector in Thiès (15.8%). Technical or formally structured fields such as IT, industry or finance were hardly represented at all. In the sample as a whole, less than 1% of women worked in these sectors. Overall, our results suggest that most women who frequent agroecological markets work in sectors that are accessible without advanced technical qualifications, which reflects both their career paths and the socio-economic dynamics of the areas surveyed.

Table 6 shows a wide range of occupations among the spouses of the women consumers surveyed, with a predominance of the informal and agricultural sectors.

Table 6: Spouse's sector of activity for women consumers surveyed (%)

Sector of activity	Patte d'Oie/Amitié 2	Thiès	Toubab Dialaw/Bambilor	Total
Unemployed	26.7	18.3	15.0	20.0
Agriculture Livestock Fishing	5.0	15.0	36.7	18.9
Public works and construction	10.0	13.3	15.0	12.8
Trade	21.7	5.0	3.3	10.0
Teaching	11.7	1.7	1.7	5.0
Finance	1.7	1.7	1.7	1.7
Industry	3.3	0.0	8.3	3.9
IT	3.3	1.7	0.0	1.7
Health	0.0	0.0	1.7	0.6
Others to be specified	16.7	43.3	16.7	25.6
Total	**100.0**	**100.0**	**100.0**	**100.0**

Overall, one spouse in five (20%) is unemployed, 18.9% work in agriculture, 10% in trade and 12.8% in construction. Like women, spouses are poorly represented in technical or formal sectors such as finance, IT or health, illustrating a local economic fabric dominated by informal, agricultural and craft activities. In Patte d'Oie/Amitié 2, 26.7% of spouses were unemployed, the highest proportion of the three areas. This figure is followed by 21.7% working in commerce and 16.7% declared in "other to be specified" sectors. Technical fields (IT, industry) remain marginal. In Thiès, there was a high concentration in the "other to be specified" category (43.3%), which may reflect a difficulty in classification or a diversity of atypical activities. Agriculture and fishing accounted for the work of 15% of spouses, while construction and public works represented 13.3%. In Toubab Dialaw/Bambilor, agriculture/livestock/fishing was by far the main sector of activity with

36.7%, reflecting the rural or peri-urban nature of the area. Construction and public works followed with 15%, while trade and education are only marginally represented.

5.1 Women consumers' health and medical history

Women self-reporting NCDs

Women self-reported in the survey whether they had any NCD (Figure 12). Overall, a total of 35% of women reported being affected by at least one NCD. The proportion of reported NCDs varied depending on the outlet, with Patte d'Oie/Amitié 2, the most urbanised site, recording the highest proportion (45%) of women indicating they had at least one NCD, and Thiès/Pout Diack the lowest levels (28.3%), and 31.7% in Toubab Dialaw/Bambilor. Women aged 46-49 were the most affected, with 43.6% reporting at least one NCD, followed by the 35-45 (31.9%) and 25-34 (31.6%) age groups, with similar proportions. Younger women, aged 18-24, reported the lowest levels, with only 27.8% declaring a NCD. Overall, the prevalence of NCDs increased with age, in line with medical research showing NCD risks increase with age.

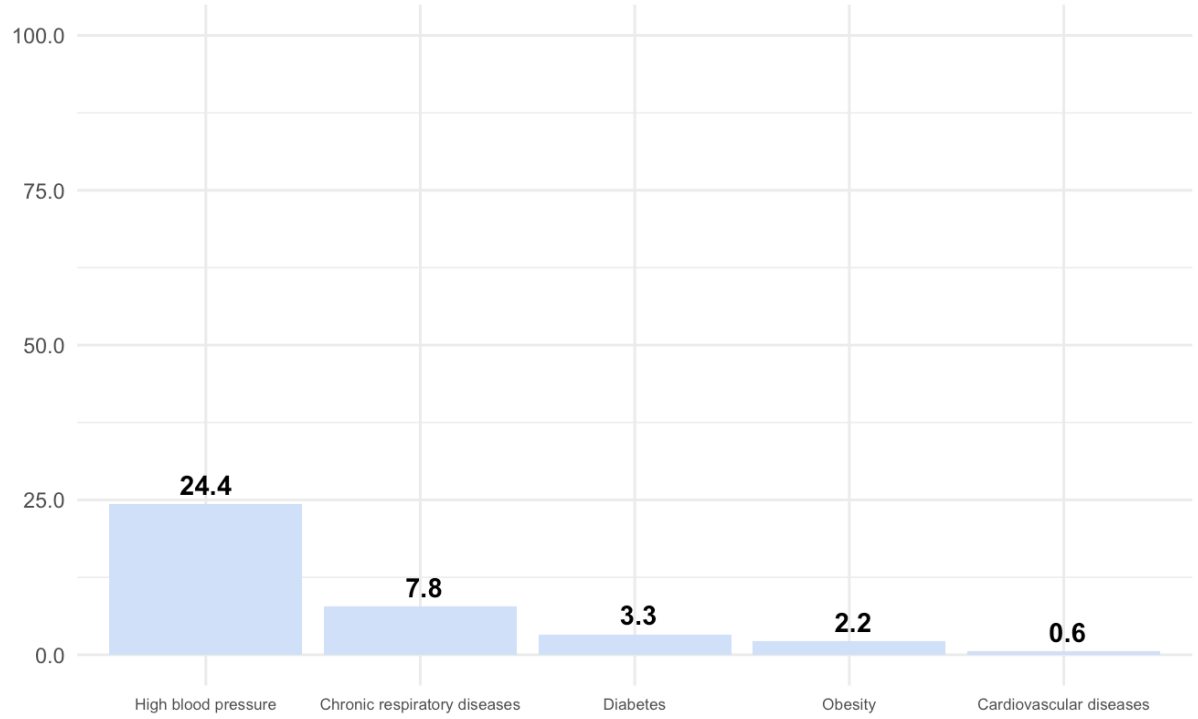

Figure 12: Proportion of diet-related diseases self-reported by women (%) (n=180 respondents)

In terms of type of NCDs, hypertension is the most common declared pathology, affecting **24.4%** of respondents (Figure 9). It is followed by chronic respiratory diseases (**7.8%**), diabetes (**3.3%**), obesity (**2.2%)** and, lastly, cardiovascular diseases, which are the least frequent, accounting for only **0.6%** of cases. These figures of self-reporting NCDs are far below those from the national statistics. We will also see below that obesity is in fact much higher than what is self-reported among the respondents.

Consuming agroecological products to prevent diet-related NCDs

An analysis of women's views on the consumption of agroecological products reveals that those who consumed agroecological products for their health did so either as a preventive measure, aware of the risks of diet-related diseases, or after having been diagnosed with an NCD. Some women reported using these products to prevent illness, and others used them to treat their illnesses and stabilise their state of health. Indeed, women who used agroecological products to prevent disease often had a family history of transmissible diseases such as diabetes. Therefore, they turned to these products to prevent these ailments, believing that avoiding ultra-processed foods and foods containing pesticides and chemical fertilisers residues can favour the onset of these diseases.

"Coming from a family affected by diabetes, my mother is diabetic herself. That's why I use this particular product a lot. Most processed foods do indeed pose health problems, which is why I prefer to turn to agroecological products in order to avoid this disease." ESS_FD_C_Patte d'Oie.

Among those who consumed agroecological products to treat their ailments or maintain their health, the majority were suffering from hypertension, constipation or joint problems. These women felt that their health problems were mainly attributable to their diet. It is for this reason that they opted for agroecological products, or that someone close to them suggested that they give priority to this type of product.

"I also have a friend who uses these products to stabilise her illness. She often had joint pain, and that's when I advised her to use agroecological products to improve her health. Since then, she rarely complains of muscle pain. That's why I believe that agroecological products can help cure illness." ESS_FD_C_Patte d'Oie

"It (high blood pressure) only creates problems for me if I eat pungent foods. If that happens to me, I can take spicy herbs like lemon balm and sage along with basil and soursop leaves, then infuse them to make a drink. So, every time I drink this mixture, I feel better. "ESS_NFF_C_Toubab dialaw/Bambilor

Body Mass Index for women

The results of Body Mass Index measurement show that figures of overweight and obesity were much higher than what was self-reported. Overall, there were 36.9% of women consumers with normal-weight and 36.9% who were overweight, while 23.4% were obese (Figure 13). There was a high prevalence of overweight and obesity, especially in Patte d'Oie/Amitié 2, which may be linked to urban eating habits, notably with the influence of a food environment marked by the presence of fast food and ultra-processed foods. Conversely, Thiès/Pout Diack and Toubab Dialaw/Bambilor showed slightly different trends, with a higher proportion of people of normal weight. These prevalence rates are higher than average prevalence in the region of Dakar (23.4% are overweight and 17.6% are obese) according to SECNSA, 2019.

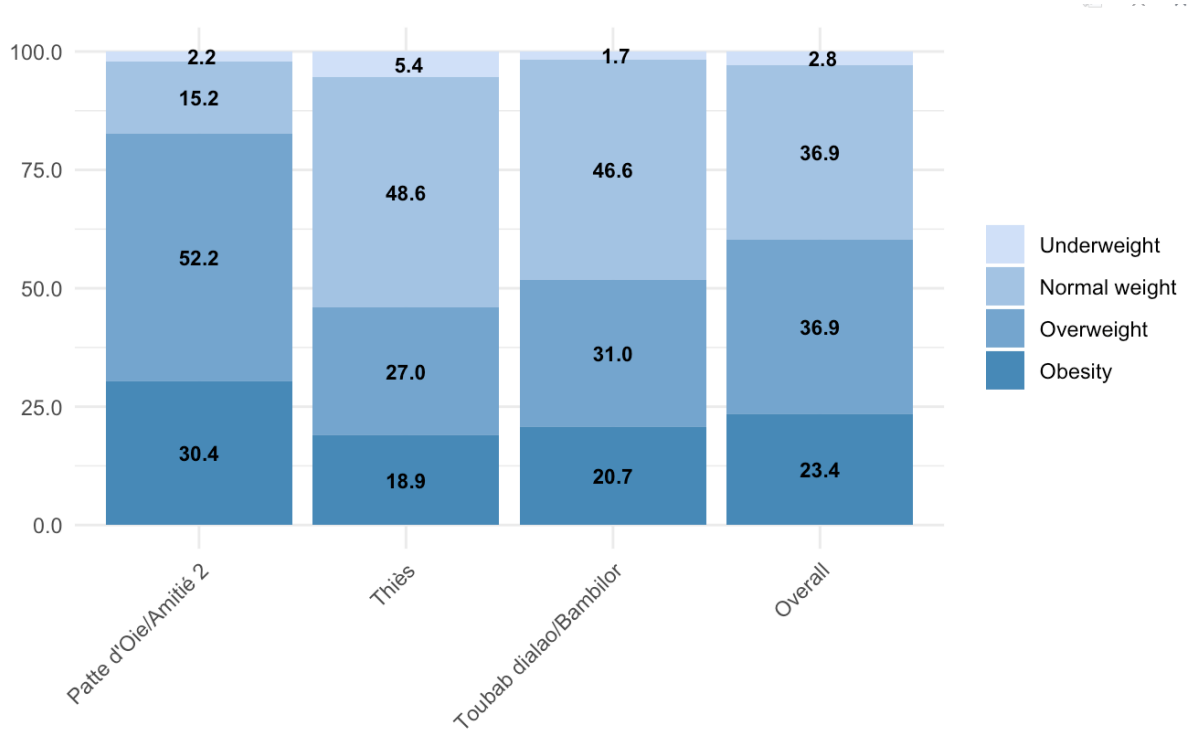

Figure 13: Categorisation of female consumers by BMI (n=180 respondents)

5.2 General eating habits and diets of women consumers

5.2.1 Frequency of consumption

Condiments and spices (6.8 days), oils and fats (6.6 days) and rice (6.5 days) were the foods eaten most frequently over the last seven days (Table 7). Vegetables, particularly orange vegetables (6 days) and other vegetables (6.4 days), also featured prominently in the diet. Among animal products, consumption of fish and seafood was relatively high (5.3 days), unlike meat, offal and poultry (1.9 days) and fresh or curdled milk (1.9 days), which were consumed much less frequently. Pulses and nuts (2.3 days) and eggs (2.5 days) were also less common in women's diets. These results highlight a diversified diet dominated by cereals, fats and vegetables, with significant consumption of fish, while animal protein sources such as meat and dairy products occupied a marginal place in women's diets.

Table 7: Frequency of consumption by food category based on the seven-day recall

Categories food	Average consumption (in days)
Condiments/Spices	6.8
Oil/fat/butter	6.6
Rice	6.5
Other vegetables	6.4
Orange vegetables	6
Fish/seafood	5.3
Sugar or sweetened products	5.2
Roots, tubers	5
Other fruit	5
Other dairy products	4
Green leafy vegetables	3.5
Other cereals	3.2
Orange Fruit	3.1
Pasta/ bread	2.8
Eggs	2.5
Pulses/nuts	2.3
Meat and poultry	1.9
Fresh or curdled milk	1.9

Note: Pulses and nuts are part of different food groups in the MDD-W. These food groups will be split in any future data collection.

Figure 14 displays the percentage of women consumers consuming each food group.

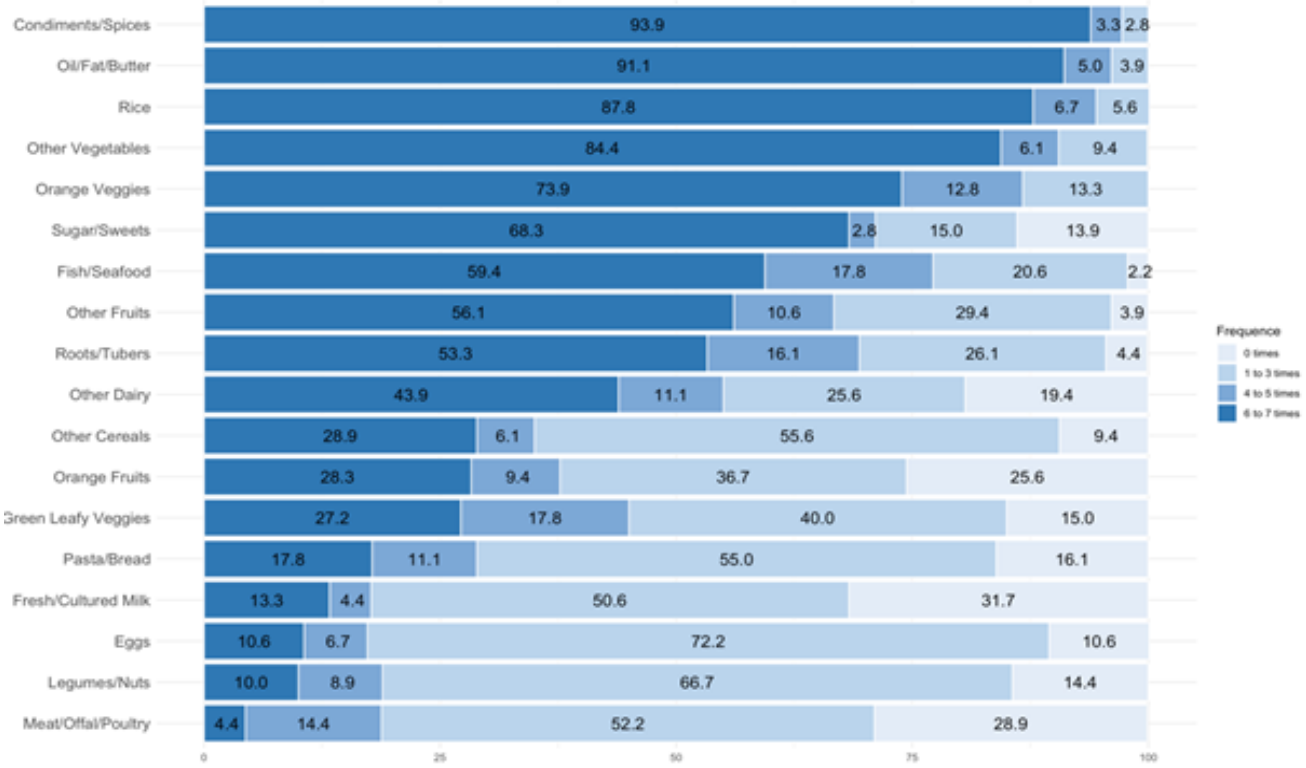

Figure 14. Percentage of women consuming each food group

5.2.2 Frequency of consumption of agroecological products

Table 8 shows the frequency of consumption of agroecological products according to different food categories. Condiments and spices are consumed most frequently on a daily basis, with 62.2% of women using them every day, while only 6.1% say they never eat them. Other vegetables and orange vegetables are also eaten frequently, with 27.8% and 26.1% of women respectively using them every day.

Green leafy vegetables are eaten every day by 17.8% of women, but a significant proportion (37.8%) eat them at least three times a week. Roots and tubers are a regular part of the diet, with 21.7% of women eating them every day and 27.2% at least three times a week.

Orange fruit and other fruit were eaten daily by 18.9% and 26.1% of women respectively, but almost 25.6% of women said they never ate orange fruit. This trend suggests that agro-ecological fruit is less integrated into respondents' diets overall than vegetables and condiments.

Table 8: Frequency of consumption of agroecological products (n=180 respondents), in %

Categories	Every day	A few times a week	Rarely	Never	Not concerned	Total
Roots, tubers	21.7	36.1	24.5	13.3	4.4	100.0
Orange vegetables	26.1	37.3	26.1	10.6	0.0	100.0
Green leafy vegetables	17.8	49.5	16.1	1.7	15.0	100.0
Other vegetables	27.8	34.5	28.3	9.4	0.0	100.0
Orange fruit	18.9	17.8	29.4	8.3	25.6	100.0
Other fruit	26.1	28.9	28.3	12.8	3.9	100.0
Condiments/Spices	62.2	18.3	13.4	6.1	0.0	100.0

5.3 Women's motivations for consuming agroecological products

Figure 15 shows the main reasons women surveyed gave for consuming agroecological products. Health was the dominant factor, cited by 89.4% of respondents. Taste is also an important criterion, with 62.8% of participants claiming to consume these products for this reason. Avoidance of chemicals was another significant motivation, cited by 33.9% of respondents. Other reasons, although less frequent, are also mentioned: 14.4% of women consume these products to support local producers, 10% to protect the environment, and 9.4% to encourage sustainable agriculture or because of better food preservation. The influence of friends and family is mentioned by 10% of respondents, while 2.8% cite respect for food traditions or other reasons.

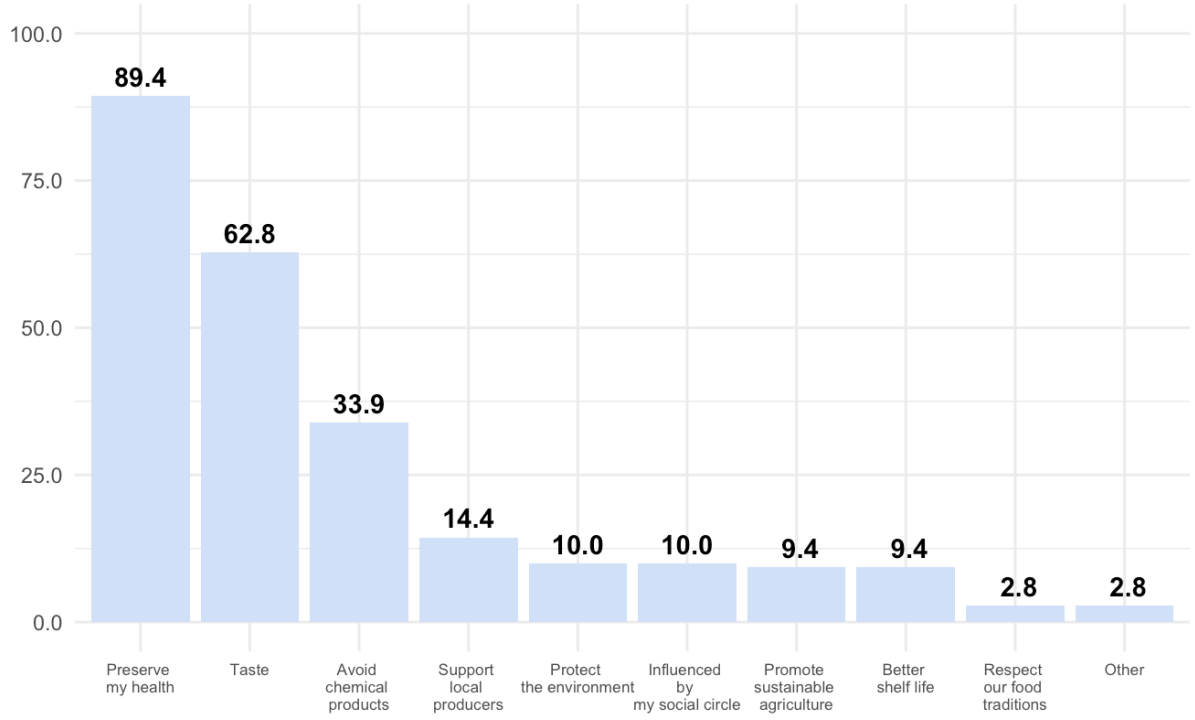

Figure 15: Main reasons for buying and consuming agroecological products (n=180)

The women were also asked to identify their primary source of motivation from among the various options they had chosen. Health and taste stand out as the primary reasons, with 74% and 14.6% of respondents respectively placing them at the top of their list of motivations. This shows that health and taste considerations are the main drivers behind the consumption of agro-ecological products, while environmental and social aspects remain secondary in the decision-making process. Environmental and social aspects remain secondary in the decision to consume agroecological products.

A final point to consider was environmental reasons. Some consumers said that they turn to agroecological products in order to preserve the environment, as these do not use chemical products for their cultivation, but rather natural substances.

> "*Indeed, I also take the environment into account. You're aware that chemicals damage the environment. I've also noticed that farmers who use chemical products age much faster than those who produce agro-ecological food.*" (ESS_FD_C_Thiès/Pout Diack)

Agroecological product availability as the main constraint for consumption

Consumers indicated the availability of different products depending on the outlet, since each outlet has its own specificity and offers specific products. Generally speaking, products that are frequently unavailable across all outlets include rice, green leafy vegetables, pasta and roots and tubers. Conversely, condiments/spices and certain vegetables (particularly orange vegetables) are considered more widely available, regardless of site.

At **Patte d'Oie/Amitié 2**, the foods most in demand but unavailable are "other vegetables (onions, tomatoes)" (30.0%), followed by orange and green leafy vegetables (26.7% each). On the other hand, condiments/spices (90.0%) and green leafy vegetables (66.7%) are among the most available. This shows that some fresh produce is readily available, despite the unavailability of certain vegetable varieties.

In **Thiès/Pout Diack**, fish and seafood (30.0%) and pasta (26.7%) are notably unavailable. Condiments/spices (80.0%), fruit (66.7%) and green leafy vegetables (53.3%) appear to be the easiest to find. This situation indicates that, even if seafood products and certain processed cereals are lacking, the supply of fresh produce and condiments remains relatively satisfactory.

In **Toubab Dialaw/Bambilor**, legumes and nuts (36.7%) are particularly difficult to obtain, while orange vegetables (68.3%) and other vegetables (53.3%) are perceived as more available. This highlights an imbalance between different food categories, with some plant protein sources being less accessible.

6. Cross-cutting findings

To analyse the cross-cutting findings of the market and consumer surveys, we draw on recent work by of the United Nations High Level Panel of Experts (HLPE 2024), which highlights the significance of the **food environment** for shaping markets, consumer behaviours and diets, and ultimately food security and nutrition outcomes (Figure 12). It is worth noting that food security pillars within this framework include availability, access, utilisation, stability and, importantly, agency and sustainability, these last two pillars being closely aligned with agroecological principles such as fairness, biodiversity, input reduction and recycling.

The food environment is defined by Turner et al. (2018) as “the interface that mediates people’s food acquisition and consumption within the wider food system. It encompasses external dimensions such as the availability, prices, vendor and product properties, and promotional information; and personal dimensions such as the accessibility, affordability, convenience and desirability of food sources and products.” We consider each of the six dimensions of the food environment (summarised in Figure 14) in turn, to understand the factors that could influence the supply chains for agroecological markets, consumer behaviours and diets, and the broader structural factors that shape the food environment of urban Senegal.

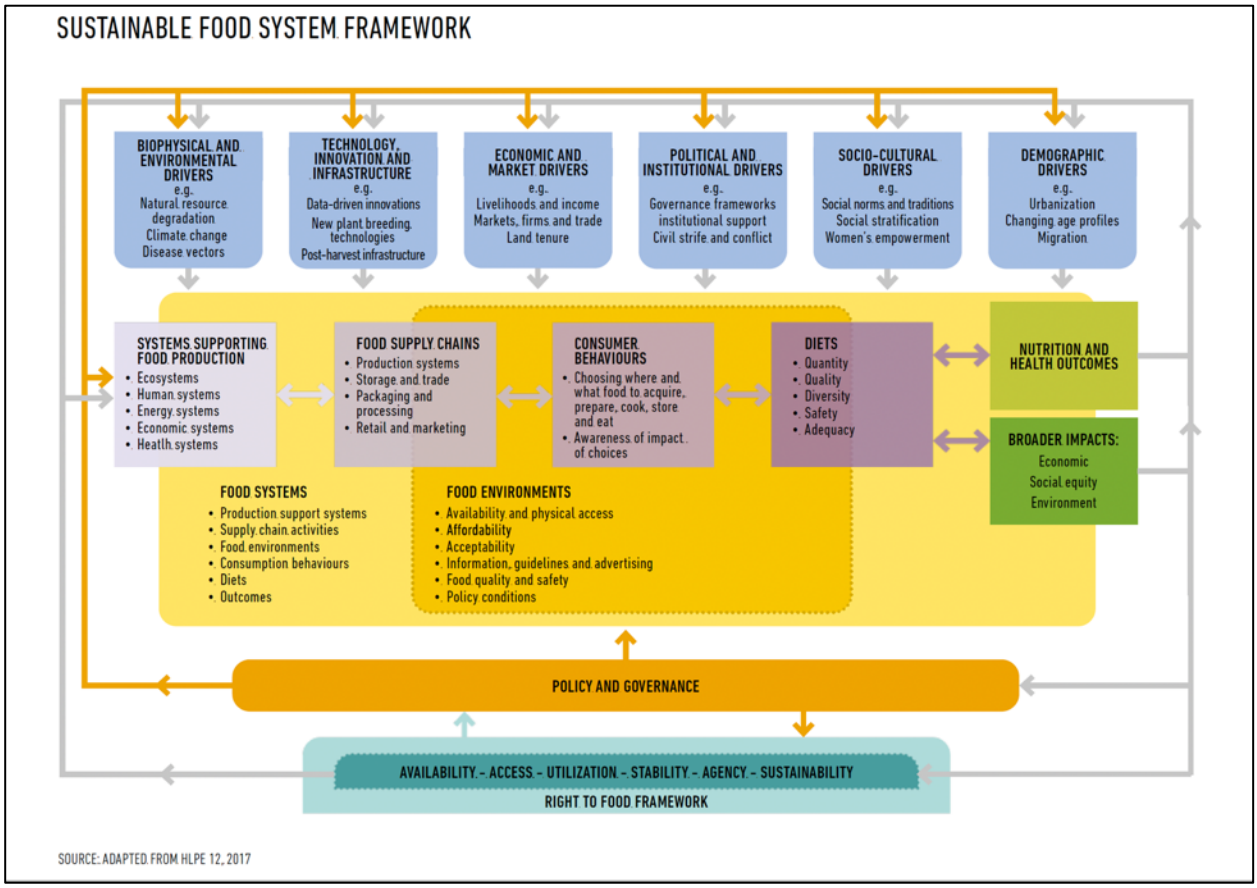

Figure 16: Food system framework (HLPE 2020: Figure 2).

6.1. Availability and physical access

Availability

Ensuring the availability of diverse food products for all is particularly important for the agroecological principles of *fairness* and *governance* processes which respect people's right to access healthy food products. Producers and consumers in our study both valued these principles, as reported by one farmer in Bambilor:

> "*Everyone loves a good product and even if you don't have much money, you're going to want to buy something that's good for your health*."(Bambilor, Female Farmer (1/10/2024)

Despite this recognition, both surveyed producers, vendors and consumers raised the problem of **low volumes of produce**, with a limited **land area** for production, and a limited **number of producers** committed to agroecological production (Table 2). Patte d'Oie had at most 30 producers, but many of them grew on only one raised bed or table, and most of the vegetables that they grew were consumed by themselves; their focus for the market was mint, a higher-value product. In Thiès there were only 10 vendors, but who had higher volumes of fruits and vegetables, and who sold to an estimated 50-60 consumers per week. Bambilor had only 1000 m^2 dedicated to production, with 10 farmers, while Thiaroye Gare had up to 1 ha dedicated to agroecological production and 20 farmers. Both markets estimated 10-20 consumers per day.

Seasonality: "Why do I come to the market if it's to buy one carrot?"

A second challenge that was discussed by all stakeholders was the **seasonal availability** of the produce. This issue was particularly discussed by vendors in the case of short circuits in Thiès (compared to direct sales by producers from raised beds in Patte d'Oie). In Thiès, during the high season, i.e. the dry season, production is abundant, and prices are low on the conventional market. The vendors do not have any difficulties obtaining requested volumes but may lack customers to sell 100% of the farmers' produce on the organic market. In the low season, i.e. the rainy season, production is reduced, and prices increase sharply at the conventional market. The vendors face difficulty in supplying enough food, because producers tend to sell

to the more remunerative conventional market or to organic distribution networks in cities with higher purchasing power such as Dakar or the tourist region of Mbour. Agrecol organised a seasonal cultivation plan to stagger the production and thus avoid the disruption of certain products at the market. Nevertheless, the options remain very limited in the rainy season. These shortages can affect customer satisfaction, with some perceiving that this lower seasonal diversity was one of the reasons for reduced customers in Thiès, even if loyal customers tended to adapt, as one consumer from Bambilor noted:

> "*It depends on the accessibility, the availability of certain products. For example, depending on the season, there are not certain products, but that's how it is, you have to get used to it, it's normal, we will not have tomatoes for a period, and we will not have carrots during wintering, and this, we must accept it. It is normal to say so and find other alternatives*." ESS_MDS_Toubab Dialaw/Bambilor

Consumers who bought agroecological food products were asked if they experienced any difficulties in doing so (Figure 17). Most respondents (67.8%) reported no particular difficulties. Among those who expressed difficulties, the **limited availability of products was the most frequently mentioned problem** (21.1%). Another notable difficulty was the distance to market (12.8%). Other constraints such as lack of transport, incompatible opening hours, high travel costs and lack of information on sales locations remain very marginal, each cited by only 1.1% of respondents. Therefore, the unavailability of products and distance were the main obstacles for a significant number of consumers to purchase agroecological food products.

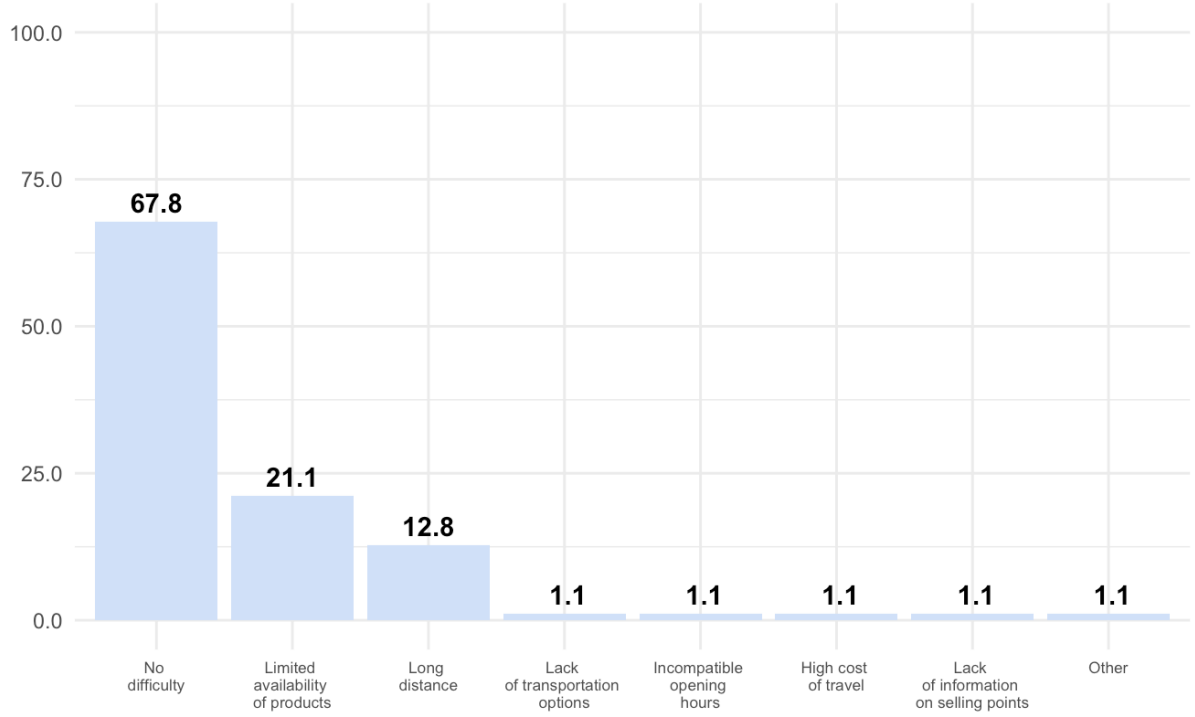

Figure 17: Reasons that consumers had difficulty accessing agroecological food products (n=180)

Most women consumers surveyed considered that agroecological products are either "always available" (45.6%) or "fairly available" (46.1%) during the **dry season**. Availability was particularly high in Thiès (95.0%) and Patte d'Oie/Amitié 2 (95.0%), where almost all respondents rate the products at least as "fairly available". In Toubab Dialaw/Bambilor, however, the proportion of women considering products to be "always available" decreased significantly to 31.7%, and 53.3% of respondents considered them to be only "sufficiently available".

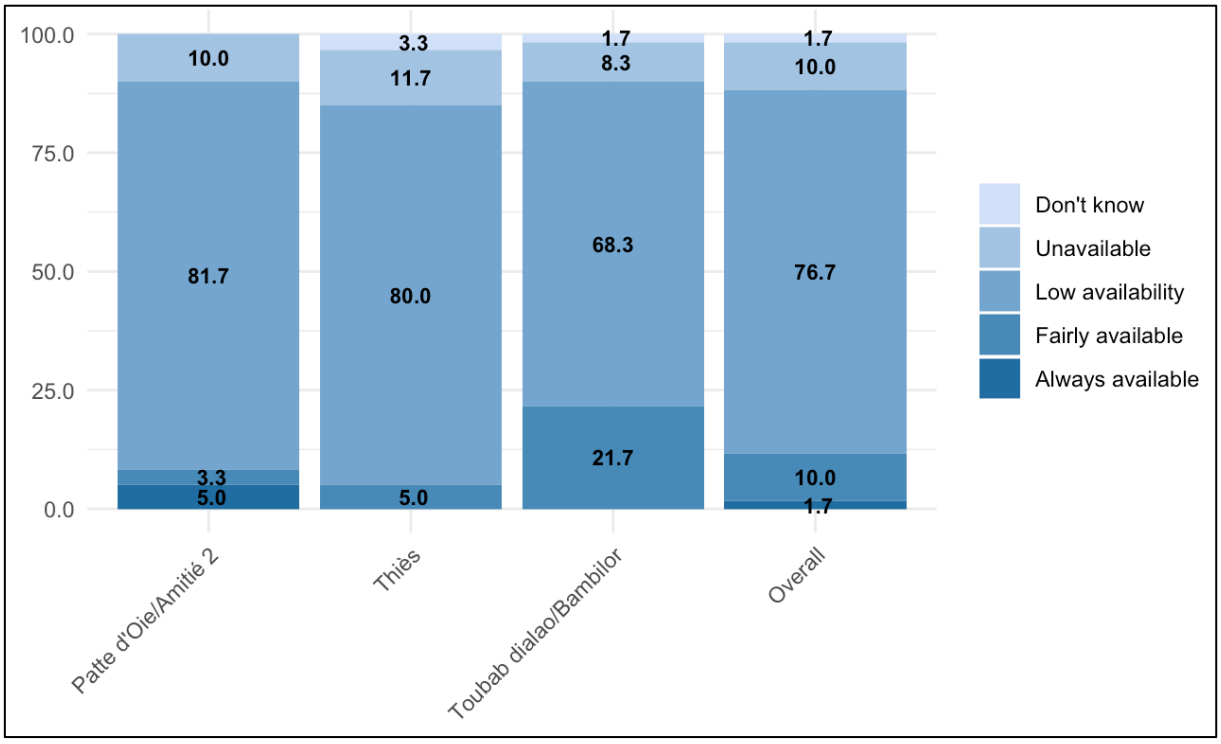

Figure 18: Availability of agroecological products in the rainy season, by market location (n=180)

In contrast, the majority of respondents (76.7%) felt that agroecological products are "not readily available" during the **rainy season** (Figure 18). This trend is confirmed in Patte d'Oie/Amitié 2 (81.7%) and Thiès (80.0%), where the vast majority consider that products are not easily accessible during the rainy season. In Toubab Dialaw/Bambilor, the proportion of women who rated products as "not available" remains high (68.3%), although a significant proportion of women (21.7%) stated that products were fairly available. The availability of agroecological products during the rainy season is therefore generally limited on all sites.

Seasonal shortages during the rainy season are in part due to **increased pest and disease pressure** with higher temperatures (Labou et al. 2016) but are likely also due to a combination of political, technical, economic and epistemological factors which reinforce the primacy of chemical pesticides in horticulture in Senegal (Gaillard 2022). Respondents from local NGOs shared information about the extent to which chemical pesticides are heavily used in the horticultural sector in Senegal (Galliard 2022; DPV et al. 2019). In 2019, the Senegalese Direction de la Protection des Végétaux, FAO and Luxembourg Aid & Development Agency published a report analysing residues in samples of commonly consumed vegetables (carrots, cabbage, tomatoes, bitter and sweet aubergines) in two major markets (Thiaroye, Notto). They concluded that 67% of the vegetables sampled in Thiaroye and 63% in Notto were contaminated, with Codex Alimentarius maximum residue limits exceeded for at least one pesticide (and up to 5), particularly dicofol (acaricide) (DPV et al. 2019). Another study showed that cabbage was more likely to have pesticide contamination because it is highly vulnerable to several insects and pathogens and pesticides are used heavily in production (Diop 2013). This study also found that although pesticide application was more common during the rainy season because of the high pest pressure, the absence of leaching during the dry season explains the higher residue levels obtained on horticultural products (Diop 2013).

The chemicals used are often of the same class of insecticides, which increases the risk of insect resistance, as well as causing considerable environmental and human health damage (Diatte et al. 2018). Previous research with horticultural producers in Senegal showed that there was a dominant perception that chemical pesticides were the only effective means to deal with pest outbreaks, producers frequently exchanged informal advice about chemical pesticides, and there is limited knowledge both of environmental and health impacts or of alternatives to pesticides (Gaillard 2022). Prior research on agroecological methods to control insects and diseases in horticulture in Senegal show that several methods hold promise but are not widely used. Promotion of natural enemies such as parasitoids, for example, is feasible with a reasonable diversity of natural enemy species present, and their host plants, for several key insect pests in horticulture (Tendang et al. 2022). Use of insecticides and heavy watering can reduce natural predators such as *Nesidiocoris tenuis* of some horticultural pests (Chailleux et al. 2022). Another strategy are traps which lure insect pests and then kill or make them unable to reproduce; this technique, using *Metarhizium* sp. treated traps, has been

shown to be effective with fruit flies in citrus fruits in Senegal (Faye et al. 2023). The use of pesticidal plant sprays, such as neem, has also been tested in west Africa (Mondedji et al. 2015) Participatory testing and training on a range of agroecological pest and disease management strategies is needed for horticultural producers to effectively increase production during the rainy season and maintain production volumes needed in urban contexts.

The types of agroecological products that are less available vary depending on the market outlet (Table 9). This suggests that each outlet is more or less specialised in some types of agroecological products. It is also worth noting that food items such as green leafy vegetables are among the most available items in all outlets.

Table 9: Agroecological food products least and most available by sales outlet (n=180 respondents)

Agroecological market	Items requested but not available (%)		Most available items (%)	
Patte d'Oie/Amitié 2	Other vegetables	60.0	Condiments, spices	90,0
	Orange vegetables	46.7	Green leafy vegetables	66.7
	Orange fruits	36.7	Meat, offal, poultry	38.3
	Other fruits	28.3	Other vegetables	23.3
	Roots, tubers	25.0	Orange vegetables	8.3
Thiès	Orange vegetables	41.7	Other vegetables	76.7
	Rice	26.7	Green leafy vegetables	70.0
	Pasta (local)	26.7	Orange vegetables	66.7
	Meat, offal, poultry	26.7	Other fruits	56.7
	Fish / seafood	25.0	Condiments, spices	56.7
Toubab Dialaw/Bambilor	Other cereals	51.7	Orange vegetables	70.0
	Bean, pulses, nuts	36.7	Other vegetables	68.3
	Rice	30.0	Green leafy vegetables	60.0
	Pasta	26.7	Roots, tubers	55.0
	Roots, tubers	20.0	Other fruits	51.7

Physical access

The location of sales outlets affects the physical accessibility to agroecological food products. In Patte d'Oie, sales take place mainly at the production site in a neighbourhood of Dakar, along a busy road close to public transport stops, which makes it physically accessible to many people in the community or on their way to work. Being set by and for the community, the choice of location was naturally made in their neighbourhood. In Thiès, the location of the organic market was chosen by the NGO Agrecol and the women's network at the time it was set up, with the municipality providing land that was nearby the NGO offices. There was also a desire not to be directly in the central market to avoid any confusion between organic and conventional sellers. They feared that other traders would display 'organic' on their stalls and give bad publicity to the genuine organic sellers supported by Agrecol. This location makes them less visible than the central market. In Toubab Dialaw, the women farmers supported by the "Ferme des 4 chemins" sell in the local market - which makes their products accessible to the whole community - and during the monthly special events "Market Biodialaw".

Another widespread practice in these agroecological marketing channels is home delivery. These practices were developed during the covid-19 outbreak and have continued. A distinction can be made between home deliveries via orders on a dedicated WhatsApp groups (Marché bio de Thiès, Sell Sellal in Dakar, Ferme des 4 chemins in Toubab Dialaw) or via phone orders (e.g. some organic producers in Thiès, or Patte d'Oie). The latter is more informal, based on loyalty between producers and clients, and facilitated by possibilities of

money transfers. In both cases, they are more flexible than orders via internet platforms and could therefore be aimed at a wider audience.

The question of the market's location also raises a tension between making agroecological products physically accessible to the poorest people (selling in poorest neighbourhoods/cities), and the livelihoods of the farmers/vendors. As pointed out by a trader in Bambilor, selling in Dakar is more beneficial than selling in Bambilor, because she can sell higher quantities, especially non-indigenous vegetables (e.g. white eggplants). Selling in Dakar not only allows her to reach people with more varied incomes, including higher incomes, but also people from different cultural backgrounds who eat a wider variety of vegetables.

There was considerable variation in the distance that consumers we surveyed had to travel to the agroecological markets. In Patte d'Oie/Amitié 2, most respondents (68.3%) considered the markets to be very or fairly close. In Thiès only 35% of respondents considered the outlets to be close, with 50% considering the distance to be 'average'. In contrast, in Toubab Dialaw/Bambilor, most respondents (70%) rated the agroecological markets to be 'quite far' or 'very far'.

Women used a variety of means of transportation to reach the various outlets, ranging from walking on foot to using personal cars, public transit or taxis. Overall, regardless of the point of sale, most women (68.7%) walked to buy agroecological products (68.7%). This is true for each of the three sites studied. Notably, however, the proportion of women in Toubab Dialaw/Bambilor who used a personal car (10%) or a motorcycle (3.3%) was relatively higher than in Patte d'Oie/Amitié 2 and Thiès. In Patte d'Oie/Amitié 2, the proportion of women using public transportation was significantly higher (28.3%) than in the other two communities. In Thiès, almost all respondents prefer walking (72.9%), while the use of a personal car was also more pronounced (8.5%) compared to Patte d'Oie/Amitié 2.

It is notable that in qualitative interviews, non-consumers of agroecological products indicated that accessibility was a major barrier for them to purchase agroecological foods, pointing to the need to address this concern.

6.2. Affordability

Seasonal availability has a direct impact on prices with agroecological products. Conventional prices, as one vendor explained, vary markedly between the dry season, when they drop due to high production volumes, and the rainy season, when they rise because of lower production (Figure 19). Agroecological prices are more stable, because they are based more on production costs rather than the market dynamics. This is especially true in Toubab Dialaw (Ferme des 4 chemins) where the prices don't vary as the season progresses. Since agroecological prices are more stable, they can be lower than conventional foods in the rainy season, as one vendor observed:

> "*During the dry season, producers prefer to bring their produce here [to the organic market], because the products are cheaper on the conventional market. Currently [during the rainy season], our products are much cheaper. [...] But it's during the dry season that products are much more plentiful and cheaper on the conventional market. But our products are cheaper during this rainy period. The problem is product availability, but when we have the item at that time, our goods are less expensive*". (Interview, Thiès vendor)

In all cases, the results show that the question of setting prices is a complex one, particularly in the context of the values promoted by agroecology related to both decent livelihoods for small-scale family farmers and social justice, with physical, social and economic access to healthy food for all. During the rainy season, there is more competition between different agroecological markets, because of lower availability of the products.

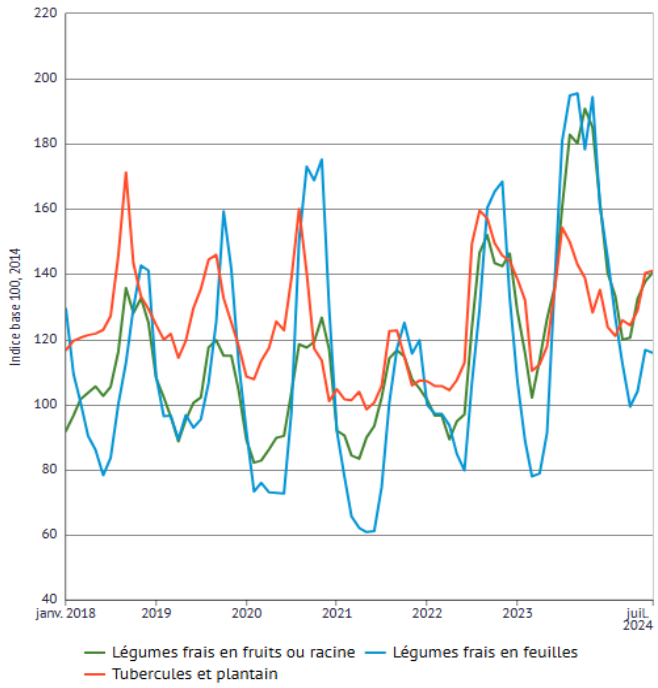

Figure 19: Vegetables and tuber prices in Senegal (2018-2024). Compiled by authors.

This competition can mean that vendors from Dakar travel to peri-urban and rural areas to purchase agroecological foods, as one NGO respondent noted:

Interview 5 "So there are some who don't follow us, who say, OK, I've seen my carrot. So I can sell at a better price in Dakar. Yes, we have them too. We've had to deal with this problem. There's one producer, for example, when we give him the local market price, he says, no, no, no. People from Dakar come here to buy it for so many francs. And you want me to sell it to you for that?! So, I'd rather sell to them than to you". (Thiès NGO 3/10/2024).

6.2.1. "When you raise prices too much, people will really flee": affordability in agroecological markets

All the sites are frequented by clients of all professional categories and income levels. Several strategies, described below, are used by farmers and vendors to guarantee economic access to agroecological products to all.

1) Limiting retail prices compared to those on conventional markets

Some of the markets either limited the price or had a fixed, stable price to make the products affordable. In Thiès, farmers, vendors and NGOs claim to offer prices equal to, or slightly higher (50 or 100 FCFA), than conventional prices, to make their products accessible to all. This pricing policy was first initiated by the NGO Agrecol Afrique. Each week, Agrecol Afrique provides producers, vendors and consumers with recommended retail and wholesale prices for each product. Prices are based on the MIS with a premium of 50-100 FCFA per kilo.[17] Indeed, as part of their overall agroecological approach, the NGO promotes values such as fairness and seeks guaranteeing accessibility to all. The pricing policy seems to be widely followed by farmers and vendors. Despite these efforts and the good intentions of all the actors we met, some vendors expressed they felt aggrieved and trapped between producers seeking recognition for their quality work with more remunerative prices than conventional prices, and a 'pricing policy' of the initiative seeking affordable retail prices.

In contrast, in Patte d'Oie, the producers said that their selling prices were certainly higher than on the conventional market, which they justified due to the quality (healthy and tasty) of their products. They did not emphasise any desire to keep their prices low in order to make their products accessible to the most disadvantaged, although they pointed out that they are also consumers (see next section). According to Bambilor's actors, the prices offered for agroecological products are equal or higher than conventional prices. Profiles of customers are varied, but the price can make it difficult for the poorest ones to buy. The farm gate clients often buy a crate and then share out the goods. This practice is made possible by the good storage capacity of agroecological products, widely recognised by the interviewees.

[17] According to Agrecol Afrique, in the high season the carrot is sold around 1500 FCFA/kilo, the cabbage around 1500 FCFA/kilo and tomatoes 1000 FCFA/kg.

We compiled prices from several markets to assess price differentials between agroecological vegetables and conventional ones, beyond the perceptions and claims made by the actors we met. Fruit and vegetable prices are highly seasonal and therefore difficult to assess. The "*Commissariat à la Sécurité Alimentaire et à la Résilience*" (CSA) organises price records for specific products such as potatoes and onions, but neither has information on prices for other vegetables on a regular basis nor differentiates prices according to product quality. The *Agence Nationale de la Statistique et de la Démographie* (ANSD) conducts regular surveys and compiles food prices, but groups vegetables under wide categories such as fresh fruit or root vegetables or fresh leafy vegetables. We have therefore used different sources of data.

The conventional prices come from four sources: (i) official records from the "Système d'information sur les marchés agropastoraux" from the CSA for onion (local and imported), potatoes, sweet potatoes and cassava[18] (ii) official records from ANSD for tubers, fresh fruit or root vegetables and fresh leafy vegetables , (iii) records at the Castor market made by an individual from personal contacts network from April 2023 to October 2024[19] (iv) the data collected in the Agrecol Afrique MIS on the central market of Thiès from January 2023 to August 2023. **Figures 20 and 21** presents recent conventional price data, showing high variation in prices.

Unfortunately, we could not get the agroecological prices for either the organic market of Thiès or Patte d'Oie. In Thiès, there is no record of prices, except the conventional prices that are collected in the Agrecol Afrique MIS. In Patte d'Oie, we don't have access to prices offered in the *micro-jardin* of Patte d'Oie yet, because there is no price per kilo or per bunch, the client indicates the amount he wishes to spend, and the woman farmer cuts a quantity accordingly.

Thus, we collected prices of the organic certified market (Sell Sellal) operating each week in Dakar. We collected and computed prices offered in the organic market from September 2023 to October 2024.[20] It is noteworthy that the methodology and the sources are multiple, so we report general trends rather than the exact prices. We have focused our price analysis on the 7 vegetables that account for most of the F&V expenditures of Dakar households according to the recent study by Faye et al 2023:[21] onions, potatoes, cassava, tomatoes, carrots, cabbage and sweet potatoes, to which we have added eggplants.[22] All prices presented here are in FCFA/kg (655.96 FCFA=1 Euro).

Figures 20 and 21 give several insights:

- Conventional prices fluctuate considerably;
- Organic prices appear (on average) more stable than conventional prices;
- Organic prices are not systematically higher than conventional ones, the difference between the two prices varies depending on the season and the product:
    - Organic prices are most often higher than the conventional prices, between approximately 30% more in the rainy season and 100% more in the dry season for tomatoes, sweet potatoes;
    - Organic prices are lower than conventional prices during the rainy season, for carrots (up to 35% lower) and cabbage (up to 25%).
    - For local onions, conventional prices are lower than local organic prices, which are nevertheless cheaper than imported onions.

These results, in particular regarding price stability are in line with previous research on the cooperative Sell Sellal (Gassama 2023).

[18] Prices are collected on a weekly basis on a sample of 55 markets spread across Senegal's 14 regions.

[19] Prices presented here are the monthly mean of prices calculated from 1 to 4 records per month.

[20] The prices presented here are the retail prices of the first market of each month (between the 1st to the 4th of each month)

[21] It is noteworthy that these vegetables are non-indigenous vegetables. In Faye et al. 2023, building on a representative sample of consumer households at national scales, 57% of F&V diets in value terms are composed of non-indigenous vegetables, against only 11% for the three considered indigenous vegetables (Okra, African eggplants and leaves).

[22] The prices record for mint, salad, parsley, green onion - widely consumed - use the 'bunch' or the 'unit' as unit of price, so comparing prices can be misleading.

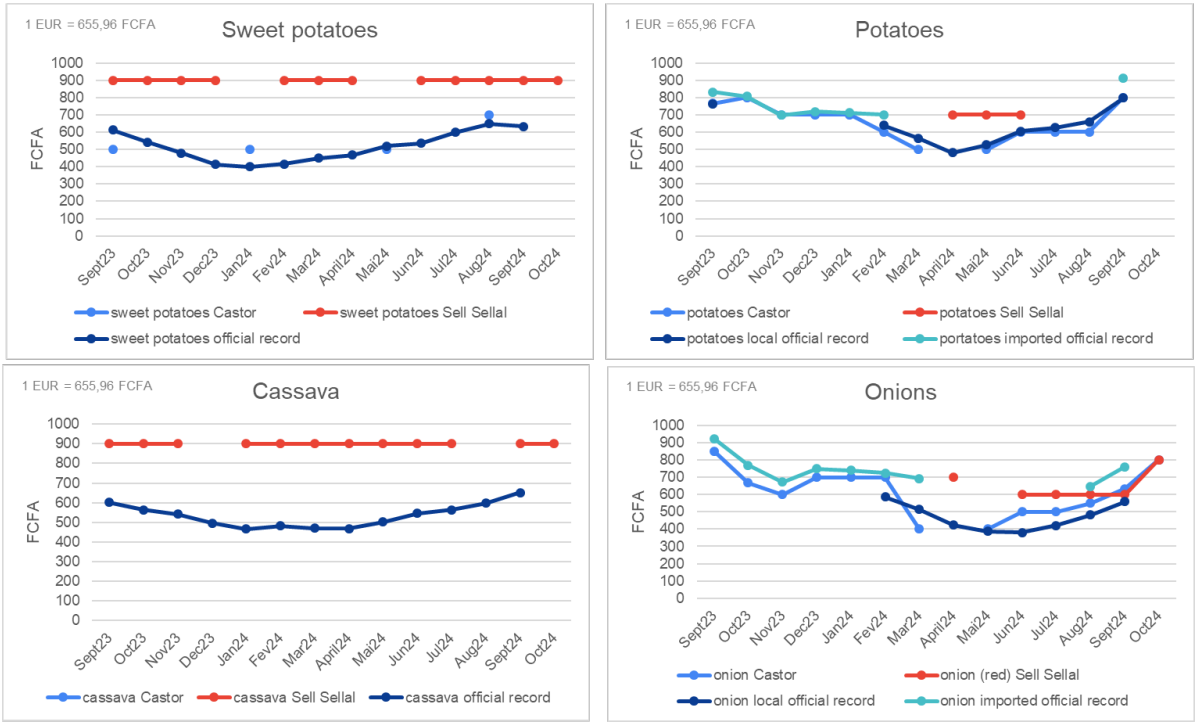

Figure 20: Conventional (blue) and organic (red) food prices for several vegetables in Dakar (Compiled by authors)

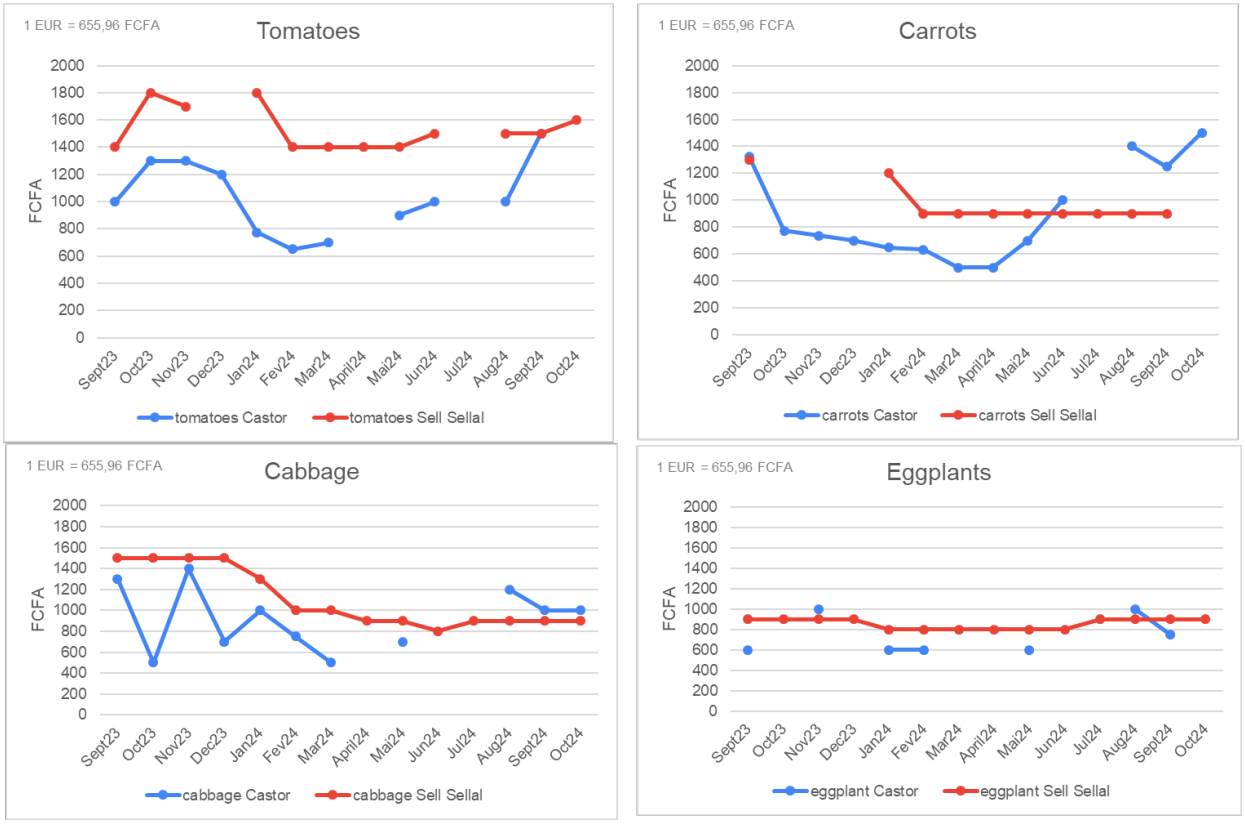

Figure 21: Conventional (blue) and organic (red) food prices for several vegetables in Dakar (Compiled by authors)

2) Decreasing the minimum purchase amount or adjusting prices

Whether in Patte d'Oie or Thiès, vendors try to make their products accessible to low-income consumers by lowering the minimum purchase amount (Interview 7). For example, in Patte d'Oie, the minimum amount is normally 500 FCFA, but some women agree to sell for 200 FCFA or offer the products to those who cannot

afford to buy for 500 FCFA. In a context where the poorest consumers buy their food daily (and in very small quantities), this practice is an interesting lever for improving access to these products for all.

Several interviewees (sellers or producers who do direct sales) suggested that prices vary according to customers' perceived or stated budgets (Interview 7). This mechanism could be linked to a form of solidarity pricing (i.e. the wealthier paying a higher price so that the disadvantaged one can benefit from an affordable price), but it was neither institutionalised nor justified as such.[23]

> *Interview 7 "We have all sorts of customers... everyone buys according to their income. We used to sell at much higher prices, but to reach the poorest people, we've lowered the price and we also sell in small quantities. Now, when you come to the garden to buy, we can even sell you 100 francs worth of each vegetable." (Thiès – Vendor 4/10/2024).*

6.2.2. 'Organic is for the rich' or 'Organic is for the boss': Social accessibility

In the context of the study, the idea that organic food (often used interchangeably with agroecological food), is for the rich is very widespread, so even if the products are made physically accessible and affordable, the most disadvantaged will not buy on these markets. This image appears to be a major obstacle to increasing the consumption of agroecological produce among the poorest population. Despite these challenges, the four initiatives claim their clients are from all income categories of consumers, although the proportion is unclear (Interview 8 and Interview 9).

> *Interview 8 "There is a market segment for all customers. There are celebrities, there are mechanics, there are those who have nothing". (Patte d'Oie - Farmer 2/10/2024)*

> *Interview 9 "We have different types of consumers. Honestly, in the market too, we have consumers who are really foreigners. Foreigners are really... westerners, who know the market well, who come and buy regularly. That too. There are some who are a bit more... educated like me, who went to school, to university, who know a bit, who come too, who buy. There are also some who are here for health reasons. They're really... They just want to be well-stocked, to eat healthily. There are also those who are not rich at all. They're less well off, but they believe in it and regularly, for example, there's... [Name of a particular client]. There's a guy who comes to every market, he's got 500 francs, he takes 200 francs worth of carrots and peppers and puts it in his bag. That's what he uses that week. And he does it every Saturday." (Thiès- NGO 4/10/2024)*

The consumer survey showed that agroecological products are considered highly affordable by the overwhelming majority of women consuming agroecological foods. The foods fit into the eating habits of 2 out of 3 women (67.8%) without financial sacrifice, with 28.9% indicating that a financial effort was needed to obtain these foods. A small proportion (2.3%) found the products too expensive for their income. There was no significant difference between sites for these findings. At the same time, most respondents (83.9%) stated that agroecological products are more expensive than conventional products, a perception particularly pronounced in Patte d'oie/Amitié 2, where 90% of respondents found agroecological products to be more expensive. In Thiès, this proportion was also high (85%), while in Toubab Dialaw/Bambilor it was slightly lower (76.7%), with a notable proportion of respondents (11.7%) believing that prices are cheaper. These results clearly indicate that most women, regardless of location, perceive agroecological products as generally more expensive during the rainy season, which could be a barrier to their widespread purchase. Qualitative interviews with women who did not consume agroecological products indicated that other barriers were more significant than price.

6.3. Acceptability (adequacy with cultural habits)

The agroecological markets provide a range of culturally relevant products for local food habits, such as mint, spices and locally-grown grains such as rice and fonio (Figure 22). While health is the most common motivation for consumers to purchase agroecological foods, a secondary motivation is taste, which suggests

[23] In Burkina Faso, an initiative experimented this system of pricing (La Saisonnière).

that these markets are acceptable and address important cultural values. While many of the products sold are not indigenous crops, they are still incorporated into local diets and appear to meet the acceptability dimension of food environments.

Figure 22: Mint sold in Patte d'Oie and grains sold in Thiès

Taste was mentioned as the second most important motivation to buy agroecological products, and was mentioned far more frequently by women with limited education (28.6%) than by more educated women (11.2%). Taste indicates that these products are meeting important cultural needs. In interviews, consumers also stated that the agroecological food products are much tastier than conventional products, which is why they prefer agroecological food.

> *"I have this inexplicable feeling. I'm really happy when I eat agroecological products. I really feel like I'm eating. Sometimes my child says to me: Mommy, when I eat, I feel like I'm eating really well. I tell her it's because it's agroecological. I'm really active when I eat agroecological products because I know that what I'm eating tastes really good." (*ESS_FD_C_Thiès/Pout Diack)

In terms of quality and durability, women consumers indicated that agroecological products last longer than conventional products, don't have to be refrigerated, and can be stored in the open air.

> *"Quality first, then sustainability. If you buy agroecological products and others containing chemical fertilisers and put them somewhere, the agroecological product will stand up much better than the conventional one. I've already made the comparison. If you happen to buy lettuce from agroecology and lettuce from conventional agriculture, the former can remain unchanged for 2 days, without rotting, unlike the conventional lettuce which, after a day, completely loses its aesthetic appeal. It's this comparison that allows me to say that agroecological products are better." (*ESS_FD_C_Thiès/Pout Diack*)*

Another less common reason given was to support local producers. Some claimed that by prioritising the purchase of agroecological products, they can support local producers by sourcing their goods rather than imported ones.

> "*As I said, it's to support local producers and I favour local trade and community development. So it's products from Toubab Dialaw next door, plus they're healthy and clean*" (ESS_MDS_C_Toubab dialaw/Bambilor)

6.4. Market information, the role of interpersonal relationships and trust

Trust was an important theme for producers, vendors and consumers, and was reinforced through frequent social interactions. Among the initiatives identified in the inventory, only the market *Sell Sellal* clearly displays organic certification (obtained from the SPG BioSenegal) but this market is based in wealthy areas of Dakar, with a largely foreign clientele accustomed to these labels. The advantages and limitations of expanding markets and distancing producers from consumers, by replacing direct interaction and trust with certification, is a matter of strong debate in the agroecology literature.

Our qualitative research suggests that the trust factor is even more important as there is no formal information on food production procedures and conditions. In the absence of certified information on

production processes, word-of-mouth via people you trust may be enough to consider products as coming from responsible or agroecological practices. Trust translates into word of mouth and good reputation of these agroecological markets. Such consumer-to-consumer exchanges are presented as the basis of the success of the initiatives and suggest that a pathway to democratise agroecology is through the engagement of consumers who, progressively, convince others to visit these agroecological outlets. This might be a way to overcome the generalised idea that "organic" is for the rich.

Except for the monthly market Biodialaw, the main market sites included in this study had no visible signs on the stalls, production sites or the market to indicate sales of agroecological products. This lack of advertisement makes the promotion of agroecology more complex, as consumers could not distinguish between agroecological and conventional markets. The initiatives only worked by establishing trust through interpersonal relationships and word of mouth to spread the good reputation.

In the relationship between vendor and consumer, the vendors see part of their role in communicating and justifying prices and product quality. They felt they were listened to, and customers agreed to buy, despite sometimes an initial hesitation due to the price. After that, it was the product experience that played a role: people tasted and came back. The place of trust and inter-knowledge as a catalyst for this trust can be illustrated by the sentence: '*They know the field and the people who sell the products. They know it's organic*' (Thiaroye, farmer, 3/10/2024).

Most consumers (88.3%) cited friends or family as their main source of information about the agroecological markets. Local events such as markets and fairs represented a source for 8.9% of respondents, while social networks accounted for 6.7%. NGOs (3.9%), the Internet (2.2%) and advertising via posters or newspapers (0.6%) play a lesser role. Finally, 7.8% used other sources of information. As a result, social and family relationships were the main sources of information about agroecological products.

Most Patte d'Oie/Amitié 2 consumers said that they trust the producers of agroecological products, which may be partially explained by their proximity with the women working in the Patte d'Oie garden. As a result, as described in section 6.2, women consumers of agroecological foods sometimes don't even buy the products, but the horticulturalists offer or sell them to them at a low price. It's also worth noting that most women vendors grow their own produce on their terraces, so family members don't need to come to the garden to buy. The proximity to sellers thus reinforces consumers' confidence in consuming non-labelled items that are nevertheless called agroecological products*"I trust the growers. They're all our moms, we live with them in the same neighbourhood, so if they say it's agroecological, I really believe it, I don't doubt it. In the whole locality, they're the only ones growing agroecological crops; the other horticulturalists on the other side use fertilisers and pesticides. But not the women who work at HLM Patte d'Oie. (*ESS_TT_C_Patte d'Oie/Amitié 2.)

Non-consumers of agroecological foods also attached great importance to trust in agroecological products and producers. According to some non-consumers, their lack of trust in agroecological food producers leads them to prefer conventional products. They perceive no difference between agroecological and conventional products. Gaining and maintaining trust in agroecological methods thus emerged as a crucial aspect of food environments for low-income consumers in urban and peri-urban markets in this case study in Senegal.

6.5. Food quality and safety: health motivations with agroecological food

According to the consumer survey and interviewees, health concerns in a broad sense were emphasised as the main motivation of farmers and vendors and an argument to sell. Three distinct health concerns are highlighted:

Food safety.[24] Avoiding chemicals (i.e. fertilisers and pesticides) was one of the main arguments put forward by producers, sellers and consumers according to our interviewees. Reducing or eliminating the use of chemicals, in particular pesticides, have been highlighted by promoters of initiatives as well as by producers as a way to produce healthy food, protect the environment and the health of consumers and farm workers. This finding is in line with previous studies that found that agroecology means a "natural agriculture without chemicals" for most surveyed consumers in Dakar (64%) (CICODEV and Humundi 2023). Importantly, organic

[24] Food safety is "the assurance that food will not cause harm to the consumer when it is prepared and/or eaten according to its intended use" (Codex Alimentarius Commission, 1969).

or agroecological practices are not automatically a guarantee of food safety, since biopesticides can be at risk as well at high dosage (FAO 2021). Furthermore, the risks of biological contamination (e.g. bacteria) were not mentioned, though they still can occur as products deteriorate or due to lack of hygienic practices. The lack of mention of biological contamination might be due to perceived good preservation capacity of agroecological products mentioned by many respondents. Finally, not using wastewater is promoted as a healthy practice in Patte d'Oie and Bambilor, unlike other production sites in the capital.

Diseases. Consuming agroecological or organic foods is viewed as a preventive action for health. Limiting the risk of diet-related non-communicable diseases (diabetes, hypertension) is promoted during sales, and, according to the interviewees, is also a motivation for some consumers who visit these places (on the advice of their doctor or relatives). NGOs supporting initiatives such as CICODEV build their strategy to fight against these diseases on an agroecological approach. Other types of diseases that can be diet-related (e.g., cancer) or prevented/cured by healthy plants (e.g., insomnia, digestion, arthritis, view) were also mentioned.

Nutrition/healthy diets. Agroecology is seen by vendors and producers to promote healthy diets, either through producers consuming their own produce, or through the sale of chemical-free, fresh, nutritious products to consumers. Selling vegetables and herbs - in a wide variety - is one way of contributing to healthier diets, for instance with selling a mix of herbs and spices (rosemary, marjoram, oregano, different types of parsley, chives, onions, bay leaves…) and culinary recommendations to use them in broths (for example for cooking fish) and replace industrial bouillon cubes, which are very heavily used and salty.[25]

The vision of CIGA in Bambilor also emphasises the contribution of agroecology to sustainable dietary changes for children,[26] diversified and seasonal diets. In Senegal, producing and supplying customers with vegetables during the rainy season is a major challenge. Production is decreasing, prices are increasing, and many vegetables are imported. Adapting consumption to the local agroecological supply - and therefore taking seasonality into account - has been identified as a lever for action and a value to be promoted (Interview 2 and Interview 3).

> *Interview 2 "We communicate a lot with consumers, telling them: if the product isn't available, but listen, let's try to find another substitute, but don't go to the conventional market. So that too is a form of communication. And some people accept it. There's no carrot. They say, OK, I won't take a carrot, but I'll see what else I'll take apart from the carrot. For me, for example, that's how I do it: when there are no carrots at the market, I don't have any carrots. I don't eat carrots at home." (Thiès – NGO 4/10/2024)*

> *Interview 3 "I only drink basil and mint, I eat salad and already, if there is no salad in the garden, I don't eat salad". (Patte d'Oie - farmer 3/10/2024)*

The consumer survey also found that health was the most common motivation for women to buy agroecological products. Among women with non-formal education, health was cited by 68.6% of respondents. Interestingly, they attach little importance to other factors such as avoidance of chemicals (2.9%). Among women with formal education, health was also the main motivation (75.5%), but they also gave priority to other factors. They were more likely to mention the avoidance of chemicals (5.6%), the influence of those around them (1.4%) and better food preservation (1.4%). They were also more inclined to support local producers (4.2%), a reason which was absent among women with non-formal education.

Qualitative data also revealed that health was a major motivation for purchasing agroecological foods. Women described how they replaced certain processed or ultra-processed products such as bouillon and flavored rice with agroecological foods. They asserted that these products helped them to avoid certain health problems.

> *"People have to take a good look at the products they consume, and I'm convinced that when you use agroecological products, you won't run into any health problems, as long as they don't contain*

[25] The share of ultra-processed food items consumed by households in Senegal has been estimated to 25%. (Thériault et al. (2024).

[26] E.g. deliver vegetables to canteens, not using "bouillon cube" and communicate this information, produce honey and partner with women vendors in front of the schools so that they can sell such honey bars to replace industrial foods, adapt packaging of nutritious local products such as milk.

*chemical fertilisers and are healthy. That's really why I prefer to buy agroecological products. (*ESS_AN_C_Thiès/Pout Diack)

"We only use green family broths. Green leaves means pepper, onion and Chinese parsley. These are the products that we will assemble to prepare our condiments. Nothing is simpler than this, and it does not create any complications. You don't have a digestive problem. Because the broths sometimes give you bloating, and you can do your ablutions several times a day. So we thank God."(ESS_FD_C_Patte d'Oie/Amitié 2).

Women consumers in the survey reported changing their eating patterns since the introduction of agroecological products into their consumption habits. More than half of the respondents (53.3%) reported eating more vegetables, and 43.3% reported an increase in their consumption of herbs and spices. A quarter of the participants reported consuming more fruit, while 14.4% stated that they paid more attention to the origin of their food. Most respondents (56.7%) reported that they now cooked more often with fresh produce, while 24.4% used fewer processed products. About one in five respondents (20.6%) said that they had experimented with new, healthier recipes. While most women report a change in their cooking habits, a significant proportion have observed no change (17.8%).

In terms of oil, 45.6% of women reported using less oil since consuming agroecological products, while 18.3% reported maintaining their consumption, 33.3% of respondents indicated that oil use depends on the type of meal being prepared, and 2.8% said that they did not pay attention to the amount of oil used.

Bouillon, or broth, is a high salt ultra-processed food addition used in cooking in Senegal, and 48.3% of women consumers reported using less broth after switching to agroecological foods, while 16.1% said that they still consumed the same amount and 17.8% used even more. Only about 12.8% of respondents stated that they had never used bouillon and 5% adjusted their consumption depending on the meal type.

Some consumers pointed out that their motivation for buying and consuming agroecological products is the fact that producers don't use chemical fertilisers or pesticides, which is why they prefer to buy and consume these products.

*"No, they don't use fertiliser in their crops. They use peanut shells in their tables, but that's what we see. I've never seen them use chemical fertiliser. Really, I've never seen it. (*ESS_FD_C_Patte d'Oie/Amitié 2)

The interviews show a convergence in the motivations and values promoted by the various actors we met, with a strong emphasis on health and healthier diets as a whole; at least in the discourse, given it is not possible in this study to assess the direct effect of these promoted practices on health or diets.

6.6. Policy conditions influenced agroecological food production and use

In the four agroecological initiatives studied, the key role played by **local or national authorities** is noteworthy, and was valued by all interviewees: providing **human resources** to help the women farmers (Patte d'Oie, Thiaroye), **market sites** (Thiès) or **land to grow** (Patte d'Oie). They can be involved directly as partners of a project (e.g. at the launch of Patte d'Oie) or through encouraging the creation of a committee dedicated to **food systems governance** (e.g. Bambilor). This finding is in line with previous studies that highlighted the key role of intermediaries such as local authorities in setting up a physical market space where agroecological products can be exchanged as well as information and values (Loconto et al. 2018). In Brazil, for example, the government contracted agroecological farmers to grow food for a public procurement program that supported low-income households and the national school feeding program (Wittman and Blesh 2015).

7. Conceptual Framework on Impact Pathways

7.1 Agroecological principles and potential direct and indirect links with nutrition

Potential pathways for agroecology to improve nutrition, as discussed by several papers (Bezner Kerr et al. 2021; 2019; van Zutphen et al. 2022) include through: 1) increasing both farm-level and landscape **biodiversity**, thereby increasing the number of foods (both wild and cultivated) available to consume; 2) improving the **livelihoods** of food producers, food workers and small and medium food enterprises, (which assumes that some of their increased income is then spent on healthy foods); 3) **empowerment** of marginalised groups, and thereby increasing their access and agency over healthy diverse food e.g. through women's empowerment 4) **rights-based approaches** which address marginalised groups' access and control over healthy food systems, such as through public procurement programs or Food Policy Councils that increase low-income consumers access to nutritious food; 5) revising or strengthening local and Indigenous **knowledge systems** to support diverse, nutritious food systems. This knowledge exchange and support could be on production/gathering, healthy food choices, post-harvest food storage, processing, food preparation and also support for critical life stages such as pregnancy and early child feeding, which could in turn result in improved nutrition; 6) supporting Indigenous and local **cultural foodways** that are nutritious; 7) reducing **exposure to pesticides**.

These pathways, however, are mostly drawn from empirical data in rural contexts. There are limited studies focused on pathways linking agroecology and urban consumers. A study in Kenya examined the drivers and solutions of unhealthy food consumption patterns amongst youth in urban slums (Wanjohi et al. 2025). They found that youth considered ultra-processed foods 'modern, urban and classy' while minimally processed foods were boring, 'primitive' and for older people or those living in rural areas. A combination of individual (e.g. taste, aroma, convenience, autonomy), social (peer-pressure, social status) and food environment (availability and accessibility) drivers all encouraged unhealthy diets. In Ecuador, April-Lalonde et al. (2020) conducted a study in 3 cities on the motivations of consumers who purchase their food from agroecological markets or directly from producers in conventional markets. They found that personal health was a major motivation for people to purchase from agroecological markets, and these same consumers had diets that were higher in fruits and vegetables and lower in processed foods high in salt, but as a cross-sectional study could not attribute causality to these food purchase and consumption behaviours.

In the North-American context, farmers markets are also considered as a lever to both more equitably support small-scale diversified farmers and encourage more diverse diets with fresh foods, even if they mail fail to reach low-income marginalised socioeconomic groups, due to both price and location (Kremen et al. 2012).

There are also few studies looking at agroecology in relation to diet-related diseases such as diabetes. One recent study, Deaconu et al. (2021), compared diets of agroecological association farmers and non-agroecological farmers, by assessing consumed processed foods, Body Mass Index and self-reported diagnosis of diet-related chronic diseases. They found that agroecological farmers had healthier dietary patterns (although equally high prevalence of overweight/obesity), but they did not consider consumers in urban areas.

Lastly, an area which has not been actively theorised is that of shifting people's **motivations** to consume healthy, nutritionally dense foods, which could be achieved through multiple avenues, including through knowledge-co-creation, empowerment, cultural foodways increasing people's connectivity to food systems and direct participation in food systems.

7.2 Pathways

In this case study of Senegal, based on the literature review and our fieldwork in urban and peri-urban areas, we find at least seven possible pathways to connect agroecology to nutrition (Figure 23). These pathways are partly the same as in rural areas, including given the existence of urban agriculture: 1) Agrobiodiversity, 2) Livelihoods/Social Empowerment; 3) Local knowledge systems, 4) Participation/connectivity; 5) Cultural foodways; 6) Reduced exposure to pesticides and 7) Rights-based approaches. While many of these pathways are the same as rural people, the participation/connectivity and reduced exposure to pesticides are different for urban consumers.

Agroecological principles can influence multiple pathways and a given pathway can be affected by multiple principles, so in this conceptual figure we did not put direct linkages between each pathway and principle. Thick orange arrows indicate the main pathway envisioned, while the smaller orange arrows indicate alternative ways this pathway can occur. The dark green shapes are food supply chain aspects, purple are consumer behaviours and lighter green are those directly related to diets, all within food environments. We will outline each pathway in turn.

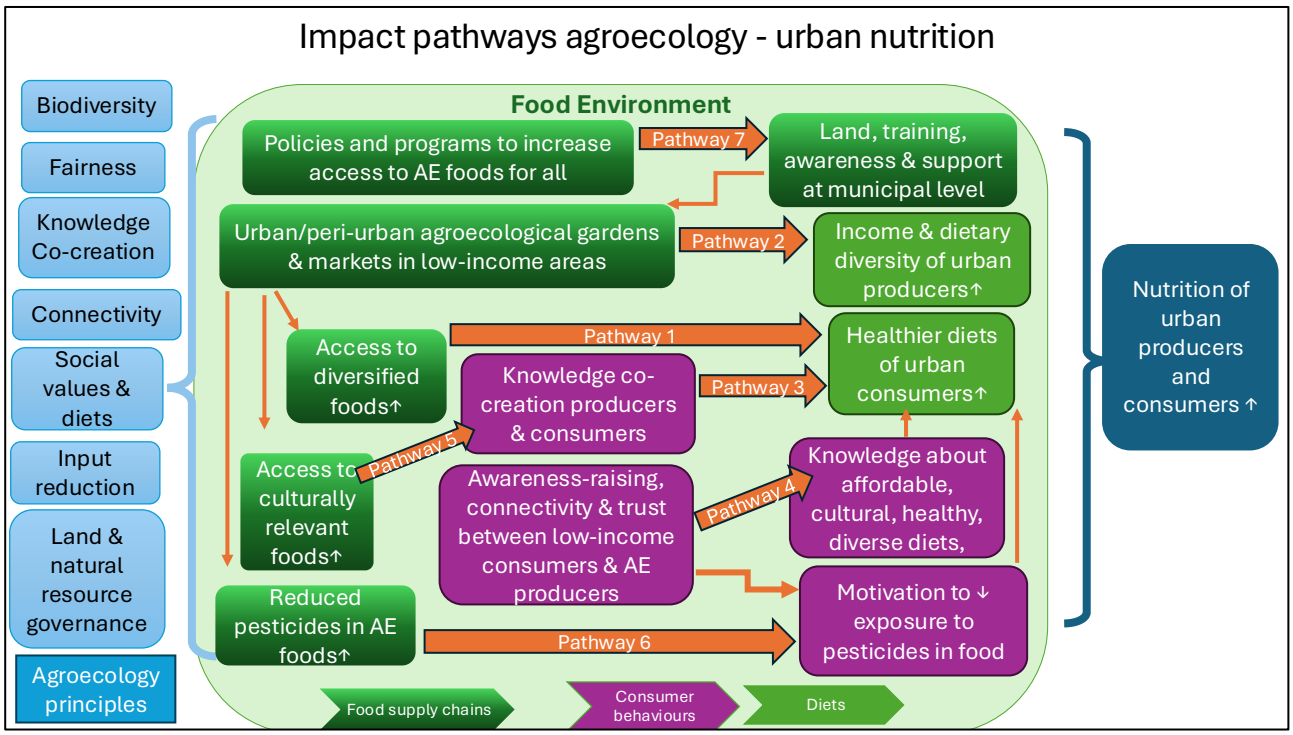

Figure 23: Conceptual framework for agroecology to improve nutrition of low-income urban consumers.

Pathway 1: Agrobiodiversity: Consumers and urban producers themselves gain access to urban/peri-urban agroecological markets with a high diversity of species of vegetables/fruits and herbs as well as varieties, including both indigenous (e.g. *jaxatu*) and non-indigenous species or varieties. As noted above, health was the most common motivation (89.4% of respondents) for people to buy agroecological products, and the diverse fruits and vegetables were one of the underlying reasons that they chose these foods. This association between agroecology and health echoes the "medicalisation" or "nutritionalisation" of food consumption in urban areas – especially for fruits and vegetables – as observed in Dakar by Leport (2017).

The intended benefits of supporting agroecological farming of a diversity of vegetables may only materialise if there are accompanied by addressing current dietary norms and preferences, because customers and even the farmers themselves may have limited knowledge of the variety of vegetables and be reluctant to try cooking unfamiliar foods as shown in urban context in South Africa (Kesselman et al. 2021).

Pathway 2: Viable livelihoods/social empowerment: Farmers and vendors gain a viable income from their involvement in agroecological channels, and in turn may spend some of their income on healthy diverse foods. This pathway might require additional interventions to avoid the predominant shift in diets towards ultra-processed foods high in fat, sugar and salt.

In some of the agroecological markets, low-income women are working as farmers and vendors. These activities enable women to gain money and to contribute to the needs of their families and the community, especially through mint, which is a highly remunerative crop. Notably, however, without additional interventions, unequal gender patterns of decision-making and control around income use may persist, and increased workloads might worsen nutritional status (Bezner Kerr et al. 2019; Ume et al. 2022).

Pathway 3: Knowledge co-creation: Horizontal and vertical sharing of knowledge on food and health are promoted. Horizontal sharing of knowledge takes the form of farmer-to-farmer exchange or producer/vendor-consumer exchanges. In Thiès, these exchanges are organised by the NGO Agrecol Afrique, with peer visits and experience sharing (on both farming practices and the capacity of agroecology to provide producers with the livelihoods they need to support their families). The NGO is also taking part in a sub-

regional programme on this subject and is setting up the PGS, which encourages exchanges between peers. In Patte d'Oie, this farmer-to-farmer exchange was driven by the FAO at the time of the programme, but has since become autonomous. Members of the community come and ask to be trained by the women of Patte d'Oie, sometimes with training paid for by the city of Dakar, sometimes by the trainees themselves. Experimentation by women themselves is also promoted as a form of empowerment and co-production of knowledge. The women of Patte D'Oie emphasise the sharing of experience between generations and see this as a prerequisite for sustainability. The initiative supported by CICODEV in Bambilor will be in the same vein: the CIGA committee has signed an agreement with the local youth centre, which is providing 1,000 m² of land where 10 young people will be trained in agroecological horticulture alongside 20 women.

Vertical sharing experience between producers/vendors and consumers include nutrition and health benefits of agroecological products and culinary knowledge exchanges, especially regarding food preparation of underutilised species (e.g., spices, spinach). These exchanges are valued by both farmers/vendors and consumers.

> *Interview 10 "For example, there's spinach. A lot of people don't know what spinach is. So when you're in front of my stand, I explain everything to you, I explain how to cook spinach and everything." (Thiès - vendor 4/10/2024)*

Pathway 4: Participation/connectivity: Building greater participation and raising awareness about food systems issues for the whole community appears important for all the initiatives studied, although the means used are different. In Bambilor, the CIGA adopts a wide-scale approach to sensitise the community (through schools and directly with someone visiting the community, a "VAD" ("visite à domicile"). In Thiès they organise organic fairs three times a year and do radio broadcasts (which they have had to cut back in recent years because of costs). In Thiaroye Gare they try to build on the local *bajenu gox* (term in Wolof which means 'neighbourhood mentor', see below) who represent recognised and institutionalised relay between health centres and the communities. This social role of mentorship may contribute indirectly to consumer empowerment, especially linked to nutritional awareness.

Direct and frequent interactions between producers and consumers in the agroecological markets is another pathway for increased consumption of agroecological food products, by establishing trust and a common understanding of food issues. Vendors-consumers relationships are not limited to commercial relationships but also include a form of social bond - with long-term loyal clients- or sharing of culinary knowledge. The actors of these initiatives associate consumption of agroecological products with good health, and communicate these values to their customers, thereby contributing to nutrition awareness.

Pathway 5: Culture and diets: Most interviewees emphasised the contribution of agroecological products to healthy, diversified and seasonal diets rather than food that addresses cultural needs or values. Although the vegetables and herbs sold in the targeted markets are quite widely consumed, they include many non-indigenous vegetable species that are rarely used in traditional dishes, such as basil, beetroot, specific aubergines and cauliflower. One notable exception was the initiative by CIGA in Bambilor, that includes promoting traditional foods, keeping Senegalese culture, such as avoiding bouillon cube or promoting local cereals like millet, to overcome the negative image associated with this type of product (food for the poorest) (Interview 11). Elders in villages were asked to come up with traditional, healthy dishes that don't contain too much oil.

> *Interview 11 "I'll share an anecdote. In our culture, millet porridge is nutritious and filling, but when served for dinner, if someone knocks at the door, we hide the bowl under the bed out of shame. This reflects a food complex we aim to change. People need to value their traditional, healthy food instead of eating meat, you don't know where it comes from. And when you have millet porridge, you have maize, you have it all.... So that's it. It's not easy. It's not easy. It's going to take time. We have to get started, because we can't go on dying like this because of diet-related illnesses. We have to save these children. But the children understand. Because nowadays, even children in canteens say, 'I've heard you don't put any stock in your dishes'? But it's good! So you see, with these little comments, you can feel that the child is beginning to understand. And they'll even be able to tell their mother that there's no need to add stock. Even without broth, you can eat. So, if we manage to do it by the time we're 20 or 30, we won't be here anymore." (Bambilor- CIGA. 1/10/2024)*

Pathway 6: Reduced exposure to pesticides: Some NGOs and producers were focused on reduced exposure to pesticide as a key reason for their promotion of agroecological products. On the consumer side, one third (33.9%) of consumers listed avoidance of pesticides and chemical fertiliser as a major motivation for choosing agroecological foods. In qualitative interviews, some respondents described specific health benefits and why reduced exposure to pesticides was a major motivation for their consumption of agroecological products.

> *"When a person eats, the whole organism is put to work. Each organ fulfils a well-defined role. However, a diet full of pesticides exhausts the organs, which must regulate and correct excesses. This is why many health problems are linked to our diet, such as kidney disease requiring dialysis, or cancer, largely caused by poor nutrition. Conversely, an agroecological diet offers better health and nutritional quality. "* (ESS_NFF_C_ Toubab Dialaw/Bambilor)

On the producer side, a key motivation was not being exposed to pesticides at work as a farmer.

> "We truly know that agroecology is the best. For consumption, also for those who work, for everyone and for the environment. (...) For those who work, it's for the products. For health". (Thiès farmer)

We see this pathway through both a motivation for producers, programs and consumers to buy agroecological foods, through specific mechanisms that show how reduced exposure to pesticide may reduce the likelihood of Type 2 diabetes and other diet-related diseases. There is considerable evidence of an association between exposure to organochloride or organophosphate pesticides and development of Type 2 diabetes (Chung et al. 2021; Evangelou et al. 2016), and emerging evidence that they can disrupt the function of adipose tissue to promote obesity and metabolic diseases such as type 2 diabetes (Gutgesell et al. 2020). There is also evidence that consuming organic diets is negatively associated with the prevalence of metabolic syndrome, a predictor of cardiovascular disease (Baudry et al. 2017). Reduced use of pesticides was expressed as a major motivation for the Ministry of Agriculture's support of agroecology, as stated by the Department of Plant Protection representative (Interview June 13, 2024). This motivation which may serve as an important mechanism to promote agroecological foods for the general population.

Pathway 7: Rights-based approaches - The idea of offering healthy food to all is widely integrated in the discourse of development actors. In particular, the NGO CICODEV explicitly adopts rights-based approaches.[27] In Bambilor, CIGA takes this rights-based approach, with the aim to "democratise food" so that "*it's no longer just a matter for the rich. Let the poor child know that he or she can eat healthy, and at the same time local food*"" (Interview, President of CIGA).

Part of a rights-based approach includes addressing *access to land*, which was mentioned as a key lever to scale out agroecology, and an area of concern in the urban and peri-urban context. In Thiès, the women vendors were previously organic farmers in the city; they felt constrained by the lack of land while they have the knowledge and skills to grow vegetables in agroecology. They expressed their wish to access land to grow, or at least to train young people to grow organically. The space in Patte d'Oie was relatively limited and may be due to low land availability in an urban context (Séye, 2024). In Bambilor, which is a peri-urban location more distant from central Dakar, land availability is better (although urbanisation pressures may change that), and they were able to obtain significant land for production. Getting more land to protect is part of the CIGA strategies to achieve their objective to develop a healthy and sustainable food system for Bambilor. In Toubab Dialaw, access to land given by the "Ferme des 4 chemins" to the group of women farmers was key for their involvement in agroecological farming, in addition to training received.

Addressing food systems governance at the municipal scale is needed to ensure land availability, market sites, training and other resources needed to scale out agroecological production in the city. It is notable that the municipality played an important role in allocating land, training and support for several of these agroecological initiatives. Other studies have highlighted the need to include agroecology-oriented producers in municipal decision-making structures and governance (Lopez-Garcia and Carrascosa-Garcia 2024). The nearby example of Ouagadougou, Burkina Faso setting aside 2000 hectares of urban land as a

[27] Food sovereignty and right to food are part of the right-based approaches connected to agroecology. In an urban context, we can also quote the right of cities which includes several rights that city residents required in order to enjoy adequate living standard. Ensuring the right to the city is guaranteeing urban spaces are inclusive, participatory and designed to meet the need of all the residents

'green belt' around the city for agroecological food production and to reduce urban heat impacts[28] thereby serving as both a food security strategy and a climate change adaptation, is an example of governance strategies that could mobilise the potential of agroecology within cities.

8. Conclusion and recommendations to decision makers

Main findings

This study aimed **to examine potential impact pathways between agroecology and nutrition in an urban context for multiple forms of malnutrition, with a focus on low-income urban women**. We chose Senegal as a case study, both because of the high rate of malnutrition, and an active agroecological social movement which provided potential avenues to address malnutrition.

Territorial agroecological markets: We found that the marketing channels characteristics echo the connectivity principle of agroecology, where proximity and trust between producers and consumers are ensured through short distribution networks and re-embedding of food systems into local economies. Indeed, i) direct sales from producers to their neighbours seem to work well, thanks to relational and physical proximity; ii) although agroecological production seems to be lacking in the rainy season, it is abundant and diverse in the dry season, struggling to be sold as organic in dedicated markets; iii) transport may be costly in cities, compensating the slightly lower price in conventional markets. This finding is consistent with recent studies of territorial markets (FAO 2023; IPES Food 2025). "Territorial markets are typical of short food supply chains, which are generally characterised by the involvement of few intermediaries, as well as by geographical and cultural proximity, trust and high social capital. They promote family farming, market inclusivity for small-scale entrepreneurs and producers, and a direct relationship between consumers and producers, as well as improved availability and accessibility for healthy and diversified diets at territorial level" (FAO 2023).

On the other hand, the different markets also raise some of the tensions within the agroecological approach, which seeks to provide decent livelihoods to producers while also providing affordable healthy agroecological products. These tensions are well illustrated in the Thiès case study. Despite the NGO's commendable efforts to find a fair balance and satisfy both producers and vendors, the system remains fragile with producers sometimes practising side-selling (because of better prices in other outlets) and vendors facing supply and sometimes sales challenges, then are tempted to increase prices to benefit more. This tension of reconciling individual freedom/choice of commercial partners with a commitment to supplying the collective initiative to ensure a steady supply of local agroecological products is still prevailing. The tension could also be illustrated by the choice of products, between the most remunerative crops (e.g., mint or vegetables with high retail price such as green beans) and the most nutritious and culturally adequate. This question of affordability is critical since fruits and vegetables account for half of the cost of a healthy diet (CoHD) (data from 2017) (Bai et al. 2023).

Agroecology has strong connections to the food sovereignty movement with several common principles linked to the preservation of natural resources, relocation of food systems within territories, based on social values, equity and valorisation of healthy and culturally adequate diets and the democratic control over food systems. In this sense, the primary actors are the farming communities, for which agroecology helps to rebalance power inequalities at multiple scales, including in markets. The consumers, however, seem less involved in decision making. In Thiès, Agrecol Afrique aims to involve them through a WhatsApp group, their participation in the cooperative Nat-Bi and in a PGS, but this study did not enable us to ascertain whether their participation is effective. Notably, in all the agroecological markets in this case study, an intermediary actor (e.g. NGO, municipal government) has played a key role in the emergence and sustainability of the initiatives, often supported by technical and financial partners. Other scholars have been critical of the more top-down approach to governance that some in the NGO sector have taken to agroecology, likening it to a neocolonial approach (Marfurt et al. 2023). Agroecological initiatives need to strive to have grassroots participatory governance to ensure they meet these divergent needs.

[28] See: https://www.theguardian.com/environment/2025/feb/06/we-water-rest-water-the-green-belt-of-vegetable-plots-cooling-a-city

Consumers: Women who were purchasing from the agroecological foods bought a diverse range of food types on a regular basis. Based on the consumer survey, women consumers of agroecological products had higher than average levels of education compared to national rates, and the majority were overweight or obese - at much higher prevalence than Dakar's average. One-third of them reported suffering from a diet-related disease such as diabetes or cardiovascular disease. The main motivations for consumers to purchase agroecological food products were health reasons (89.4% of respondents), taste of the food (62.8%) and avoidance of pesticides and/or chemical fertiliser (33.9%). Consumers noted several barriers to eating more agroecological foods, including availability of the markets, distance to the markets and seasonal availability of diverse food products. Consumers' trust was based on interpersonal interactions with producers and sellers.

Based on our assessment of the market and consumer findings and cross-cutting themes, we identified seven possible pathways to connect agroecology to nutrition (Figure 23). These pathways are: 1) Biodiversity, 2) Livelihoods/Social Empowerment; 3) Local knowledge systems, 4) Participation/connectivity; 5) Cultural foodways; 6) Reduced exposure to pesticides and 7) Rights-based approaches.

Recommendations

Based on this exploratory study, some areas of action are identified. It has to be noted that these findings and proposals are based on one case study in Dakar region of Senegal and will not apply to every context.

Supporting agroecological producers in urban/peri-urban context

- Increase access to land in urban and peri-urban low-income areas to increase agroecological production and access. Urbanisation threatens land in urban and peri-urban areas, pushing back the agricultural production that provides food for urban dwellers. This is accompanied by logistical problems, transport costs and a distance between producers and consumers. Preserving/increasing the place of agriculture in these urban/peri-urban areas (including interstices) would enable to make the most of the knowledge of landless farmers trained in agroecology and promote a local, high-quality supply.
- Support and strengthen capacity of local producers in agroecological production methods (considering women's workload) in urban and peri-urban context to ensure seasonal availability, support them so that they can extend their production season, especially for products subject to strong price variations, through farmer experimentation, training and exchanges;
- Support the creation of cooperatives bringing together agroecological producers at the local and national levels
- Encourage farmers to produce fresh pesticide-free agroecological fruits and vegetables which are particularly important for healthier diets of the local population through awareness-raising about pesticides and agroecology and other mechanisms such as support to alternatives to pesticide use.
- Promote responsibility in production practices of agroecological products without having labels to increase confidence in labelled agroecological products;

Supporting short agroecological food chains /agroecological territorial markets

- Invest in small scale and operational infrastructures (cold room, storage facility, for example), such as in low carbon storage facilities that can reduce availability and prices variations but also allow for a more regular supply of the market outlets; or in stand in the central market with a form of signal of agroecological quality of the products.
- Invest in multiple small-scale kiosks or mobile markets in low-income neighbourhoods where farmers and/or vendors could sell agroecological fresh products and reach vulnerable households (of their own community).
- Support transversal collective action (producers, vendors, consumers) to build a fair and long-term price setting mechanism that considers production costs, seasonality of conventional prices and unequal living income of consumers. This support can be both tangible (tools to help coordination) or intangible (training). For instance, price setting mechanisms could include an agreement on a price

band (floor and ceiling) for the year or even the establishment of a solidarity price (where the most well-off pay a little more to allow less well-off people to access these products)

- Support public procurement mechanisms specifically focused on agroecological foods, to increase consumer access to agroecological foods, e.g. school foods, hospitals, community health clinic gardens and/or public restaurants or canteens.

Raising public awareness of agroecology links to health, culture and livelihoods

- Promote awareness of agroecology and links to health, nutrition and other agroecological values, such as justice, culture and local livelihoods, through large-scale food campaigns in the public media, health centres, schools, urban community kitchens, cultural events and other venues. (While in some contexts where consumers cannot afford healthy diets, raising awareness on nutrition would not have been that helpful, in countries like Senegal, where the cost of a healthy diet has been shown to be lower than the current average food expenditures, such action could have an effect.)

Strengthening urban food governance and policy

- Build on local experiences to redesign food governance to make it more responsive to low-income consumers and agroecological producers. Governance could include a Dakar Food Council, which includes agroecological producers and consumer groups. The municipality and national government could work with local stakeholders to build programs adapted to the realities of each territory based on concerted action with the different actors, including citizens and bottom-up governance to strengthen local experiences carried out by communities and local authorities.
- Develop a national action plan on agroecology that links health, agriculture, climate and biodiversity policies and programs.
- Develop synergies and networks to facilitate the sharing of agroecological practices and principles with producers, consumers and civil society organisations.

Supporting research on agroecology:

- Support more studies on agroecology impacts on urban nutrition and on diet-related diseases in different contexts; studies could include a cluster randomised control trial of a participatory nutrition intervention that compares consumers who are purchasing agroecological food products to those who are not; such an intervention should include an educational component, and could include pesticide residue measurement.
- Invest in studies on current agroecological interventions and initiatives that could impact nutrition, especially those that target low income populations;
- Monitor prices of fruits and vegetables from both conventional and agroecological markets, considering spatial and quality disparities.

Public and private actions must ensure that food systems as a whole support healthy and diverse diets, and this requirement implies working on both offer and demand sides of food systems, but also in a broader policy vision that goes beyond food systems, in particular in supporting the livelihoods and incomes of vulnerable populations, in both urban, peri-urban and rural settings.

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10. Annexes

Annex 1: Inventory of potential case studies according the analytical grid

What interventions to support agroecological food systems could be implemented to combat multiple forms of malnutrition?

Identification		General information			Structure of marketing channels						Agroecological differentiation			Governance	Potential to reach low income women (rapid appraisal)			Selection criteria		
Number	Name	Location	Type of products	Networks	Production areas	Intermediaries / Length	Consumption areas	Retail outlet	Consumers	Distance between producers and consumers	Qualification of the products	System of gaurantee	Signal to consumers		Physical access	Economic access / affordability	Empowerment / nutrition awareness	AE	urban / periurban ?	low income consumers ?
1	Agrecol Market	Thies	Fresh vegetables, cosmetics, juices...	Members of FENAB, supported by several projects, supported	Periurban and rural	Direct sales or short chain	Urban (Thies)	Weekly agroecological (producers?) market in center Thies / direct sales?	Households of all income levels, but mostly middle and	<50km	organic agriculture and agroecology	Participatory certification system (farm certification)	Label BioSENEGAL Dedicated market	?	uncertain	uncertain	uncertain	yes	yes	uncertain
2	Sell Sellal	Dakar	Fresh vegetables, some fruits	supported by Enda Pronat/ project	Periurban and rural	short chain	Urban (Dakar)	Markets in two upper living neighboorhoods + oneline (Whatsapp group)	Upper income households	<100km	Agroecology, organic (specifications from FENAB) or "agriculture saine et durable"	FENAB Participatory certification system / internal certification for "asd" (plot certification)	Label BioSENEGAL (before : Label ASD) Dedicated market	producers members of an union + agreements with the marketing coorpertative in charge of selling vegetables at organic markets + sales to conventional markets	no	limited	limited	yes	yes	no
3	Patte D'Oie	Dakar	Fresh vegetables, spices	supported by FAO,	urban	direct sales	Urban (Dakar)	Conventional retail/wholesale big market	Households of all income levels	<5km	Micro-gardening, No pesticides, few mineral inputs	No certification - trust based system	None	?	yes	yes	uncertain	uncertain	yes	yes
4	Soreetul	Dakar	Processed foods (cereals, juices, yams...) and cosmetics		Rural production throughout Senegal	Long chain	Urban (Dakar)	Online and specialized shop in Dakar	Unclear	<400km	local (=senegalese production) and "natural"	No certification - trust based system and Third party certification ?	Brand (+ labels ?)	written annual contracts between SMEs and Soreetul (volume, packaging, price), trainings delivered to some SMEs	limited	limited	no	no	yes	uncertain

Identification		General information			Structure of marketing channels						Agroecological differentiation			Governance	Potential to reach low income women (rapid appraisal)			Selection criteria		
Number	Name	Location	Type of products	Networks	Production areas	Intermediaries / Length	Consumption areas	Retail outlet	Consumers	Distance between producers and consumers	Qualification of the products	System of gaurantee	Signal to consumers		Physical access	Economic access / affordability	Empowerment / nutrition awareness	AE	urban/ periurban ?	low income consumers ?
5	La Calebasse Verte	Mbour/ Saly	Rice, vegetables, chickens, processed goods.	?	?	?	?	Online (facebook)	Upper income households	?	?	?	?	?	?	no	no	?	?	?
6	Lengdeng, Rufisque	Lendeng	Vegetables	GRDR, CICODEV...	urban	mostly long chain (banabana and food vendors), sometimes short, and school canteens	Urban (Dakar)	Conventional markets (+ a school canteen program to feed children in Rufisque canteens)	Households of all income levels / children	<30km	place-based qualification (from "Lendeng") transition towards agroecological practices (reduce chemicals use)	No certification - trust based system	None	Spot transactions with bana-bana (farm gate) / relational proximity / provisionning programs for the school canteens from Rufisque	yes	yes	no	uncertain	yes	yes
7	Women groups supported by la Ferme des 4 chemins	Thies-village	Fruits and vegetables	"Ferme des 4 chemins" (an ecological farm) trained and funded the women groups, help for marketing, access to water etc	Periurban/rural	direct sales	Local sales (periurban/ rural) and urban	Online (whatsapp group) + monthly producers agroecological / organic market + conventional local market	Households of all income levels	<5km <50km	Holistic vision of agrecology - zero chemicals - high diversification - recycling ...	No certification - based on trust	Brand "Biodialow"	Horizontal collective action (4 groups of women farmers) for farming + important role of the "ferme des 4 chemins" / Sales are made individually	yes	uncertain	yes/uncertain	yes	uncertain	yes (partly)

What interventions to support agroecological food systems could be implemented to combat multiple forms of malnutrition?

Identification		General information			Structure of marketing channels						Agroecological differentiation			Governance	Potential to reach low income women (rapid appraisal)			Selection criteria		
Number	Name	Location	Type of products	Networks	Production areas	Intermediaries / Length	Consumption areas	Retail outlet	Consumers	Distance between producers and consumers	Qualification of the products	System of gauarantee	Signal to consumers		Physical access	Economic access / affordability	Empowerment / nutrition awareness	AE	urban/ periurban ?	low income consumers ?
8	Mampuya	Thies-village	Fruits and vegetables		Periurban/rural	?	Local sales and urban	farmgate ??? (Agroecological farm)	Unclear	<5km <50km	agroecology	?	?					yes	uncertain	uncertain
9	Bambilor	peri-urban	Vegetables	supported by FAO, CICODEV and "Comité pour Governance Alimentaire" (local NGO)	Periurban	direct sales	Periurban (local sales)	School canteens+ farmgate sales to local households	Children + Selfoncsumption + Households of all income levels	<5km	agroecology	No certification - trust based system	None	"horizontal" collective action	uncertain (focus on children)	yes	yes	yes	yes	yes (partly)
10	Ferme de Guelack	next to Saint Louis	vegetables and fruits, meat, fish		Periurban	?	self consumption, saint louis ?	Undear	Unclear	<20km (of Saint Louis)	agroecology	No certification - trust based system						yes	?	?
11	Thiaroye Gare	Thiaroye Gare	vegetables	supported by CICODEV, local authorities	urban, in the "Camp de Thiarroye"	direct sales	Urban (Dakar)	Specific stand in daily conventional market (by women farmers)	Households of all income levels, but more low income (due to the location)	<5km	agroecology	No certification - trust based system	None	"horizontal" collective action, role of the local authority	yes	yes	yes	uncertain/yes	yes	yes
12	Club Med Ziguinchor	Department of Ziguinchor	vegetables and fruits	supported by Agrisud	rural	direct sales to Hotels	Rural tourist area sales (Cap Skirring)	Hotels	High income (through hotels)	<20-40km	agroecology	No certification - based on trust OR (internal certification by agrisud ?)	None	?	no	no	uncertain	yes	no	no
13	Babagarage	Department of Ziguinchor	vegetables	supported by Agrisud	rural	direct sales	Rural	Local weekly market	Selfconsumption and low income households	<10km	agroecology	No certification - trust based system (internal certification by agrisud ?)	None / dedicated place in the local market	"horizontal" collective action for farming	yes	yes	uncertain	yes	no	yes

Annex 2: Information sheet and consent form

Etude : NRF agroécologie et nutrition

Partenaires : Centre de coopération internationale de recherche agronomique pour le développement (CIRAD), Cornell University et l'UCAD (LARTES)

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Objectifs. A partir de l'exemple du Sénégal, cette étude vise à identifier les interventions et les voies par lesquelles les initiatives agroécologiques pourraient être bénéfiques aux femmes économiquement et nutritionnellement vulnérables dans les zones urbaines et périurbaines afin de lutter contre les multiples formes de malnutrition. L'étude est subdivisée en trois sous-questions : 1) Quels sont les principaux circuits de commercialisation des fruits et légumes agroécologiques produits localement ? 2) Quels sont les facteurs qui influencent la consommation de produits agroécologiques ? 3) Quelles sont les voies par lesquelles des interventions soutenant l'agroécologie peuvent impacter la nutrition ?

Sélection des participants. Vous êtes invités à participer à cette recherche car nous souhaitons en apprendre davantage sur votre initiative de production et de commercialisation de produits agroécologiques. Nous pensons que vos connaissances et votre expérience peut contribuer à notre recherche en comprenant mieux vos pratiques, vos réussites et vos difficultés à cibler populations à faible revenus et à démocratiser l'agroécologie.

Participation volontaire. Votre participation à cette recherche est entièrement volontaire. Vous pouvez changer d'avis quant à votre participation à l'étude et interrompre l'entretien à tout moment, sans conséquence, auquel cas toutes les données collectées seront détruites.

Risques/inconfort. Nous ne prévoyons pas que vous ressentiez de l'inconfort lors de votre participation à l'étude, ni de conséquences négatives liées à votre participation. Vous êtes libres de ne pas répondre à une ou plusieurs questions si vous vous sentez mal à l'aise.

Avantages. Il n'y aura pas d'avantage direct pour vous, mais nous partagerons les résultats de l'étude avec vous si vous le souhaitez et nous espérons que vous trouverez la discussion intéressante. Cette étude donnera lieu à la rédaction d'un rapport et un projet de publication scientifique. Les résultats pourront être restitués dans le cadre d'ateliers et de conférences, en particulier auprès des financeurs de l'étude au niveau de l'Union Européenne.

Protection des données personnelles. Les informations recueillies sont collectées à des fins de recherche scientifique. Ce traitement est fondé sur votre consentement explicite, exprimé sur cette « fiche participant » qu'il vous sera demandé de signer avant le début des entretiens. Rien de ce que vous nous direz aujourd'hui ne vous sera imputable. Vos réponses peuvent être partagées avec d'autres personnes ou citées dans des publications, mais uniquement sous forme anonyme. Vos données seront conservées, en toute sécurité et confidentialité, pendant la durée de l'étude puis pendant 5 années. Ces informations seront uniquement réservées à l'équipe de recherche.

Contacts. Si vous avez besoin de plus amples informations ou si vous avez besoin de clarifier un problème, vous pouvez contacter l'un des membres de notre équipe d'étude : Ninon Sirdey au +221 77 336 32 54 ou +33 6 83 62 44 54.

Conformément à la règlementation applicable en Europe, vous disposez des droits d'accès, de rectification, d'effacement et de portabilité (lorsqu'il s'applique) à l'égard des données vous concernant, ainsi que de limitation et d'opposition pour motifs légitimes à leur traitement.

Vous pouvez les exercer en contactant le Délégué à la Protection des Données du responsable de traitement à l'adresse dpo@cirad.fr. Vous disposez du droit de déposer, à tout moment, une réclamation auprès de l'autorité compétente (en France, la CNIL ou au Senegal auprès de la Commission de Protection des Données Personnelles au 76, Mermoz Pyrotechnie VDN-Dakar, Tél: +221 33 859 70 30, BP: 25528 Dakar, Fann, Email: contact.cdp@cdp.sn).

Fiche participant

Projet	NRF agroécologie et nutrition
Chercheur référent	Ninon SIRDEY – CIRAD UMR Moisa – sirdey@cirad.fr Rachel Bezner Kerr – Cornell University rbeznerkerr@cornell.edu Arlene ALPHA – CIRAD UMT MoISA alpha@ciraf.fr Moustapha Seye – UCAD LARTES -- cmoustaphaseye@gmail.com Bintou Oumaya Ba – UCAD LARTES babintououmaya@gmail.com

Personne interrogée	
Personne conduisant l'entretien	
Date et lieu de l'entretien	

	OUI	NON
Avez-vous reçu et compris l'information qui vous a été communiquée ? Avez-vous pu poser des questions ? Avez-vous compris que vous pouvez, à tout moment, décider de ne plus participer à l'enquête ? Donnez-vous votre accord pour participer à cet entretien Avez-vous compris quels sont vos droits sur vos données personnelles ? Donnez-vous votre accord pour que les données collectées dans le cadre de cette enquête soient utilisées selon les finalités, durée de conservation et destinataire indiqués dans la lettre d'information ? Donnez-vous votre accord pour que des photographies ou vidéos de vous soient prises dans le cadre de l'étude et utilisées à des fins de communication externe de l'étude (site internet, affiches…) ?		

Signature du participant		
Si la signature n'est pas possible	Consentement verbal devant un tiers	
	Nom du tiers	
Signature de la personne conduisant l'entretien		

Annex 3: Interview guide (French version)

Introduction
Cette étude vise à identifier les interventions et les voies par lesquelles les initiatives agroécologiques pourraient être bénéfiques aux femmes économiquement et nutritionnellement vulnérables dans les zones urbaines et périurbaines afin de lutter contre les multiples formes de malnutrition. Cette étude est financée par la Commission européenne et réalisée par le Cirad (France), l'Université de Cornell (USA) et le LARTES à l'UCAD. Trois initiatives ont été sélectionnées parce qu'elles sont prometteuses pour atteindre les deux objectifs de promotion de l'agroécologie et de bénéfice pour les femmes à faibles revenus. La discussion durera une heure à une heure et demie et vous pouvez décider de ne pas répondre à certaines questions. Votre identité restera anonyme. J'aimerais aborder les thèmes suivants : (1) l'histoire, les motivations et les objectifs de l'initiative, (2) l'organisation concrète des canaux de distribution/de la vente, (3) la différenciation des produits sur le marché, (4) l'interface avec les clients et enfin (5) les défis auxquels vous pourriez être confronté et vos éventuelles recommandations.
Puis-je enregistrer notre conversation ?

Thème 1 : Historique, motivations, objectifs

1. Pouvez-vous vous présenter et présenter les activités de votre organisation ?
Nom de la personne interrogée et de l'organisation, date de création, nombre de membres, activités principales, y compris le plaidoyer (par exemple, l'organisation est membre de la DyTAES), etc.

2. Depuis quand êtes-vous impliqué dans cette initiative d'AE ?

3. Pouvez-vous m'en dire plus sur l'origine de cette initiative d'AE et sur ce qui s'est passé depuis son lancement ?

   3.1. Qui (y compris l'organisation qui fournit le soutien, la sensibilisation, le financement, la formation technique) ?
   3.2. Pourquoi : quelles sont les motivations pour mettre en place ou rejoindre une initiative d'AE ?
   3.3. Comment l'adhésion à cette initiative a-t-elle été décidée au sein de votre organisation ?
   3.4. Est-ce que vous voyez des éléments de contexte qui ont pu encourager sa mise en place
   3.6. Dates/moments clés de l'évolution, y compris l'évolution des objectifs de l'initiative ou des motivations des acteurs rejoignant cette initiative

4. Selon vous, quelles sont les valeurs importantes défendues par les participants ?
La réponse pourrait porter sur : (i) le recours à des processus écologiques plutôt qu'à des intrants achetés ; (ii) offrir une grande diversité de produits (iii) proposer des produits avec une valeur socioculturelle (iv) l'équité ou la solidarité ou le droit à l'alimentation saine; (v) l'impact environnemental ; (vi) la santé ; (vii) la qualité des aliments (sanitaire, nutrition, conservation) ; (viii) l'adaptation et le contrôle au niveau local l'autonomie face au système alimentaire ; (ix) l'adoption d'une approche systémique/ globale plutôt que de se concentrer uniquement sur des technologies spécifiques ; (x) la revendication politique en vue de changer le système alimentaire actuel, (xi) production agricole pour encourager des livelihoods décent, prix rémunérateurs, couts réduits.

Thème 2 : Organisation et gouvernance des circuits de commercialisation

5. **SUP Comment fonctionne la chaine de commercialisation ?**
5.1. Qui sont les acteurs, y compris sur le marché final ? Comment êtes-vous rentré en relation avec eux/ les avez-vous identifiés ?
5.2. Y a-t-il d'autres acteurs indirectement impliqués ? *Par exemple, les autorités locales, les ONG, etc... Qui, pourquoi ?*
5.3. Fonction de chacun d'entre eux (par exemple, production, logistique, vente, sensibilisation à la nutrition, soutien, plaidoyer, appui technique au producteur, mise en relation avec des vendeurs/ clients, sensibilisation nut des producteurs et des consommateurs, communication/publicité)
5.4. Emplacement : Où se déroulent les activités de production/stockage/commercialisation ? Où les produits sont-ils vendus ? Comment s'est fait le choix de l'emplacement du point de vente ?
5.5. Comment les acteurs se coordonnent-ils en matière de volumes, de prix, de qualité et de logistique ?
6. **PRO : Comment fonctionne la chaine de commercialisation ?**

Quels sont les produits que vous cultivez ? Pourquoi ceux-ci ? (Diversité, variété, justifications)

6.1. Les produits sont-ils commercialisés individuellement ou collectivement ? *Pour toutes les questions ci-dessous, il convient de faire attention de qui on parle (organ/indiv)*

6.2. Comment vous coordonnez-vous [en tant qu'organisation ou pratique habituelle des membres] avec les acheteurs en ce qui concerne les volumes, les prix, la qualité et la logistique ? *Vérifiez s'il y a un équilibre ou un déséquilibre de pouvoir.*

6.3. Quel est le prix au producteur des produits ? Savez-vous si vos produits sont vendus moins chers/plus chers/au prix du marché/prix juste pour le producteur/consommateurs ? S'il y a une volonté d'être compétitifs avec les produits conventionnels/ qui ne se revendiquent pas de l'agroécologie ?

6.4. Pourquoi travaillez-vous avec ces acheteurs spécifiques ?

6.5. Savez-vous où vos produits sont vendus et s'ils sont valorisés en tant que produits de l'AE ?

6.6. Quels volumes produisez-vous/vendez-vous ? Quelle est la part du marché de l'AE par rapport au marché conventionnel ?

Précis sur le volume : par jour, par mois, par an ? S'agit-il d'un volume moyen par rapport aux producteurs de l'initiative, d'une part de la production agroécologique par rapport à la production totale ?

Gouvernance de l'organisation de producteurs

6.7. Dans votre organisation de producteurs, tous les producteurs pratiquent-ils l'agroécologie ? Si oui, s'agit-il d'une condition préalable pour devenir membre ?

6.8. Comment sont prises les décisions dans l'organisation de produceurs ? Avez-vous un rôle dans la gouvernance/prises de décisions ?

6.9. Combien d'hommes et de femmes ? Quels profils économiques des productrices ? Participent elles à la gouvernance ?

6.10. Quels sont les services fournis par l'organisation aux agriculteurs ?

6.11 Y a-t-il d'autres partenaires ? *Par exemple, les autorités locales, les ONG, etc... Qui, pourquoi ?*

7. **VEN : Comment fonctionne la chaine de commercialisation ?**

7.1. Comment vous coordonnez vous avec les agriculteurs en ce qui concerne les volumes, les prix, la qualité et la logistique ?

7.2. Quel est le prix de vente des produits ? Sont-ils vendus moins chers/plus chers/au prix du marché /prix juste pour le producteur/consommateurs ? Comment fixez-vous les prix ? Avez-vous des consignes de la part de l'initiative à laquelle vous appartenez de vendre les produits AE à un prix compétitif ? essayez vous d'avoir des prix *abordables pour les femmes urbaines à faibles revenus ? Soyez précis, demandez des variations de prix en fonction de la localisation du marché, de la saison, des consommateurs...*

7.3. Pourquoi travaillez-vous avec ces agriculteurs en particulier ? Comment êtes-vous entré en relation avec ces agriculteurs ? Travaillez-vous toujours avec les mêmes ? Sur quoi se base la confiance avec les agriculteurs ? *(connaissance de longue date, visite sur leurs champs, confiance dans l'orga d'appui, etc.)*

7.4. Quels volumes achetez-vous/vendez-vous en tant que produits AE et en tant que produits conventionnels, le cas échéant ? *Capacité par jour, mois, année*

7.5. Pourquoi avez-vous choisi cet endroit pour vendre vos produits ? *Y-a-t-il une volonté de sortir des quartiers les plus aisés et de cibler des quartiers plus populaires ?*

8. **PRO en vente directe**

Quels sont les produits que vous cultivez ? Pourquoi ceux-ci ? (Diversité, variété, justifications)

8.1. Comment fixez-vous le prix, quel est-il ? Les produits sont-ils vendus moins chers/plus chers/au prix du marché /prix juste pour le producteur/consommateurs? Y a-t-il une volonté de votre organisation de proposer des prix compétitifs par rapport aux produits conventionnels ?

8.2. Quels volumes produisez-vous ?

par jour, par mois, par an ? S'agit-il d'un volume moyen par rapport aux producteurs de l'initiative, d'une part de la production agroenvironnementale par rapport à la production totale ?

8.3. Pourquoi avez-vous choisi ce lieu pour vendre vos produits ? Y a-t-il une volonté de voter organisation de sortir des quartiers les plus aisés et de cibler des quartiers plus populaires ?

8.4. Pourquoi ne travaillez-vous pas avec des vendeurs ?

Thème 3 Différenciation des produits (autres que le prix)

9. Comment décrivez-vous ou définissez-vous les produits agroécologiques ? Que dites-vous à vos clients ?
ex. Naturels, sans produits chimiques, locaux, diversifiés , quels principes d'AE ?
(argument santé, environnement, goût, conservation, etc.).

10. Comment garantissez-vous la qualité agroécologique des produits ?
Basée sur la confiance, la connaissance de l'organisation d'appui, certification interne, système de certification participatif, certification par un tiers.
Pour les SPG : qui est impliqué dans le processus de SPG ? visite, attributions de certificats.... ? *Consommateurs, producteurs ?*

11. Comment communiquez-vous sur la qualité des produits aux consommateurs ? *Label, marque, marché physique dédié, échanges oraux producteur/consommateur...*

Thème 4 Interface avec les consommateurs

12. Y a-t-il des produits pour lesquels il est plus facile [ou plus difficile] de s'assurer qu'ils ont des qualités agroécologiques / qu'ils sont produits avec des méthodes agroécologiques ? Si oui, lesquels sont plus faciles/difficiles à garantir et pourquoi ?

13. Tous sauf les producteurs qui ne font pas de vente directe
    13.1. Les clients posent-ils souvent des questions sur les processus de production ou les qualités des produits agricoles ? Si oui, sur quel type de choses posent-ils des questions ?
    13.2. Certains types de clients sont-ils plus intéressés par les produits agroécologiques ? Si oui, quel type de client (ou quel est le profil du client type) ? Y-a-t-il des types de clients que vous ne voyez jamais, à votre avis pourquoi ?
    13.3. Vos clients sont-ils particulièrement fidèles ? *La relation avec ces clients est-elle différente de celle avec des produits conventionnels ? Si oui, de quel point de vue ?*
    13.4. Les participants aux initiatives mènent-ils des actions de sensibilisation ou d'éducation à la nutrition ou aux pratiques culinaires ? Si oui, pouvez-vous m'en dire plus sur ces initiatives [ou qui pourrait m'en parler] ?

Thèmes 5 Satisfactions, défis et recommandations

14. Quelles satisfactions tirez-vous de votre participation à l'initiative ?

15. Quels sont les principaux défis liés à cette initiative ?
16. Existe-t-il des défis au sein de votre organisation ? *problèmes de free riding, pratiques inadéquates, opinions divergentes concernant l'AE / le ciblage des marchés ...*
17. Existe-t-il des tensions/conflits/concurrence entre les partenaires de l'initiative ? Entre qui, pour quoi ?
18. Quels sont les défis spécifiques pour atteindre les consommateurs pauvres et démocratiser l'agroécologie ?
19. Quelles seraient vos principales recommandations pour relever ces défis ?

Avez-vous des remarques/questions ?

Souhaitez-vous obtenir les résultats de l'étude ? si oui, comment ?

Annex 4: Food consumption insights from Source: Thériault, V. et al. (2024), "Diet transformations and changing food environments in the Sahel and West Africa," Sahel and West Africa Club (OECD/SWAC), West African Papers, No. 45, OECD Publishing, Paris)

[A] The frequency of consumption of food groups per week refers to the number of days within a week that the specific food group was consumed, by rural and urban settings 2018-19. (LSMS data)..[B] Frequency of consumption (#days/week) of food groups by expenditure quintiles, 2018-19. (LSMS data).

[A] [B]

Annex 6: Variations of retail prices fresh fruit or root vegetables (in green), fresh leafy vegetables (in blue) and tubers (red) (source ANSD 2024)