Food Preservation Methods among Agbor households of Delta State, Nigeria

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Abstract
This study investigates food preservation methods among households in Agbor, Delta State, Nigeria, with particular emphasis on the factors influencing preservation choices and their implications for food security. The objectives were to identify commonly used food preservation techniques, examine the socio-economic and cultural determinants of method selection, evaluate the effectiveness of these methods in reducing food spoilage, and assess the challenges households face in adopting modern preservation technologies. A mixed-methods research design was employed, integrating quantitative surveys with qualitative interviews across 200 purposively sampled households representing various socio-economic strata. The findings reveal a predominant reliance on traditional preservation methods such as drying (68%), smoking (45%), and salting (31%), though refrigeration (54%) is also notably used where infrastructure permits. Socio-economic status, access to electricity, and cultural preferences significantly influence the choice of preservation methods. Modern techniques, particularly refrigeration, were more effective in reducing spoilage and increasing economic savings, but their adoption is hindered by high costs (65%), unreliable power supply (60%), and limited awareness (40%) of alternatives. The study concludes that while traditional methods remain essential, especially among low-income households, promoting hybrid approaches and supporting access to low-cost, energy-efficient technologies—such as solar-powered refrigeration—could significantly enhance food security in Agbor. Policy recommendations include targeted subsidies, public awareness campaigns, and infrastructural improvements to bridge the socio-economic gaps affecting household-level food preservation and security.

Keywords: Food preservation, Agbor households, Food security, Nutrition

Background to the Study

Food preservation is a pillar of food security, particularly in regions fighting issues such as fluctuating food availability, economic uncertainty, and seasonal variation. In Delta State, Nigeria, effective food preservation methods are necessary for shelf-life extension, reduced dependence on the constant acquisition of food, and loss reduction. By providing an opportunity for food to be stored in homes for longer periods, these traditions guarantee sustained access to food, especially during scarcity (Akande and Adebayo, 2021). As a result of the fundamental aspect of food as a survival need, its procurement, preparation, and consumption are inevitable. Therefore, preservation of food from contamination is crucial to health (Daniyan and Nwokwu, 2021), and personal preference and situation determine the choice of preservation methods (Abdalla *et al*., 2019).

Street food enterprise is a well-documented aspect of Nigeria's economy, with affordable meals and employment. These businesses, be they static or mobile, occur in various public places, including markets, transportation hubs, and the workplace (Cortose *et al*., 2016; Canini *et al*., 2023). Although street food vending provides a significant opportunity for employment creation and revenue generation, concerns relating to food safety standards remain (Steyn *et al*., 2021). Delta State is not behind this trend as demand for quick, convenient food rises with urban expansion and population growth (Mwove *et al*., 2020). The trend is largely witnessed among working-class people who have less time to spend on home-cooked food (Fellows and Hilmi, 2021). The growth of street food businesses is spurred by economic advantage, low start-up capital, and rural-to-urban migration (Rane, 2021). Despite its informal nature, the sector is a significant means of livelihood, promoting self-employment and accumulation of skills at minimal capital investment (Njaya, 2014; WHO, 2020). Street food draws customers as it is cheap, convenient, and tasty (Barro *et al*., 2017).

Agbor, a major town in Delta State, boasts diversified food preservation methods due to both traditional and modern influences. The traditional processes of drying, smoking, salting, and fermentation continue to be common, particularly in rural and semi-urban areas, where they are valued for being inexpensive and part of culture (Ezeokeke and Oguejiofor, 2020). The traditional practices have been handed down from generations, ensuring food security even in the absence of modern storage (Ezeokeke and Oguejiofor, 2020). Nevertheless, with increasing urbanization and improved access to technology, modern preservation methods like refrigeration, freezing, and chemical preservatives are gaining popularity. The application of these processes, however, depends on household income, the availability

of electricity, and understanding of preservation practices (Ogundele and Okon, 2022).

Despite the many benefits of preservation techniques in the modern era, their widespread application in Agbor is hindered by a prevalent issue of power outages, limiting reliance on refrigeration and freezing (Omole and Ajayi, 2019). As such, homes resort to a combination system of both traditional and new methods in an attempt to ensure food security while minimizing infrastructure issues. Interaction between the methods impacts the availability, quality, and safety of food across different socio-economic classes.

Food preservation is at the heart of ensuring year-round food security. Extensive research highlights the effectiveness of both traditional and modern methods in reducing food spoilage and improving food stability, particularly in regions with inadequate infrastructure (Akinola and Joda, 2020). For centuries, techniques such as drying, smoking, salting, and fermentation have been important in extending the shelf life of staple foods, including meat, fish, vegetables, and grains. Drying, for example, is widely utilized to preserve fish, fruits, and vegetables through the reduction of moisture content, thereby inhibiting microbial growth and spoilage (Ekezie and Onuegbu, 2021).

Salting and smoking, applied regularly to fish and meat, are particularly beneficial for households that do not have regular access to refrigeration. Research by Omotayo and Falola (2019) indicates that these preservation methods are highly prevalent in rural Nigeria, where there is restricted access to resources that would enable the utilization of refrigeration. The two methods both require a long time, though, and alter food's sensory qualities, such as taste and texture.

Fermentation is another frequent preservation method, particularly for main staple crops like cassava that is processed to products such as garri and fufu. Aside from increasing shelf life, fermentation enhances nutritional quality and taste through breakdown of anti-nutritional components. Traditional preservation methods have proved to be viable enough in poor-resource settings, with actual-practice applications in scenarios where storage facilities and power supply are low (FAO, 2012).

Compared to this, modern preservation techniques like refrigeration, freezing, and chemical preservatives are being increasingly utilized in urban regions with improved infrastructure. They are less labor-intensive and offer improved food texture and nutritional preservation but are more costly and dependent on the use of consistent electricity supply (Akinola and Joda, 2020). In areas such as Delta State, where blackout is frequent, most homes utilize a combination of modern and conventional preservation methods in an effort to reduce food wastage. Applications of chemical preservatives, i.e., vinegar and saltpetre, in homes are comparably low across Nigeria because information about them has been limited as well as being wary of posed health hazards. Canning and bottling though increasing in occurrence, are compared to other preservation methods more prominent in urban locales that have good access to material needed.

Food preservation choices in the domestic environment are dictated by education level, socio-economic status, and cultural tradition. Less wealthy families will likely utilize traditional methods due to cost, whereas wealthier communities prefer modern methods (FAO, 2019). Cultural choice also comes into play, as foods are preserved using methods that conventionally correspond with particular localities. For example, fish drying is prevalent in coastal societies, and cassava fermentation is widely practiced in southeastern Nigeria.

Food security at the domestic level is directly affected by knowledge of preservation practices. Evidence suggests that individuals with high levels of knowledge in preservation practices are likely to diversify practices of preservation in order to maintain a steady diet throughout the year (Ekezie and Onuegbu, 2021). Grassroots initiatives focusing on enhanced preservation practices have been put in place to enhance food security through waste reduction and increasing nutritional access.

Food preservation plays an important role in stabilizing food supply, alleviating household economic burden, and minimizing foodborne illness through the prevention of contamination and spoilage (Akande and Adebayo, 2021). But the method of preservation must be in harmony with local conditions. Hybrid solutions—combining traditional and innovative approaches—can yield flexibility in infrastructurally limited environments and in seasonality environments.

While a large body of research has been conducted on methods of food preservation, more studies are required to understand how local practice is evolving around urbanization and technological development. The health and environmental consequences of different preservation processes in Delta State also require more investigation. Research into new and sustainable preservation technologies low-resource environments can be beneficial in enhancing food security.

Food preservation is critical to food security, reducing waste, and maintaining nutritional value, and ensuring a stable food supply. Traditional methods remain necessary in regions with infrastructural deficits, while new approaches gain popularity in urbanized areas. The choice of preservation methods is based on socio-

economic and cultural factors, usually requiring a hybrid practice where infrastructural deficits dominate. Understanding these dynamics can inform policy to promote beneficial preservation practices and eventually enhance food security in Delta State and elsewhere.

Objectives

The main purpose of the study was to investigate the food preservation methods among households in Agbor, Delta State, Nigeria. Specifically, the study determined

1. food preservation methods used by households in Agbor.
2. factors influencing households' choice of food preservation techniques, including socio-economic status, access to resources, and cultural factors.
3. effectiveness of different food preservation methods in reducing food waste and enhancing food security.
4. challenges and limitations faced by households in adopting modern food preservation techniques.

Research Questions

Based on these objectives, the study seeks to answer the following research questions:

1. What types of food preservation methods are most commonly used by households in Agbor, Delta State?
2. What socio-economic, cultural, and infrastructural factors influence households' choice of preservation methods?
3. How effective are these preservation methods in reducing food spoilage and maintaining household food security?
4. What challenges do households face in adopting modern preservation techniques, such as refrigeration, in Agbor?

Methodology

Study Area

Agbor is the most populous city of approximately 67,610 among the Ika people. It is located in Ika South Local Government Area of Delta State, in South-south geo-political zone of Nigeria, West Africa. Agbor is the headquarters of Ika South Local Government Area, in Delta State, Nigeria.Ika South has two kingdoms. They are Agbor Kingdom and Abavo Kingdom. Ika North East has 9 kingdoms. They.are Owa Kingdom, Akumazi, Umunede, Igbodo, Mbiri, Ute Ogbeje, Otolokpo, Ute Okpu and Idumu Esa kingdom. The research was conducted in Agbor, a major city in Delta State, Nigeria. Agbor was chosen due to its urbanization level, diverse socio-economic population, and mixed reliance on traditional and modern food preservation methods.

Research Design

The quantitative and qualitative methods of data collection were combined in this research to fully understand the food preservation practices with respect to household food security in Agbor, Delta State, Nigeria. Such an approach allowed the study to statistically analyse the quantitative data and delve deep into qualitative insights that enable the framing of a stronger approach toward the fulfilment of the research questions.

Mixed-methods design was adopted (i.e. use of physical interviews and questionnnaires. Data were collected on the methods of food preservation, factors that influence it, and the outcomes regarding food security. This was particularly apt for the present study for understanding the present state of food preservation practices in the households at Agbor, finding its pattern and challenges. In this respect, the mixed-method approach used for the present study has been very important in bringing out a comprehensive understanding of the food preservation practices of Agbor households by studying in detail both the quantitative extent and qualitative reasons behind them. The methodology helped identify good practices in food preservation and challenges to food security as important issues in Delta State. Insights were provided that could help in supporting policy at the local level and community-based interventions.

Population and Sample

The study population were residents within Agbor, Delta State. Multistage sampling was employed to ensure residences chosen were representative.

Stage 1: Agbor was divided into distinct neighborhoods based on socio-economic status—low, middle, and high-income neighborhoods. This division aimed to capture a broad spectrum of food preservation activities and the factors influencing these activities.

Stage 2: A random sampling technique was used within each socio-economic stratum to select a total of 200 households. The sample was deemed large enough to be applied in quantitative analysis, allowing statistically significant data to be collected regarding food preservation habits in households without sacrificing broad representation among diverse economic groups.

Data collection was over a period of two weeks to accommodate intensive interaction with respondents. Of the 200 sampled families, about 20 (10%) were purposively selected for semi-structured in-depth interviews. The sub-sample covered participants from each socio-economic group to ensure qualitative

examination of cultural, economic, and personal factors on food preservation activity.

In addition, important informants such as preservation experts and local community leaders were also interviewed in order to collect contextual data and specialist opinions on food preservation methods and household food security. This sampling technique helped include a diverse cross-section of the Agbor population in the research, with the result that an accurate understanding of how socio-economic status affects food preservation practices and impacts on food security was developed.

Quantitative Data Collection

Quantitative data used in the research was collected from Agbor homes in Delta State, Nigeria through the administration of a standardized survey questionnaire. These included the various types of food preservation methods utilised by families, determinants of household choice, and what the implications for household food security are, that were collected using the questionnaire.

Qualitative Data Collection

Context and expert opinion to the findings were elicited from key informant interviews with local preservation food specialists (2), extension agents (2), and 2 community leaders. Semi-structured interviews were conducted on a sample of a few households (approximately 20) in every socio-economic class to elicit in-depth information on: Personal and cultural determinants for the choice of particular preservation methods, perceived challenges for implementing preservation practice and views about the effectiveness of various preservation methods in improving food security.

Instrument Design

The questionnaires were structured in such a way that they contained close-ended questions as well as Likert scale items to encompass quantifiable information. The questionnaire was split into four main sections:

1. Demographic Information: This has been used for recording the basic demographic and socio-economic details of respondents, for instance, gender, age, family income, education level, and family size. These variables have helped in developing the respondents' profile and thereafter analyzing how the same can assist food preservation practices.
2. Food Preservation Methods: Here, the respondents were asked to indicate the food preservation methods that are used in their households. The traditional methods of drying, smoking, and fermentation were covered as well as the more modern ones like refrigeration, freezing, and chemical preservatives. The respondents were open to selecting more than a single method to enable multiple methods in the household.
3. Determinants of Preservation Choice: Here, the determinants of household choice of preservation method used were of prime concern. The questions identified the socio-economic drivers (e.g., education level, resources availability, income level), infrastructure (e.g., electricity provision, storage capacity availability), and cultural drivers. The drivers' importance was ranked on a Likert scale ranging from 1 (not important) to 5 (very important).
4. Food Security Indicators: The chapter assessed food security results on preservation practices. It enquired about frequency of food loss, ability to keep food for off-season consumption, and amount of money saved through preservation. Responses illuminated how much food preservation practices assisted in reducing loss and enhancing household food security.

Data Analysis

The quantitative data collected from the questionnaires were analyzed using descriptive and inferential statistics in SPSS software. Key analyses included: Frequency distributions to identify common preservation methods, Cross-tabulations to explore relationships between socio-economic factors and preservation method choices and Regression analysis to examine the impact of preservation practices on food security indicators. Thematic analysis was used to analyze qualitative data from interviews. Transcripts were coded to identify recurring themes related to factors influencing preservation choices, challenges, and perceived effectiveness of preservation methods. This analysis helped provide context and explanation for the quantitative findings.

Ethical Considerations

Informed Consent: Participants were informed about the study's purpose, procedures, and their right to withdraw at any time. Written or verbal consent was obtained before participation.

Confidentiality: All participant responses were kept confidential and anonymized in reports and publications.

Respect for Participants: Sensitivity to cultural beliefs and practices around food and preservation was maintained throughout the study.

Results

Types of Food Preservation Methods Used by Households in Agbor

Table 1 shows the percentages of households using various food preservation methods in Agbor

The result in table 1 indicated that;

- **drying** is the most common method (68%), likely due to its low cost, accessibility, and minimal reliance on infrastructure.
- **smoking** (45%) and **salting** (31%) are also widely used, particularly for meats and fish. These traditional methods are well-suited to the local environment and cultural preferences.
- **refrigeration** (54%) is the most common modern method but is limited to households with stable electricity access.
- **freezing** and **canning** are used less frequently (22% and 8%, respectively) due to cost and

dependency on consistent power, which is not always available in the area.

Thus, the findings showed a reliance on traditional methods in Agbor, though modern methods like refrigeration are used when resources allow.

Factors Influencing Preservation Method Choices

The table 2 summarizes the major factors influencing households' choices of methods for preserving a high level of understanding of why one method is chosen over another. Socioeconomic status plays an important role in the choices of preservation. Households with higher incomes could afford to engage in modern methods of preservation, such as refrigeration and freezing, where costs are related not only to higher initial costs but also to power consistently. Modern means of preservation do require access to a variety of resources, including electricity, for instance. Households with no dependable access to electricity will not store food by refrigeration or freezing. The choice for traditional methods, including smoking fish, is usually dictated by cultural preference. Households usually select the preservation methods that correspond to their local taste, preferences, and traditions. The table serves to underscore how socio-economic factors, infrastructure, and cultural practices influence choices made for preservation and how those choices impact food security outcomes.

Challenges in Adopting Modern Preservation Methods

The results in table 4 identifies the main barriers households face in adopting modern preservation methods. This table illustrates how financial, infrastructural, and informational barriers prevent some households from fully utilizing modern preservation methods. High Costs are a significant barrier (reported by 65% of households). Refrigerators, freezers, and their associated power costs make these methods expensive, especially for low-income families. Inconsistent Power Supply affects 60% of households, limiting the effectiveness of modern methods reliant on electricity, like refrigeration and freezing. Lack of Awareness of alternative methods, such as pickling or advanced drying techniques, affects 40% of households, suggesting that informational support could help improve food security

Discussion

The study examined food preservation methods in Agbor households, exploring how these methods influence food security and identifying barriers to adopting modern techniques. The discussion below interprets the findings in relation to socio-economic factors, infrastructural challenges, cultural practices, and potential strategies for improving food security.

In reference to **types of food preservation methods used by households in Agbor (Table 1), t**he findings have shown a clear reliance on traditional methods of food preservation, such as drying, smoking, and salting, used by households in Agbor. In fact, similar studies done in Nigeria and other developing regions also show this, where traditional means are favorable for their access and affordability and are well adaptable to local resources. Such a high utilization of drying at 68% and smoking at 45% is most probably attributed to the conducive local climate to such methods and cultural familiarity with these modes of preservation especially for grains and fish. In contrast, modern methods of food preservation, like refrigeration, are confined to households that enjoy a stable electricity supply and higher incomes. It is represented by the reported refrigeration usage, which was at only 54% of households, showing both the socioeconomic barriers and infrastructure limitations standing in the way of many to transition to this more effective but resource-dependent method. This is indicative of wider studies on income levels and access to electricity-dependent methods of preservation, beyond the reach of a large part of the population in poor-income settings.

Regarding **factors influencing preservation method choices (Table 2), s**ocio-economic factors, infrastructural, and cultural practices are really potent influences on choices regarding preservation. Households with higher incomes are more likely to use refrigeration and freezing because of better access to electricity, indicating how income and resource availability will directly affect the preservation choice within the household. This supports the socio-economic model by Smith and Olanrewaju, 2021, that postulates economic aspects and access to infrastructure are key to influencing food-related behaviours in households. Specific cultural preferences also exist; many households prefer preservation methods that give more flavor to the local staples, such as smoked fish. This preference for smoking and salting certain foods rather than refrigeration indicates the strong cultural element of preservation practices mentioned by other studies on food security in sub-Saharan Africa (Nwosu and Onwuzuruike, 2022). This means that food security projects should be sensitive to the respective culture of the communities, using indigenous knowledge and food preference while promoting new approaches.

On factors influencing preservation method choices (Table 3), the traditional methods of preservation were accessible yet relatively inefficient in lowering the loss rate as compared to the modern method: refrigeration. Households using refrigeration had a significantly lower spoilage rate at 30%, compared to 52% for households that dry and 48% for those that smoke. This agrees with the work of Eze and Ikechukwu 2021, which indicated that refrigeration prolongs the shelf life of food and reduces losses. But this effectiveness is adulterated in the absence of reliable electricity, with wide ramifications touching on food security. Households characterized by frequent power outages are forced to apply inefficient preservation methods; hence, they record increased food waste. This agrees with the findings of Oladele, 2023, who posited that infrastructural improvements, especially in the area of electricity, remain key in ensuring

increased food security through better preservation options.

Concerning challenges in adopting modern preservation methods, high costs and erratic power supplies were the major issues in the adoption of the modern methods. More than 65% of the households mentioned high costs as a prohibitive factor-a realization of prevalent financial burdens amongst low-income households (**Table 4)**. Studies like that of Ayodele *et a*l. (2023) have also highly pointed out such situations, explaining that in resource-constrained communities, the high initial cost of refrigeration equipment and expenditure on electricity is certain to act as a limiting force to adoption. The other key issue was the unreliable electricity, as the level of unreliable power for a household was recorded at 60%. This constraint follows from consistency with research in other parts of Nigeria. Because of the inadequacy of infrastructure, the potential to further increase refrigeration and freezing has greatly been curtailed. These findings flag policy interventions in addressing gaps in infrastructure in regions where the power supply is unstable. The study underscores the need for an integrated approach to food security that combines traditional knowledge with modern techniques. Policy initiatives should consider the socio-economic and infrastructural realities in Agbor, focusing on making preservation equipment affordable, improving electricity access, and providing targeted education on preservation methods. By addressing these barriers, policymakers can support households in adopting more effective preservation practices, reducing food waste and improving food security.

Traditional food preservation methods such as smoking, drying, and salting have long been employed across many communities due to their cultural acceptance, affordability, and reliance on locally available resources (Ajala et al., 2011; Fasoyiro & Ashaye, 2009). These techniques are crucial for extending the shelf life of food commodities, particularly in areas with limited access to modern preservation infrastructure. However, their effectiveness in significantly reducing microbial spoilage is often limited compared to contemporary methods like refrigeration or vacuum packaging (Alegbeleye, Singleton, & Sant'Ana, 2022). As a result, communities that rely primarily on traditional preservation practices—especially for perishable goods such as vegetables, fish, and meat—face higher risks of food spoilage, which in turn affects household food availability and increases food-related costs (Bello et al., 2020).

Integrating traditional and modern preservation techniques has shown potential to improve food shelf life while maintaining local acceptability. This hybrid approach supports the development of culturally sensitive and resource-efficient preservation strategies (Akinola, 2021). Awareness and adoption of such blended techniques can enhance community resilience and contribute to broader food security goals, particularly in regions like Agbor where food losses are prevalent.

Importantly, the accessibility of modern preservation technologies remains uneven. Poor households often lack the financial capacity or infrastructure to afford refrigeration or other advanced methods that can effectively slow spoilage (FAO, 2019). This disparity exacerbates vulnerability to food scarcity and price inflation due to increased postharvest losses. In this context, the promotion of affordable and energy-efficient preservation tools—such as solar-powered refrigerators—could significantly mitigate these risks (Okoruwa, 2015).

The findings highlight the urgent need for a holistic food security strategy that addresses not only technological access but also educational and infrastructural support. Subsidies or financial assistance for low-cost preservation technologies, combined with community-based training programs, can empower more households to reduce food waste and ensure more stable food supplies.

Conclusion

Food preservation methods are central to Agbor in developing its food security amid a reliance on both traditional and modern methods of food preservation. While modern methods do exist, they mostly rely on the largely unstable nature of electricity; hence, traditional practices are indispensable. By understanding these patterns, policymakers and community organizations can encourage sustainable and effective means of preservation that support food security, reduce waste, and enhance resilience against economic and environmental fluctuations in Delta State, Nigeria. The evidence from this study indicates that food security in Agbor relies on both traditional and modern methods of food preservation. Whereas the traditional techniques are culturally relevant, easily accessible, and thus widespread, modern methods of preservation, such as refrigeration, offer better preservation but suffer from erratic infrastructure and high costs. Overcoming these challenges requires a multi-layered approach that will involve community education, improvement in infrastructure, and financial investment in preservation technologies.

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Recommendations

The study's findings and Agbor's food security inform the following recommendations. The initiatives seek to enhance food security, mitigate food degradation, and advance domestic food preservation, particularly for low-income households facing economic and infrastructural challenges. The subsequent steps are expected to resolve this issue:

In order to make food preservation more accessible to poor households and reduce wastage, subsidies or low-interest loans on energy-efficient and solar-powered refrigerators should be made available.

Pilot projects can provide low-cost solar-powered refrigerators to households with unreliable electricity,

enabling the storage of perishable foods and enhancing food security. Addressing unreliable electricity is crucial to the success of food storage, particularly in poor households. Collaboration among government agencies and power suppliers can promote electrical reliability in Agbor and the broader surroundings through greater grid extension and power stability.

Encouraging households to use solar panels for refrigeration can reduce grid dependency while optimizing preservation techniques. Community training programs also need to promote traditional along with contemporary food preservation methods. Programs can incorporate techniques such as smoking and salting while demonstrating how they complement contemporary methods. Supporting small businesses that are facing food preservation—canning or drying—through grants or loans can help provide affordable services to families without equipment. Also, integrating food preservation into health and nutrition programs can enhance community knowledge of food security, food storage methods, and diet quality.

Effectiveness of Preservation Methods in Reducing Food Spoilage and Enhancing Food Security

Table 3 presents data on how effective each preservation method is in terms of reducing spoilage, ensuring off-season food availability, and contributing to economic savings.

Food Spoilage Rate is lower with refrigeration (30%) compared to traditional methods like drying (52%) or smoking (48%). This indicates that modern methods are more effective in preserving freshness but depend on reliable power. Off-Season Availability: Drying and refrigeration provide better food availability in off-seasons by allowing households to store food for longer periods. Households using refrigeration reported higher economic savings, as less spoilage led to fewer purchases. Traditional methods like salting provide minimal savings but are more accessible to low-income households. This table shows that while modern methods may be more effective for reducing spoilage and saving costs, traditional methods remain crucial, especially for households without reliable electricity.

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Table 1: Types of Food Preservation Methods Used by Households in Agbor

Preservation Method	Percentage of Households Using Method (%)
Drying	68%
Smoking	45%
Salting	31%
Refrigeration	54%
Freezing	22%
Canning	8%

Table 2: Factors Influencing Preservation Method Choices

Factor	Influence on Preservation Choice	Description
Socio-Economic Status	High	Higher-income households use modern methods
Access to Resources	Moderate to High	Access to electricity impacts refrigeration
Cultural Preferences	High for Traditional Methods	Preferences for taste and effectiveness

Table 3: Effectiveness of Preservation Methods in Reducing Food Spoilage and Enhancing Food Security

Preservation Method	Food Spoilage Rate (%)	Impact on Off-Season Food Availability	Economic Savings (%)
Drying	52%	High	Moderate
Smoking	48%	Moderate	Moderate
Salting	46%	Moderate	Low
Refrigeration	30%	Moderate to High	High
Freezing	35%	Low	High

Table 4: Challenges in Adopting Modern Preservation Methods

Challenge	Percentage of Households Reporting (%)	Description
High Costs	65%	High costs of refrigeration equipment and bills
Inconsistent Power Supply	60%	Frequent power outages limit refrigeration/freezing
Lack of Awareness	40%	Limited knowledge of alternative methods