



The Socio-Technical Architecture of Post-Consumer Food Waste: An Empirical Evaluation of Urban Household Dynamics in Nigeria

Aliyu Mansur Sulaiman ^{a, #}, Miroslav Popović ^a, Dragoljub Bajić ^b, Mustapha Umar ^c, Rafiu Olalekan Yusuf ^d

^a Singidunum University, Department of Environment and Sustainable Development, Belgrade, Serbia

^b University of Belgrade, Faculty of Mining and Geology, Belgrade, Serbia

^c Nigerian Institute of Leather and Science Technology, Department of Science Laboratory Technology, Zaria, Kaduna, Nigeria

^d Ahmadu Bello University Zaria, Department of Geography and Environmental Management, Kaduna, Nigeria

ARTICLE INFO

Received 02 July 2026
Accepted 31 August 2026

Research article

Keywords:

Food waste
Post-harvest loss
Urban infrastructure
Food security
Sub-Saharan Africa

Citation: Sulaiman A. M., Popović M., Bajić D., Umar M., Yusuf R. O., The Socio-Technical Architecture of Post-Consumer Food Waste: An Empirical Evaluation of Urban Household Dynamics in Nigeria, *Recycling and Sustainable Development*, 19 (2), 2026, 5-23.
<https://doi.org/10.30544/RSD116>

Copyright: © 2025 CC BY 4.0 by Authors
Creative Commons License

ABSTRACT

Traditional agricultural discourse distinguishes upstream food loss in developing countries from downstream consumer waste in high-income countries. However, rapidly urbanizing and changing economic conditions in Sub-Saharan Africa are creating a transitional environment in which household food conservation efforts are undermined by challenges posed by municipal utility failures and structural bottlenecks. This study investigated the behavioral factors, socio-demographic patterns, and infrastructural barriers leading to post-consumer food waste in urban Nigerian households. A mixed-methods survey was adopted, using standard finite population models to determine sample sizes. The digital distribution network was mostly male (76.1 %) and educated (73.6 %), and therefore the sample was biased toward highly educated participants. The empirical data show that although 66.3% of urban consumers are strongly focused on market affordability and purchase in bulk to protect against rising food prices, frequent self-reported planning habits such as shopping lists (69.5 %) and freezing leftovers (44.2 %) are typically negated by power grid failures in urban areas, which cause domestic storage spoilage soon after purchase. Gender was significantly associated with shopping-list use, $\chi^2(4) = 18.491$, $p = 0.0010$; leftover freezing, $\chi^2(2) = 11.063$, $p = 0.0040$; and affordability-driven bulk buying, $\chi^2(2) = 15.554$, $p = 0.0004$. Age group and education were not significantly associated with these behaviors (all $p > 0.05$). These findings indicate that urban food waste in developing regions is not just a matter of consumer choices but also a structural problem. The reduction of urban solid waste and the challenge of feeding people in the region need to be addressed in ways that support urban food literacy and public investment in reliable municipal grids and solar-powered cold chains.

1. Introduction

Food security and environmental sustainability are

highly affected by inefficiencies in agricultural value chains. About one third of all food produced for human consumption is lost or wasted annually, resulting in

[#] Corresponding author: aliyu.mansur.sulaiman.23@singimail.rs

substantial economic losses and placing increasing pressure on municipal waste management systems (FAO, 2011). The literature has identified a geographical pattern in food waste: industrialized countries suffer from downstream food waste due to poor food waste management and retail practices (Parfitt et al., 2010; Quested et al., 2013), while developing countries experience upstream food waste due to poor harvesting practices, storage facilities, and transport infrastructure (Godfray et al., 2010; FAO, 2011; Kilemle et al., 2025). However, ongoing urbanization, the growing middle class, and the rise of supermarkets in Sub-Saharan Africa have led to changes in the pattern of food waste (Reardon et al., 2003; Tschirley et al., 2015). Recent research shows that, in developing regions, urban food waste patterns are increasingly characterized by downstream food waste, while still being shaped by structural and institutional bottlenecks typical of developing countries (Sunday et al., 2022; Mawoneke, 2025). This intersection creates a situation in which positive household management practices are often undermined by unreliable public utilities. However, research on food systems is still siloed. Western studies have focused primarily on the psychology behind voluntary consumer waste (Aschemann-Witzel et al., 2015; Stancu et al., 2016), while research in developing countries focuses almost exclusively on rural, smallholder post-harvest management (Affognon et al., 2015; Sunday et al., 2022). Very little research has been done on spillover effects (i.e., how upstream logistical bottlenecks and municipal failures lead to downstream waste in fast-growing African cities). This study addresses that gap by exploring the socio-demographic context, behavioral patterns, and structural barriers that contribute to post-consumer food waste in urban Nigeria. Viewing these dynamics in a unified manner provides a basis for designing interventions that can address the behavioral and technical challenges of urban food systems.

2. Materials and Methods

2.1. Research Design and Sampling Stratification

To understand consumer perceptions and habits regarding food waste, we used a mixed methods survey. The target sample size was determined using standard normal-curve expressions and the formula proposed by Bello et al. (2020) for finite populations to ensure statistical validity. The survey was disseminated online through social media and messaging platforms. Although this technique was effective for data collection in a dynamic urban environment, this rapid sampling method shaped the demographic composition of the dataset,

which represents an important boundary condition for interpreting the results. The final sample was mostly male, comprising 76.1 % of all respondents. In addition, the cohort was highly educated (73.6 % with postgraduate degrees) and the most represented age group was 41 to 50 years old. The required sample size was estimated using the finite-population adaptation of the standard normal-curve (Yamane-type) formula proposed by Bello et al. (2020), $n = \frac{N}{(1+N(e)^2)}$, applied at a 95 % confidence level and a 5 % margin of error to the estimated adult population of the study area; the achieved sample met and exceeded this minimum target. A total of 317 respondents were recruited using non-probability convenience and snowball sampling, with the survey link circulated through social media groups and instant-messaging platforms (e.g., WhatsApp and Facebook community pages) commonly used by urban residents. This approach maximized reach within a short data-collection window.

2.2. Questionnaire Design and Validation

The survey instrument was a structured, self-administered questionnaire organized into four sections: (i) socio-demographic characteristics (gender, age, education, and household size); (ii) household food-provisioning and preservation practices, measured on a three-point Likert-type scale ranging from "never" to "always"; (iii) perceived infrastructural and structural barriers to food preservation, including electricity supply, storage access, and transport and market conditions; and (iv) open-ended items inviting respondents to describe, in their own words, the drivers of food waste in their households. Face and content validity were established through review by subject-matter experts in food security and environmental management, followed by a pilot administration with a small group of respondents outside the final sample; items were revised for clarity and cultural relevance on the basis of this pretest before the instrument was finalized for full deployment.

2.3. Reliability of the Measurement Scales

The internal consistency of the multi-item Likert-type scales was assessed using Cronbach's alpha coefficient, with 0.70 taken as the minimum acceptable level of reliability (Bryman, 2016). The planning-practices subscale produced Cronbach's $\alpha = 0.225$ ($n = 313$, 3 items), indicating low internal consistency among the three household-practice indicators. The perceived-barriers subscale produced Cronbach's $\alpha = 0.749$ ($n = 317$, 10 items), indicating acceptable internal consistency for the set of perceived-barrier indicators. Both the food-provisioning/planning-practices subscale

and the perceived structural-barriers subscale met this threshold, supporting the internal consistency of the behavioral and perception measures used to generate the descriptive results reported in the Results section. The reliability findings show a clear difference between the two constructed subscales. The perceived-barriers measure demonstrated acceptable internal consistency ($\alpha = 0.749$), suggesting that the ten reported barrier indicators showed a reasonably coherent pattern as a set of perceived causes of food waste. In contrast, the planning-practices subscale showed low internal consistency ($\alpha = 0.225$). This low coefficient is plausible because the three items represent distinct household behaviors rather than closely interchangeable manifestations of a single latent trait. The alpha coefficient should therefore not be interpreted as evidence that the individual behaviors are unreliable in themselves.

2.4. Qualitative Component: Data Collection and Analysis

Consistent with the mixed-methods design, the questionnaire also included open-ended prompts asking respondents to describe, in their own words, the drivers of food waste in their households and their views on the causes of the cross-stage spillover effect reported later in this paper. Free-text responses were analyzed thematically, following a six-step approach comprising familiarization with the data, initial coding, searching for themes, reviewing themes, defining and naming themes, and reporting. Two members of the research team independently coded a subsample of responses to check the consistency of interpretation, and any disagreements were resolved through discussion. The resulting themes, most prominently references to poor road conditions, unreliable electricity supply, and market-price volatility, were used to contextualize and triangulate the quantitative findings reported in the Results section, including the finding that 12.6 % of respondents directly linked household waste to transit delays and poor road infrastructure.

2.5. Statistical Methods for Data Processing

Quantitative data were cleaned and analyzed using standard statistical software. Descriptive statistics (frequencies, percentages, and measures of central tendency) were used to characterize the socio-demographic profile of the sample and the prevalence of food-waste-related behaviors, as reported in Tables 1, 2, and 3. To examine the relationships between socio-demographic characteristics (gender, age group, and education) and the behavioral outcomes reported in Table

2 (shopping-list use, leftover freezing, and affordability-driven bulk buying), chi-square tests of independence were also conducted, with statistical significance set at $p < 0.05$; the results of these tests are reported in the Inferential Analysis of Socio-Demographic and Behavioral Relationships subsection. Gender was significantly associated with shopping-list use, $\chi^2(4) = 18.491$, $p = 0.0010$; leftover freezing, $\chi^2(2) = 11.063$, $p = 0.0040$; and affordability-driven bulk buying, $\chi^2(2) = 15.554$, $p = 0.0004$.

Age group was not significantly associated with shopping-list use, $\chi^2(12) = 13.634$; $p = 0.3247$; leftover freezing, $\chi^2(6) = 5.232$; $p = 0.5145$, or affordability-driven bulk buying, $\chi^2(6) = 2.652$, $p = 0.8510$.

Education level was not significantly associated with shopping-list use, $\chi^2(6) = 11.363$, $p = 0.0778$, leftover freezing, $\chi^2(3) = 1.623$, $p = 0.6542$, or affordability-driven bulk buying, $\chi^2(3) = 5.132$, $p = 0.1624$.

2.6. Methodological Scope and Limitation

In West African urban food systems, grocery shopping, household provisioning, and daily kitchen management are primarily driven by women (Duflo, 2012; Sunday et al., 2022; Pal et al., 2023). Because the survey sample consists predominantly of men and highly educated, the data reflect the views of household heads rather than the daily kitchen routines of women (Cantaragiu, 2019). The high share of postgraduate degree holders also indicates an affluent, upper-income sample bias. This group's structured behaviors, such as high shopping list compliance and regular leftover preservation, suggest that their resources are stable, especially for higher-income households with better baseline food literacy and the capacity to invest in private utilities (Block et al., 2016; Sunday et al., 2022). Thus, these findings can be considered reliable information about middle-to-high-income urban households but should not be extrapolated to low-income urban areas or rural areas, where infrastructure constraints are much higher than in urban areas (Sinyolo et al., 2016; Ogunbode and Aderinto, 2026). This demographic distribution is a known bias in digital survey formats in developing regions due to uneven internet access (Ziafati Bafarasat, 2021), so these findings should be viewed as a special case study on urbanization.

3. Results and Discussion

3.1. Socio-Demographic Baseline

To contextualize the behavioral data, Table 1 outlines the baseline descriptive statistics of the survey cohort.

Table 1
Socio-Demographic Profile of the Survey Sample

Parameter	Group	Percentage (%)	Systemic Context & Implications
Gender	Male	76.1 %	Reflects primary household financial heads rather than daily kitchen managers.
	Female	23.9 %	Historically manages meal preparation; underrepresented in this digital sample.
Education	Postgraduate	73.6 %	Correlates with higher income, resource stability, and baseline food literacy.
	Other	26.4 %	Represents mid-tier urban consumer segments with fewer financial buffers.
Age	41 - 50 Years	Highest Density	Established career professionals managing multi-person household budgets.

Empirical evidence shows that good consumer intentions are frequently undermined by a lack of public infrastructure. When looking at shopping motivation in the city, 66.3 % of urban consumers reported that affordability is the driving force. In a volatile economy, households tend to purchase more goods to keep up with market price inflation (Bellemare, 2015; Sunday et al., 2022). However, the survey reveals a paradox between intentions and outcomes: 69.5 % of respondents say they are highly disciplined, and 44.2 % report keeping track of leftovers to prevent waste. In behavioral research, self-reported data on negative habits (such as throwing away food) are often distorted by Social Desirability Bias (SDB), in which people over-report good behavior to conform to social norms (Stancu et al., 2016; Elimelech et al., 2019). Yet even with SDB in play, there remains a structural gap between what consumers intend to do and the actual waste outcomes (Stefan et al., 2013). This breakdown aligns with the "Two-Route" approach to consumer food waste behavior (Stancu et al., 2016). Even when consumers want to live a healthy life (the behavioral route), infrastructure failures within the home can cause stored foods to spoil prematurely in refrigerators and freezers, for example due to municipal power cuts (Graham and Marvin, 2001; Sunday et al., 2022). This indicates that food waste in a developing city is an institutional problem, rather than purely a psychological one (Monstadt, 2009). Traditional behavior models, such as the Theory of Planned Behavior (TPB), assume that consumer waste is entirely voluntary and driven by personal choice or lifestyle (Ajzen, 1991; Tsai et al., 2020). The findings here challenge that assumption and show that positive intentions can be completely canceled out by systemic utility failures (Niles et al., 2020).

These results diverge in an important respect from earlier consumer behavior studies conducted in high-income contexts, which typically attribute the intention-behavior gap in food waste primarily to psychological factors such as time pressure, portion misjudgment, or a low priority placed on waste reduction (Quested et al., 2013; Aschemann-Witzel et al., 2015). In the present

sample, by contrast, the gap is better explained by the physical unavailability of reliable cold storage than by any deficit in consumer motivation or awareness. This is consistent with, and extends, prior Nigerian and Sub-Saharan African evidence that infrastructural constraints, rather than attitudes, are the binding constraint on household food preservation (Sunday et al., 2022; Ogunbode and Aderinto, 2026). It also suggests that food-waste interventions transplanted directly from high-income, infrastructure-secure contexts are unlikely to be effective in similar West African urban settings without accompanying investment in reliable power and cold-chain infrastructure.

Table 2 presents household compliance rates across core domestic routines to illustrate where intentions collide with infrastructure vulnerabilities.

Table 2
Household Planning Practices and Structural Vulnerabilities

Household Practice	Compliance (%)	Key Structural Vulnerability Vector
Shopping List Utilization	69.5 %	Market price shocks forcing unexpected bulk substitutions
Leftover Freezing	44.2 %	Municipal power grid failures causing domestic storage failure
Affordability-Driven Bulk Buying	66.3 %	Macro-inflation forcing high-volume storage in fragile utility settings

3.2. Cross Stage Spillover Effect: Linking Loss and Waste

The survey data show a compelling conceptual connection between urban consumers and the causes of food spoilage. When asked to cite household food waste drivers, many people in the sample identified macro-level supply chain problems, stating that the "lack of good roads" (12.6 %) and "lack of modern processing equipment" are fundamental issues. In this sense, these are upstream food loss problems that occur during harvest, processing, and long-distance transport (FAO, 2011; Hodges et al., 2011). The fact that downstream

consumers identify poor transit networks as a direct cause of household waste shows that poor supply chain conditions spoil perishable goods before they can be sold (Kitinoja et al., 2011). Fresh produce is transported poorly on poorly maintained roads and is physically bruised and heat damaged (Sunday et al., 2022; Mawoneke, 2025). By the time it arrives at urban retail markets, its shelf life is already compromised, leading to rapid spoilage at home and forcing consumers to throw it away (Akram et al., 2023; Mawoneke, 2025). This link shows that reducing urban food waste requires more than behavior change: it requires system-level investment to maintain the cold chain during transportation (Garrone et al., 2014).

This spillover pattern differs from the classical upstream/downstream dichotomy established in earlier food-loss-and-waste literature, which tends to treat post-harvest loss (occurring before the point of retail sale) and consumer waste (occurring after purchase) as analytically and empirically separate phenomena (Parfitt et al., 2010; FAO, 2011). The present findings instead suggest a continuum in fast-urbanizing Sub-Saharan African cities, in which upstream transport and market-infrastructure failures directly shape the physical condition of food at the point of purchase and, in turn, the likelihood of its being wasted at home. This complements recent calls to move away from siloed food-loss and food-waste research agendas (Mawoneke, 2025) and represents, to our knowledge, one of the first attempts to empirically quantify consumer-perceived linkages between the two stages within a single urban West African sample. (Abass et al., 2014)

3.3. Inferential Analysis of Socio-Demographic and Behavioral Relationships

To move beyond descriptive indicators and more directly test the relationships between socio-demographic characteristics and household behavior, chi-square tests of independence were conducted between gender, age group, and education level, on the

one hand, and the three core behavioral indicators reported in Table 3 (shopping-list use, leftover freezing, and affordability-driven bulk buying), on the other, with statistical significance set at $p < 0.05$. Education level was significantly associated with leftover-freezing behavior, $\chi^2(df) = (8) \quad p = (1.564)$, with postgraduate-educated respondents reporting higher compliance than respondents with lower educational attainment.

The chi-square findings indicate that gender was related to all three specified behaviors in the observed sample. In particular, the associations with shopping-list use, leftover freezing, and affordability-driven bulk buying reached conventional statistical significance. These results suggest that household food-management practices may differ by gender in this sample. However, the analysis is associative and does not establish that gender itself causes the observed differences.

Age group and education level did not show statistically significant associations with any of the three behaviors at the 5 % level. The absence of statistical significance should not be taken to mean that age or education have no practical influence. Some age and education categories were small, which reduces statistical power and produces sparse contingency-table cells.

The interpretation of the affordability-driven bulk-buying result requires particular care because the outcome was operationalized as the joint presence of two responses in the original questionnaire: affordability as the food-choice influence and excessive buying style as a reported cause of food waste. It is therefore a derived behavioral indicator rather than a single directly worded survey item.

This study has several limitations that should be considered when interpreting its findings. First, the nonprobability, convenience-based online sampling strategy produced a sample skewed toward male, highly educated, higher-income respondents, which limits the generalizability of the findings to the broader urban population and, in particular, to women, who are

Table 3
Statistical analysis of the nine tests using chi-square test of independence

Demographic variable	Outcome	χ^2	df	p	N	Minimum expected
Gender	Shopping-list use	18.491	4	0.0010	315	0.130
Gender	Leftover freezing	11.063	2	0.0040	317	0.445
Gender	Affordability-driven bulk buying	15.554	2	0.0004	317	0.063
Age group	Shopping-list use	13.634	12	0.3247	313	0.262
Age group	Leftover freezing	5.232	6	0.5145	315	0.895
Age group	Affordability-driven bulk buying	2.652	6	0.8510	315	0.127
Education	Shopping-list use	11.363	6	0.0778	313	0.393
Education	Leftover freezing	1.623	3	0.6542	315	1.343
Education	Affordability-driven bulk buying	5.132	3	0.1624	315	0.190

A p-value below 0.05 was considered statistically significant.

primarily responsible for day-to-day food provisioning in West African households (Duflo, 2012; Cantaragiu, 2019), and to lower-income groups with more limited internet access (Ziafati Bafarasat, 2021). Second, the cross-sectional design captures behavior and perceptions at a single point in time and cannot establish causal relationships between infrastructural failures and household food waste; longitudinal or experimental designs would be needed to do so. Third, key behavioral variables (e.g., shopping-list use, leftover freezing) were self-reported, which may be subject to social desirability bias, potentially inflating reported compliance with recommended food-preservation practices (Elimelech et al., 2019). Finally, while the qualitative open-ended responses enriched the interpretation of the quantitative results, the relatively small number of qualitative respondents limits the depth of thematic saturation achieved.

4. Conclusion

This study demonstrates that post-consumer food waste in urban Nigeria is an institutional problem driven by household choices and infrastructure deficiencies. Although urban consumers are strongly committed to food preservation, with extensive use of shopping lists and efforts to preserve unwanted food, their attempts often fall short because of power grid outages and transport bottlenecks. The demographic profile of the sample (76.1 % male, 73.6 % postgraduate) suggests that this is an educated, middle-to high-income urban group, which is the focus of the research. To reduce urban food waste, policy interventions need to move beyond consumer psychology and address structural issues in the food supply chain more effectively (Godfray et al., 2010).

Beyond its empirical findings, this study contributes to the theoretical understanding of consumer food waste by showing that individual-level behavioral models such as the Theory of Planned Behavior (Ajzen, 1991) are, on their own, insufficient to explain food-waste outcomes in infrastructure-constrained urban settings. By empirically documenting a cross-stage spillover effect through which upstream logistical and municipal failures translate into downstream household waste, the study extends the "Two-Route" framework of consumer food-waste behavior (Stancu et al., 2016) to explicitly incorporate structural and infrastructural determinants alongside psychological ones. This socio-technical perspective, which draws on the literature on infrastructure governance (Graham and Marvin, 2001; Monstadt, 2009), offers a theoretical bridge between the largely separate bodies of research on upstream post-harvest loss in developing countries and downstream consumer waste in high-income countries, and provides a conceptual

basis for future studies that model food waste as a joint function of household behavior and public-service reliability.

5. Recommendations

To reduce sampling biases in regional literature, future research should move beyond digital convenience sampling. Field based, stratified random sampling across a wider range of socio-economic urban neighborhoods will be needed (Bryman, 2016; Ziafati Bafarasat, 2021). This approach improve understanding of the waste dynamics and daily lives of low-income households and primary food handlers, and will generate a more accurate dataset for municipal planning (Thi et al., 2015; Jibril et al., 2018).

To reduce crop damage during transit and protect food before it enters urban markets, technical policy should prioritize developing affordable storage methods. Purdue Improved Crop Storage (PICS) triple-layer hermetic bags, small-scale metal silos, and decentralized, solar-powered cold hubs at key transit points can reduce post-harvest transport losses by more than 60 % in Sub-Saharan Africa (Baoua et al., 2012; Mawoneke, 2025).

Overall, the results support retaining the perceived-barriers items as a reasonably coherent set, while treating the planning-practices indicators primarily as separate behavioral measures unless the study protocol includes a validated multi-item planning-practices scale. For future analyses, rare demographic categories should be reviewed before inferential testing, and a sensitivity analysis using substantively justified category collapsing or exact/Monte Carlo methods would strengthen the robustness of the chi-square conclusions.

6. Consumer-Level Behavioral and Educational Programs

At the household level, structural upgrades such as stabilizing the electric grid need to be accompanied by food literacy campaigns (Abrahamse and Steg, 2009). Studies have shown that well-designed educational campaigns focused on portion planning, proper home storage setups, and the distinction between quality-based "best before" dates and safety-based "use by" dates are low-cost and significantly beneficial for reducing urban domestic waste margins (Principato et al., 2015; Pal et al., 2023; Miti et al., 2025; Ogunbode and Aderinto, 2026).

References

Abass, A. B., Wanjala, G., Fuchs, M., Karungi, J., Peter, A., & Bekunda, M. (2014). Post-harvest food losses

- in a maize-based farming system of semi-arid eastern Kenya: Post-harvest strategies. *Journal of Stored Products Research*, 57, 49-57, <https://doi.org/10.1016/j.jspr.2013.12.004>,
- Abrahamse W., Steg L., How do socio-demographic and psychological factors relate to households' direct and indirect energy use and savings?, *Journal of Economic Psychology*, 30 (5), 2009, 711-720, <https://doi.org/10.1016/j.joep.2009.05.006>,
- Affognon H., Mutungi C., Sanginga P., Borgemeister C., Unpacking Postharvest Losses in Sub-Saharan Africa: A Meta-Analysis, *World Development*, 66, 2015, 49-68, <https://doi.org/10.1016/j.worlddev.2014.08.002>,
- Ajzen I., The theory of planned behaviour, *Organizational Behavior and Human Decision Processes*, 50 (2), 1991, 179-211, [https://doi.org/10.1016/0749-5978\(91\)90020-T](https://doi.org/10.1016/0749-5978(91)90020-T),
- Akram H. W., Akhtar S., Ahmad A., Anwar I., Sulaiman M. A. B. A., Developing a conceptual framework model for effective perishable food cold-supply-chain management based on structured literature review, *Sustainability*, 15 (6), 2023, 4907, <https://doi.org/10.3390/su15064907>,
- Aschemann-Witzel J., de Hooze I., Amani P., Bech-Larsen T., Oostindjer M., Consumer-Related Food Waste: Role of Food Marketing and Retailers and Potential for Action, *Sustainability*, 7 (6), 2015, 6457-6477, <https://doi.org/10.3390/su7066457>,
- Baoua I. B., Margam V., Amadou L., Murdock L. L., Performance of triple bagging hermetic technology for postharvest storage of cowpea grain in Niger, *Journal of Stored Products Research*, 51, 2012, 81-85, <https://doi.org/10.1016/j.jspr.2012.07.003>,
- Bellemare M. F., Rising food prices, food price volatility, and social unrest, *American Journal of Agricultural Economics*, 97 (1), 2015, 1-21, <https://doi.org/10.1093/ajae/aau038>,
- Bello U., Gummi, U. M., Hassan, A., Maria, A., Abubakar, A. M., Zoramawa, Bello L., Food Price Dynamics and Quality of Life: A Survey of Household's Perception in Sokoto State, Nigeria, *American Journal of Economics*, 10 (1), 2020, 37-46,
- Block L. G., Grier S. A., Childers T. L., Davis B., Ebert J. E., Kumanyika S., Pettigrew S., From nutrients to nurturance: A conceptual framework of food well-being, *Journal of Public Policy & Marketing*, 30 (1), 2016, 5-13, <https://doi.org/10.1509/jppm.30.1.5>,
- Bryman A., Social research methods (5th ed.), Oxford University Press, 2016, 784, ISBN-10: 0199689458,
- Cantaragiu R., The impact of gender on food waste at the consumer level, *Studia Universitatis "Vasile Goldiş" Arad - Economics Series*, 29 (4), 2019, 41-57, <https://doi.org/10.2478/sues-2019-0017>,
- Dufflo E., Women empowerment and economic development, *Journal of Economic Literature*, 50 (4), 2012, 1051-1079, <https://doi.org/10.1257/jel.50.4.1051>,
- Elimelech E., Ert E., Ayalon O., Exploring the drivers behind self-reported and measured food wastage, *Sustainability*, 11 (20), 2019, 5677, <https://doi.org/10.3390/su11205677>,
- FAO, Global food losses and food waste - Extent, causes and prevention, Rome, 2011, 29,
- Garrone P., Melacini M., Perego A., Opening the black box of food waste reduction, *Food Policy*, 46 (C), 2014, 129-139, <https://doi.org/10.1016/j.foodpol.2014.03.014>,
- Godfray H. C. J., Beddington J. R., Crute I. R., Haddad L., Lawrence D., Muir J. F., Toulmin C., Food security: The challenge of feeding 9 billion people, *Science*, 327 (5967), 2010, 812-818, <https://doi.org/10.1126/science.1185383>,
- Graham S., Marvin S., Splintering Urbanism: Networked Infrastructures, Technological Mobilities and the Urban Condition, (1st Edition), Routledge, 2001, 512, ISBN: 9780415189651, <https://doi.org/10.4324/9780203452202-101>,
- Hodges R. J., Buzby J. C., Bennett B., Postharvest Losses and Waste in Developed and Less Developed Countries: Opportunities to Improve Resource Use, *Journal of Agricultural Science*, 149 (S1), 2011, 37-45, <https://doi.org/10.1017/S0021859610000936>,
- Jibril, A., Mustapha, A., & Ahmed, S. (2018). Municipal solid waste management metrics in secondary urban centers of Northern Nigeria. *African Journal of Environmental Science*, 12(4), 88-101,
- Kilembe W., Vulla K. E., Mihafu F., Chandrasekaran C., Transforming Food Systems: A Review of Sustainable Approaches to Minimize Food Loss and Waste, *Food Science & Nutrition*, 13 (11), 2025, e71167, <https://doi.org/10.1002/fsn3.71167>,
- Kitinjo L., Saran S., Roy S. K., Kader A. A., Postharvest technology for developing countries: Challenges and opportunities in research, outreach and advocacy, *Journal of the Science of Food and Agriculture*, 91 (4), 2011, 597-603, <https://doi.org/10.1002/jsfa.4295>,
- Mawoneke K. G., Rusike T., Makumbirofa H., Mukwidigwi J., From farm to fork: a review of strategies for sustainable reduction of post-harvest losses in Sub-Saharan Africa, *Cogent Food & Agriculture*, 11 (1), 2025, 2588851, <https://doi.org/10.1080/23311932.2025.2588851>,
- Miti N., Naicker A., Grobbelaar H., Pal I., Effectiveness of food literacy on household food waste in the KwaDukuza municipality, South Africa, *Frontiers in*

- Sustainable Food Systems, 9, 2025, 1556003, <https://doi.org/10.3389/fsufs.2025.1556003>,
- Monstadt J., Conceptualizing the Political Ecology of Urban Infrastructures: Insights from Technology and Urban Studies, Environment and Planning A: Economy and Space, 41 (8), 2009, 1924-1942, <https://doi.org/10.1068/a4145>,
- Niles M. T., Bertmann F., Belarmino E. H., Wentworth T., Biehl E., Neff R., The Early Food Insecurity Impacts of COVID-19, Nutrients, 12 (7), 2020, 2096, <https://doi.org/10.3390/nu12072096>,
- Ogunbode, T. O., Aderinto J. O., Evaluation of household solid waste drivers, characteristics, management and its implications for sustainable environmental quality in Iwo, Nigeria. Frontiers in Sustainable Cities, 8, 2026, 1812929, <https://doi.org/10.3389/frsc.2026.1812929>,
- Pal I., Naicker A., Grobbelaar H., Investigating the behaviour and practices of household food waste disposal of consumers in the KwaDukuza Municipality, South Africa, Current Research in Nutrition and Food Science Journal, 11 (3), 2023, 1229-1242, <https://doi.org/10.12944/CRNFSJ.11.3.27>,
- Parfitt J., Barthel M., Macnaughton S., Food Waste within Food Supply Chains: Quantification and Potential for Change to 2050, Philosophical Transactions of the Royal Society B: Biological Sciences, 365 (1554), 2010, 3065-3081, <https://doi.org/10.1098/rstb.2010.0126>,
- Principato L., Secondi L., Pratesi C. A., Reducing food waste: an investigation on the behaviour of Italian youths, British Food Journal, 117 (2), 2015, 731-748, <https://doi.org/10.1108/BFJ-10-2013-0314>,
- Quested T. E., Marsh E., Stunell D., Parry A. D., Spaghetti soup: The behavioral dynamics of domestic food waste, Resources, Conservation and Recycling, 77, 2013, 43-51, <https://doi.org/10.1016/j.resconrec.2013.04.011>,
- Reardon T., Timmer C. P., Barrett C. B., Berdegue J., The rise of supermarkets in Africa, Asia, and Latin America, American Journal of Agricultural Economics, 85 (5), 2003, 1140-1146, <https://doi.org/10.1111/j.0092-5853.2003.00520.x>,
- Sinyolo S., Mudhara M., Wale E., To what extent does dependence on social grants affect smallholder farmers' incentives to farm? Evidence from KwaZulu-Natal, South Africa, African Journal of Agricultural and Resource Economics, 11 (2), 2016, 154-165,
- Stancu V., Haugaard P., Lähteenmäki, L., Determinants of consumer food waste behaviour: Two routes to food waste, Appetite, 96, 2016, 7-17, <https://doi.org/10.1016/j.appet.2015.08.025>,
- Stefan V., van Herpen E., Tudoran A. A., Lähteenmäki L., Avoiding food waste by Romanian consumers: The importance of planning and shopping routines, Food Quality and Preference, 28 (1), 2013, 375-381, <https://doi.org/10.1016/j.foodqual.2012.11.001>,
- Sunday C. O., Sowunmi F. A., Obayelu O. A., Awoyemi A. E., Omotayo A. O., Ogunniyi A. I., Disentangling drivers of food waste in households: Evidence from Nigeria, Foods, 11 (8), 2022, 1103, <https://doi.org/10.3390/foods11081103>,
- Thi N. B. D., Kumar G., Lin C.-Y., An overview of food waste management in developing countries: Current status and future perspective, Journal of Environmental Management, 157, 2015, 220-229, <https://doi.org/10.1016/j.jenvman.2015.04.022>,
- Tsai W. C., Chen X., Yang C., Consumer Food Waste Behavior among Emerging Adults: Evidence from China, Foods, 9 (7), 2020, 961, <https://doi.org/10.3390/foods9070961>,
- Tschirley D., Snyder J., Dolislager M., Reardon T., Haggblade S., Goeb J., Meyer F, Africa's unfolding diet transformation: Implications for agrifood system employment, Journal of Agribusiness in Developing and Emerging Economies, 5 (2), 2015, 102-136, <https://doi.org/10.1108/JADEE-01-2015-0003>,
- Ziafati Bafarasat A, Collecting and validating data: A simple guide for researchers, Advance Preprint, 2021, <https://doi.org/10.31124/advance.13637864.v1>,

Sociotehnička arhitektura otpada od hrane na nivou potrošača: empirijska analiza dinamike urbanih domaćinstava u Nigeriji

Aliyu Mansur Sulaiman ^{a, #}, Miroslav Popović ^a, Dragoljub Bajić ^b, Mustapha Umar ^c,
Rafiu Olalekan Yusuf ^d

^a Univerzitet Singidunum, Departman za životnu sredinu i održivi razvoj, Beograd, Srbija

^b Univerzitet u Beogradu, Rudarsko-geološki fakultet, Beograd, Srbija

^c Nigerijski institut za kožu i naučnu tehnologiju, Departman za laboratorijsku naučnu tehnologiju, Zaria, Kaduna, Nigerija

^d Univerzitet Ahmadu Belo u Zarii, Departman za geografiju i upravljanje životnom sredinom, Kaduna, Nigerija

INFORMACIJE O RADU

Primljen 02 jul 2026
Prihvaćen 31 avgust 2026

Originalan rad

Ključne reči:

Otpad od hrane
Gubici nakon žetve
Urbana infrastruktura
Sigurnost hrane
Podсахarska Afrika

Citiranje: Sulaiman A. M., Popović M., Bajić D., Umar M., Yusuf R. O., The Socio-Technical Architecture of Post-Consumer Food Waste: An Empirical Evaluation of Urban Household Dynamics in Nigeria, *Recycling and Sustainable Development*, 19 (2), 2026, 15-23.
<https://doi.org/10.30544/RSD116>



I Z V O D

Tradicionalni pristup problematici hrane u okviru poljoprivrednog sektora pravi razliku između gubitaka hrane u ranijim fazama lanca snabdevanja, karakterističnih za zemlje u razvoju, i otpada od hrane koji nastaje na nivou krajnjih potrošača, karakterističnog za zemlje sa visokim prihodima. Međutim, ubrzana urbanizacija i promene ekonomskih uslova u podsaharskoj Africi stvaraju tranziciono okruženje u kojem su nastojanja domaćinstava da spreče rasipanje hrane otežana poremećajima u funkcionisanju komunalne infrastrukture i strukturnim ograničenjima. U ovom radu ispitani su faktori ponašanja, socio-demografski obrasci i infrastrukturne prepreke koji dovode do nastanka otpada od hrane na nivou potrošača u urbanim domaćinstvima u Nigeriji.

Primenjeno je istraživanje mešovitim metodama, pri čemu su za određivanje veličine uzorka korišćeni standardni modeli za konačnu populaciju. U uzorku prikupljenom putem digitalnih kanala distribucije dominirali su muškarci (76,1 %) i obrazovani ispitanici (73,6 %), zbog čega je uzorak bio pristrasan u korist visokoobrazovanih učesnika. Empirijski podaci pokazuju da, iako je 66,3 % urbanih potrošača izrazito usmereno na cenovnu pristupačnost hrane i kupuje veće količine kako bi se zaštitilo od rasta cena hrane, često prijavljivane navike planiranja, kao što su korišćenje spiska za kupovinu (69,5 %) i zamrzavanje ostataka hrane (44,2 %), uglavnom gube svoju efikasnost usled prekida u snabdevanju električnom energijom u urbanim područjima, koji dovode do kvarenja hrane uskladištene u domaćinstvima ubrzo nakon kupovine. Utvrđena je statistički značajna povezanost pola sa korišćenjem spiska za kupovinu, $\chi^2(4) = 18,491$, $p = 0,0010$; zamrzavanjem ostataka hrane, $\chi^2(2) = 11,063$, $p = 0,0040$; i kupovinom većih količina hrane motivisanom njenom cenovnom pristupačnošću, $\chi^2(2) = 15,554$, $p = 0,0004$. Starosna grupa i nivo obrazovanja nisu bili statistički značajno povezani sa ovim oblicima ponašanja (sve vrednosti $p > 0,05$).

Dobijeni rezultati ukazuju na to da otpad od hrane u urbanim sredinama zemalja u razvoju nije samo posledica izbora potrošača, već predstavlja i strukturni problem. Smanjenje količine komunalnog otpada u urbanim sredinama i rešavanje problema obezbeđivanja hrane za stanovništvo ovog regiona zahtevaju pristupe kojima se istovremeno unapređuje prehrambena pismenost gradskog stanovništva i podstiču javna ulaganja u pouzdanu komunalnu elektroenergetsku infrastrukturu i hladne lance sa napajanjem solarnom energijom.