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Urbanization Exposure and Consumer Behaviour Towards Ready-to-Eat Meals: The Mediating Role of Sustainability Considerations and the Moderating Role of Socio-Demographic Factors in Bengaluru, India

Mohammed Azeem S[1],Dr. Syed Ahmed Wajih[2]
[1]Research Scholar School of commerce Presidency University, Bengaluru
Email ID: mohammed.20243com0021@presidencyuniversity.in
ORCID: 0009-0001-3762-690X
[2]Associate Professor School of commerce Presidency University, Bengaluru
Email ID: syed.wajih@presidencyuniversity.in
ORCID- 0000-0001-5143-558X

ABSTRACT
Purpose: Rapid urbanization in emerging economies is reshaping how households procure and consume food, yet consumer research has rarely treated urbanization as an individual-level, measurable exposure. This study examines whether urbanization exposure drives purchasing and consumption of ready-to-eat (RTE) meals, whether sustainability considerations transmit part of this effect, and whether age, gender and monthly household income condition the direct relationship.
Design/methodology/approach: Drawing on the stimulus–organism–response (S-O-R) framework, resource-constraint views of convenience food consumption and attitude–behaviour–context theory, a mediation model with moderation of the direct path was developed. Survey data were obtained through convenience sampling across 16 localities of Bengaluru City; of 520 responses collected, 478 eligible and usable responses were retained after screening. Urbanization exposure (urban built environment, retail and digital accessibility, urban lifestyle constraints and changing household patterns) and RTE consumer behaviour (purchasing and consumption) were specified as reflective–reflective higher-order constructs and estimated with partial least squares structural equation modelling (PLS-SEM) using the embedded two-stage approach in SmartPLS 4 with 5,000 bootstrap subsamples.
Findings: Urbanization exposure had a strong positive effect on RTE consumer behaviour ($\beta = 0.640$, $p < 0.001$) and on sustainability considerations ($\beta = 0.547$, $p < 0.001$). Sustainability considerations exerted a small positive effect on RTE behaviour ($\beta = 0.088$, $p = 0.039$), producing a significant but modest complementary partial mediation (indirect $\beta = 0.048$, 95% CI [0.002, 0.095]; VAF ≈ 7%). Age significantly and negatively moderated the direct path ($\beta = -0.065$, $p = 0.034$), the effect being stronger among younger consumers; monthly household income showed a marginal positive moderation ($\beta = 0.056$, $p = 0.059$), whereas gender did not ($\beta = 0.100$, $p = 0.123$). The model explained 47.9% of the variance in RTE consumer behaviour.
Research limitations/implications: The cross-sectional, single-city, non-probability design limits causal and statistical generalisation; the weak sustainability pathway falls below the minimum effect detectable with 80% power and should be interpreted cautiously.
Practical implications: RTE manufacturers, quick-commerce platforms and urban policymakers should treat urban time-poverty and digital access as the primary demand engine, while converting rising — but behaviourally weak — sustainability considerations into choice through credible packaging, portion and labelling interventions at the point of digital purchase.
Originality/value: The study operationalises urbanization as a multidimensional respondent-level exposure, models sustainability considerations as an evaluative mechanism rather than a purchase brake, and offers rare emerging-market evidence on the boundary conditions of urban convenience food consumption.

Keywords: Urbanization exposure; Ready-to-eat meals; Convenience food; Sustainability considerations; Consumer behaviour; PLS-SEM; Higher-order constructs; Moderated relationships; India

1. INTRODUCTION

Urbanization is among the most consequential structural forces acting on food systems in emerging economies. The United Nations projects that the urban share of the world population will continue to rise through mid-century, with India contributing one of the largest absolute increases

in urban dwellers (United Nations, 2019). Rapid economic growth in India has already transformed both the level and the composition of food demand (Gandhi & Zhou, 2014), and household panel evidence shows that three-quarters of urban Indian households now purchase more than ten groups of processed foods, with ultra-processed purchases growing over time (Tak et al., 2022). Within this broader nutrition transition (Popkin et al., 2012), commercially prepared ready-to-eat (RTE) meals — packaged rice meals, retort curries, meal bowls and chilled or frozen trays that require no cooking from scratch — have moved from a niche to an everyday option for time-pressed urban consumers (Mishra & Sinija, 2008; Funde & Shrivastava, 2023).

A substantial body of research explains convenience food consumption through individual resource constraints and orientations: perceived time scarcity, cooking skills, effort and convenience orientation (Scholderer & Grunert, 2005; Brunner et al., 2010; Botonaki et al., 2009; Raimundo et al., 2020; Imtiyaz et al., 2023). Studies in India have added psychological, social, sensory and marketing determinants (Imtiyaz et al., 2021a, 2021b, 2022) and documented changing food choices among the urban middle class (Kumar et al., 2022). Yet urbanization itself is usually invoked as an *explanatory backdrop* — the reason why convenience matters — rather than measured as a construct whose intensity varies across consumers within the same city. A recent bibliometric mapping of convenience food research identifies urbanization, lifestyle change and digital retail as drivers of scholarly interest but also shows that these drivers are rarely operationalised empirically (Sequeira et al., 2026). This is a conceptual and methodological gap: residents of the same metropolitan area experience very different densities, retail and delivery infrastructures, commuting burdens and household routines, and these differences should matter for food provisioning.

A second, increasingly salient tension concerns sustainability. RTE meals are packaging-intensive, generate plastic waste and raise questions about sourcing and portion-related food waste (Otto et al., 2021; Hirth et al., 2021). Consumers in urban settings are exposed to more environmental information, eco-labels and sustainability claims (Izcue & Palmeiro-Silva, 2026; Büttner et al., 2024), and emerging-market evidence indicates growing interest in sustainable packaging and green delivery options for RTE food (Sen et al., 2026; Bize & Qiao, 2026; Sharma et al., 2026). However, convenience and sustainability frequently pull in opposite directions: convenience-oriented lifestyles are associated with higher household food waste (Mallinson et al., 2016; Aschemann-Witzel et al., 2018), and the time constraints of large cities can override eco-friendly intentions (Ricci et al., 2018; Pickering et al., 2026). Whether urbanization raises sustainability considerations, and whether those considerations restrain, redirect or accompany RTE consumption, remains empirically unresolved — particularly outside Europe.

Third, the effect of urban living on food behaviour is unlikely to be uniform. Prior studies report that younger, male, higher-income and smaller households are more likely to consume chilled ready meals, meal kits or online-delivered food (Reed et al., 2003; Boyar et al., 2025; Lanfranchi et al., 2026), while socio-demographic characteristics shape convenience food use both directly and indirectly (Botonaki et al., 2009). Few studies, however, test socio-demographics as *boundary conditions* of the urbanization–consumption relationship rather than as control variables.

Against this background, the present study addresses three research questions in Bengaluru — India's technology capital and one of its fastest-growing metropolitan regions: (RQ1) Does respondent-level urbanization exposure influence purchasing and consumption behaviour towards RTE meals? (RQ2) Do sustainability considerations mediate this relationship? (RQ3) Do age, gender and monthly household income moderate the direct effect of urbanization exposure on RTE consumer behaviour? Using PLS-SEM with higher-order constructs on 478 consumers, the study makes three contributions. First, it conceptualises and validates urbanization exposure as a multidimensional, individual-level construct comprising the urban built environment, retail and digital accessibility, urban lifestyle constraints and changing household patterns. Second, it shows that sustainability considerations are activated by urban exposure but translate only weakly — and positively rather than negatively — into RTE behaviour, offering an emerging-market perspective on the attitude–behaviour gap (Carrington et al., 2010; Kollmuss & Agyeman, 2002). Third, it identifies which socio-demographic groups amplify the urbanization effect, informing segmentation by RTE brands, quick-commerce platforms and urban food policy.

The remainder of the paper is organised as follows. Section 2 develops the theoretical framework and hypotheses. Section 3 describes the method. Section 4 reports the measurement and structural model results. Section 5 discusses the findings, Section 6 sets out theoretical, managerial and policy implications, and Section 7 notes limitations and future research before the conclusion.

2. THEORETICAL BACKGROUND AND HYPOTHESIS DEVELOPMENT

2.1 Theoretical lens

The study integrates three complementary perspectives. The *stimulus–organism–response* (S-O-R) framework (Mehrabian & Russell, 1974) posits that environmental stimuli shape internal cognitive and affective states, which in turn drive behavioural responses; it has been applied widely to packaging, sustainability and RTE acceptance (Ghosh & Lahiri, 2026; Bize & Qiao, 2026; Qi et al., 2026). Here, urbanization exposure constitutes the environmental stimulus, sustainability considerations represent the organismic evaluative state, and RTE purchasing and consumption constitute the response. Second, the *resource-constraint and convenience-orientation* perspective (Scholderer & Grunert, 2005; Jabs & Devine, 2006) explains why time scarcity, effort and household organisation channel consumers towards prepared food, providing the mechanism for the direct path. Third, *attitude–behaviour–context* (ABC) theory (Guagnano et al., 1995; Stern, 2000) holds that pro-environmental considerations predict behaviour only when contextual forces are weak; when contextual pressures (such as urban time poverty) are strong, attitudes have limited behavioural traction. ABC theory therefore anticipates that

sustainability considerations may be activated by urban exposure without becoming a dominant driver of RTE behaviour.

2.2 Urbanization exposure and RTE consumer behaviour

Urbanization exposure is defined as the degree to which an individual's daily residential and lifestyle environment embodies the characteristics of intense urbanity. Four dimensions are distinguished. The *urban built environment* (residential and commercial density) concentrates food outlets and reduces the distance to prepared-food options (Verma et al., 2025). *Retail and digital accessibility* captures the availability of modern grocery formats and online grocery and delivery platforms, which have reshaped shopping trips and deliveries (Kim & Wang, 2024; Lanfranchi et al., 2026); market availability is itself a significant correlate of the intention to consume convenience-processed foods (Contini et al., 2018). *Urban lifestyle constraints* — work, study and commuting schedules that compress time for meal preparation — are the classic antecedent of convenience food use (Jabs & Devine, 2006; Imtiyaz et al., 2023; Raimundo et al., 2020). *Changing household patterns*, including asynchronous schedules and fewer shared meal-preparation times, weaken home-cooking routines (Oleschuk et al., 2023). Studies of urban daily life in the Global South show that such everyday contexts shift food provisioning from household-based preparation towards prepared and out-of-home options (Adeosun et al., 2022a, 2022b), and Irish evidence shows that urban residents are more likely to consume chilled ready meals (Reed et al., 2003). Accordingly:

H1. Urbanization exposure has a significant positive effect on consumer behaviour towards RTE meals.

2.3 Urbanization exposure and sustainability considerations

Urban environments intensify exposure to the environmental externalities of packaged food — visible plastic waste, delivery packaging, recycling infrastructure and sustainability communication — and to eco-labels and retailer claims (Otto et al., 2021; Izcue & Palmeiro-Silva, 2026). Consumers in emerging urban markets increasingly articulate expectations about eco-friendly packaging (Nguyen et al., 2020; Kaya, 2026), and persuasive corporate communication has been identified as a lever of sustainable packaged-food consumption in urbanising Asian markets (Tseng et al., 2020, 2021). Urban, educated and digitally connected consumers also encounter green delivery and packaging options at the point of online purchase (Sen et al., 2026). From an S-O-R standpoint, the denser informational and material stimuli of urban life should heighten the salience of packaging, waste, sourcing and environmental-impact considerations when evaluating RTE products. Thus:

H2. Urbanization exposure has a significant positive effect on sustainability considerations regarding RTE meals.

2.4 Sustainability considerations and RTE consumer behaviour

The direction of the sustainability–behaviour link is theoretically ambiguous. On one hand, environmental concern can reduce demand for packaging-intensive products or redirect it towards sustainable alternatives (De Canio et al., 2021; Drechsel et al., 2025). On the other hand, consumers who actively consider sustainability when evaluating RTE products are, by definition, engaged with the category; their considerations may shape *which* RTE products they buy (e.g., recyclable packaging, credible labels, appropriate portions) rather than *whether* they buy them (Stranieri et al., 2017; Ricci et al., 2018; Macdiarmid et al., 2021). Value–attitude–behaviour research likewise shows that some food-related values influence purchase behaviour directly while others are mediated by attitudes (Hauser et al., 2013). Because the questionnaire captured the extent to which sustainability attributes enter the evaluation of RTE meals, rather than anti-consumption intentions, a positive association is expected:

H3. Sustainability considerations have a significant positive effect on consumer behaviour towards RTE meals.

2.5 The mediating role of sustainability considerations

Combining H2 and H3, the S-O-R logic implies that part of the effect of urban exposure on RTE behaviour operates through the evaluative state it produces. Urban consumers are not only time-constrained; they are also embedded in information-rich retail environments where sustainability attributes are communicated and compared (Büttner et al., 2024; Berthold et al., 2024). ABC theory, however, suggests that this indirect pathway will be weaker than the direct contextual pathway because strong contextual constraints limit the behavioural traction of attitudes (Guagnano et al., 1995). Following Zhao et al. (2010), the mediation hypothesis is stated without presupposing full mediation:

H4. Sustainability considerations mediate the relationship between urbanization exposure and consumer behaviour towards RTE meals.

2.6 The moderating role of socio-demographic factors

Age. Younger urban consumers are more embedded in app-based food ecosystems and report greater acceptance of convenience and delivered food (Reed et al., 2003; Boyar et al., 2025; Lanfranchi et al., 2026), whereas qualitative evidence from older urban middle-class Indian consumers reveals reservations about processed foods and attachment to home-cooked meals (Kumar et al., 2022). Age may therefore alter how strongly urban exposure is converted into RTE behaviour. *Gender.* Traditional divisions of domestic food work imply that urban time pressure might translate differently into RTE use by men and women; at the same time, dual-career urban households may have narrowed such differences (Oleschuk et al., 2023). *Monthly household income.* Higher income relaxes the budget constraint on premium convenience products (Raimundo et al., 2020), and meal-kit and online delivery use rises with income (Boyar et al., 2025; Lanfranchi et al., 2026). Higher-income urban consumers should therefore be better able to act on urban convenience needs through purchasing RTE meals. Consistent with the conceptual model, moderation is specified on the direct path:

H5. Socio-demographic characteristics moderate the relationship between urbanization exposure and consumer

behaviour towards RTE meals, specifically **H5a** age, **H5b** gender and **H5c** monthly household income.

The model (Figure 1) is a mediation model with moderation of the direct path; it is not a moderated-mediation model. Because all respondents reside in one city, urbanization is measured as a respondent-level perceived exposure rather than as a city-wide rate that does not vary across individuals.

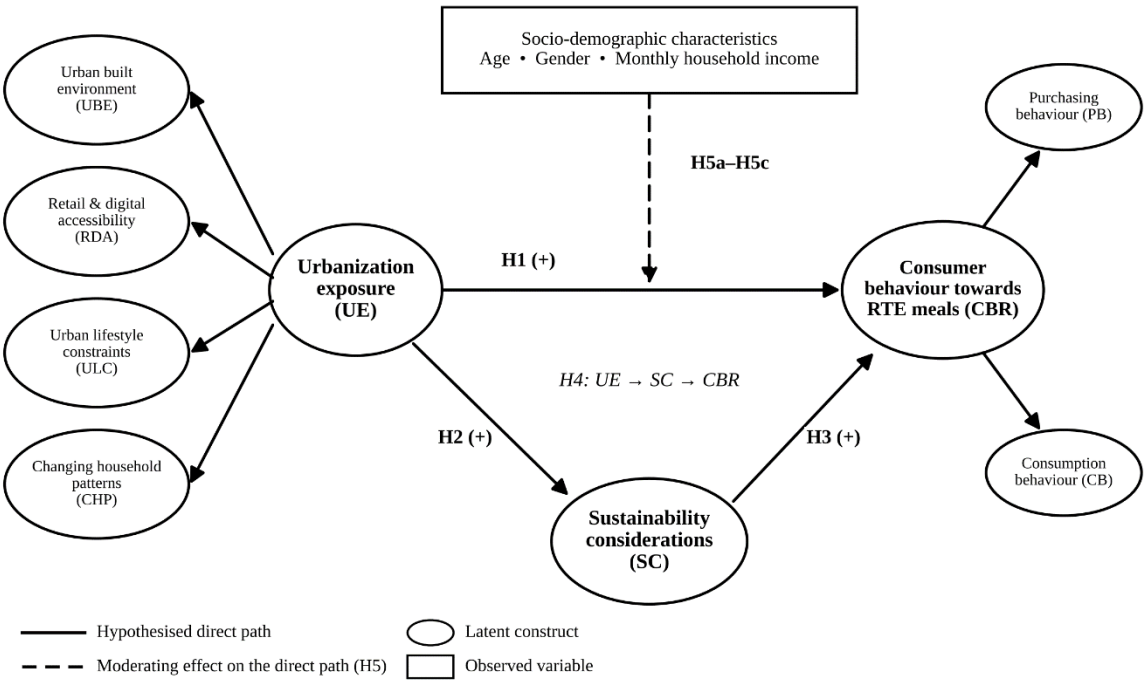


Figure 1. Conceptual model and hypotheses

Note: Ellipses denote latent constructs; the rectangle denotes observed socio-demographic moderators. UE and CBR are reflective–reflective higher-order constructs. UBE = urban built environment; RDA = retail and digital accessibility; ULC = urban lifestyle constraints; CHP = changing household patterns; PB = purchasing behaviour; CB = consumption behaviour. Source: Authors' elaboration.

3. RESEARCH METHODOLOGY

3.1 Research design and context

A cross-sectional, explanatory survey design was adopted. Bengaluru City was selected because it combines high-density information-technology corridors with established mixed residential wards, has among the highest penetration of online grocery and quick-commerce services in India, and hosts a large population of migrant professionals living in nuclear, shared or single-person households — conditions under which variation in individual urbanization exposure is substantial. RTE meals were defined for respondents as commercially prepared and packaged or pre-prepared meal products that can be consumed directly or after simple reheating (e.g., packaged rice meals, RTE curries and dal, meal bowls, chilled or frozen meal trays, packaged sandwiches, wraps and prepared salads); snacks, beverages, instant noodles requiring cooking, ready-to-cook kits and freshly prepared restaurant meals were explicitly excluded.

3.2 Sampling and data collection

In the absence of a sampling frame of RTE consumers, a non-probability convenience sampling technique was used. To limit the spatial clustering typical of convenience samples, data were collected across 16 localities spanning the city's eastern, south-eastern, southern, western and northern zones: eight high-density IT and commercial corridors (Indiranagar, Koramangala, BTM Layout, Bellandur, HSR Layout, Electronic City, Marathahalli, Whitefield) and eight established mixed residential wards (Jayanagar, Banashankari, Vijayanagar, Hebbal, Rajajinagar, JP Nagar, Malleshwaram, Yelahanka). A structured questionnaire was administered between 1 October and 12 November 2026.

Four screening questions preceded the main instrument: respondents had to be (S1) aged 18 years or above, (S2) resident in Bengaluru for at least six months, (S3) a purchaser or consumer of the defined RTE meals during the preceding three months, and (S4) willing to participate voluntarily. Of the 520 responses collected, 42 were removed because they failed one or more screening criteria, yielding 478 eligible and usable responses (usable rate = 91.92%). The retained data contained no missing values on the substantive or demographic items.

Sample adequacy was assessed with the inverse square-root method (Kock & Hadaya, 2018). With N = 478, the minimum path coefficient detectable at $\alpha = 0.05$ with 80% statistical power is $|\beta| = 0.114$ ($2.486/\sqrt{478}$). All hypothesised paths except sustainability considerations → RTE behaviour exceed this threshold; post-hoc power for those paths was 1.000. The implications of the smaller coefficient are discussed in Sections 4.3 and 7.

3.3 Measures

All substantive constructs were measured with multi-item scales adapted from the convenience food, food

environment and sustainable packaging literatures and refined for the RTE context (Table 1; full items in Appendix A). Urbanization exposure (UE) was operationalised as a second-order construct with four first-order dimensions, each measured with three items on a five-point agreement scale: urban built environment (UBE), retail and digital accessibility (RDA), urban lifestyle constraints (ULC) and changing household patterns (CHP). Sustainability considerations (SC) were measured with eight items covering packaging quantity, plastic waste, recyclability, responsible sourcing, portion-related food waste, environmental-impact information, comparative importance and credible environmental labels. Consumer behaviour towards RTE meals (CBR) was operationalised as a second-order construct comprising purchasing behaviour (PB) and consumption behaviour (CB), each measured with three frequency items over the previous three months (1 = never; 5 = two or more times per week). Using behavioural frequency rather than intention reduces the intention–behaviour gap common in food choice research. Age was captured in completed years, gender as a dummy (0 = male, 1 = female) and monthly household income as a seven-category ordinal variable (1 = below ₹25,000; 7 = ₹2,50,000 or above). The instrument was pre-tested for clarity, and the questionnaire assured anonymity and stated that there were no right or wrong answers, a procedural remedy against common method bias (Podsakoff et al., 2003).

Table 1. Construct operationalisation

Construct (code)	Order / mode	Items	Scale	Indicative sources
Urbanization exposure (UE)	Second-order, reflective–reflective	4 dimensions	—	Reed et al. (2003); Adeosun et al. (2022a)
Urban built environment (UBE)	First-order, reflective	3	5-point agreement	Verma et al. (2025)
Retail & digital accessibility (RDA)	First-order, reflective	3	5-point agreement	Contini et al. (2018); Kim & Wang (2024)
Urban lifestyle constraints (ULC)	First-order, reflective	3	5-point agreement	Jabs & Devine (2006); Imtiyaz et al. (2023)
Changing household patterns (CHP)	First-order, reflective	3	5-point agreement	Oleschuk et al. (2023); Botonaki et al. (2009)
Sustainability considerations (SC)	First-order, reflective	8	5-point agreement	Nguyen et al. (2020); Otto et al. (2021); Drechsel et al. (2025)
RTE consumer behaviour (CBR)	Second-order, reflective–reflective	2 dimensions	—	Brunner et al. (2010); Imtiyaz et al. (2021a)
Purchasing behaviour (PB)	First-order, reflective	3	5-point frequency	Brunner et al. (2010)
Consumption behaviour (CB)	First-order, reflective	3	5-point frequency	Brunner et al. (2010)
Moderators	Observed	Age; Gender; Income	Years; dummy; 7 brackets	Boyar et al. (2025); Lanfranchi et al. (2026)

3.4 Respondent profile

Table 2 summarises the sample. Respondents were aged 19–58 years (M = 32.04, SD = 8.16), with 52.09% men and 47.91% women. A large majority held a university degree (81.17%), and 82.01% were employed. Monthly household income clustered between ₹50,000 and ₹1,49,999 (71.55%). Nuclear families (69.67%), shared accommodation (16.95%) and single-person households (5.86%) together accounted for 92.47% of respondents. Online grocery and quick-commerce platforms were the leading purchase channel (38.91%), ahead of supermarkets (27.20%), and convenience and time saving (58.58% of cases), busy work or study schedules (50.42%) and limited time for cooking (47.49%) were the most frequently cited purchase reasons — descriptive evidence consistent with the time-scarcity and digital-access mechanisms underlying H1. The near-equal split between IT/commercial corridors (51.05%) and residential wards (48.95%), and between residents of five years or less (51.05%) and longer-term residents (48.95%), provides variance in urbanization exposure. The sample is younger, more educated and more affluent than the Bengaluru population as a whole, which reflects the profile of RTE category users but constrains generalisation (Section 7).

Table 2. Profile of respondents (N = 478)

Variable	Category	n	%
Age (years)	18–25	116	24.27
	26–35	203	42.47
	36–45	132	27.62

Variable	Category	n	%
	46 and above	27	5.65
Gender	Male	249	52.09
	Female	229	47.91
Education	Higher secondary / Diploma–ITI	90	18.83
	Undergraduate	212	44.35
	Postgraduate / Doctoral	176	36.82
Occupation	Private sector / Professional	242	50.63
	Government / public sector	54	11.30
	Self-employed / Freelance–gig	96	20.08
	Student	58	12.13
	Homemaker / Other	28	5.86
Monthly household income (₹)	Below 50,000	57	11.92
	50,000–99,999	232	48.54
	1,00,000–1,49,999	110	23.01
	1,50,000 and above	79	16.53
Household structure	Nuclear family	333	69.67
	Shared accommodation	81	16.95
	Joint / extended family	36	7.53
	Living alone	28	5.86
Primary purchase channel	Online grocery / quick commerce	186	38.91
	Supermarkets / hypermarkets	130	27.20
	Food delivery apps (packaged RTE)	66	13.81
	Convenience / local grocery stores	84	17.57
	Brand websites (D2C)	12	2.51
Spend per RTE meal (₹)	Below 200	231	48.33
	200–299	146	30.54
	300 and above	101	21.13
Location type	IT / commercial corridors (8 localities)	244	51.05
	Mixed residential wards (8 localities)	234	48.95

Source: Primary survey (October–November 2026). Categories merged for brevity; detailed distributions are available from the authors.

3.5 Analytical strategy

Partial least squares structural equation modelling (PLS-SEM) was employed using SmartPLS 4 (Ringle et al., 2024). PLS-SEM is appropriate because the study is prediction-oriented and explanatory, the model includes higher-order constructs and interaction terms, and several indicators departed from normality (Cramér–von Mises tests, $p < 0.05$) (Hair et al., 2019, 2022). Both higher-order constructs were specified as reflective–reflective (Type I) and estimated with the **embedded two-stage approach** (Becker et al., 2012; Sarstedt et al., 2019). In stage one, the repeated-indicator approach was used to obtain latent variable scores for the six first-order dimensions, whose reliability and validity were assessed. In stage two, these scores served as indicators of UE and CBR, and the higher-order measurement model and the structural model were evaluated. Path significance was assessed by percentile bootstrapping with 5,000 subsamples (two-tailed, $\alpha = 0.05$, fixed seed). Mediation was evaluated following Zhao et al. (2010), and moderation via the two-stage interaction-term approach recommended for PLS-SEM (Becker et al., 2018), with separate models for each moderator to avoid multicollinearity among interaction terms. Predictive relevance was assessed with PLSpredict (10 folds, 10 repetitions) against a linear-model benchmark (Shmueli et al., 2019).

3.6 Common method bias

Because all data were self-reported in a single survey, procedural and statistical checks were applied. Harman's single-factor test showed that one unrotated component accounted for 34.79% of the variance across the 26 indicators, well below 50%. The full-collinearity assessment (Kock, 2015) yielded variance inflation factors

(VIFs) of 2.213 (UE), 1.443 (SC) and 1.920 (CBR), all below the 3.3 threshold. Together, these results indicate that common method variance is unlikely to bias the findings materially, although it cannot be ruled out entirely.

4. RESULTS

4.1 Measurement model assessment

Stage one: first-order constructs. Table 3 reports the reflective measurement model. All outer loadings ranged from 0.736 to 0.845, exceeding 0.708. Cronbach's alpha (0.773–0.894), ρ_A (0.773–0.895) and composite reliability ρ_C (0.868–0.915) were above 0.70 and below

0.95, indicating internal consistency without item redundancy. Average variance extracted (AVE) ranged from 0.573 to 0.701, establishing convergent validity. Item-level VIFs (1.522–1.946) ruled out indicator collinearity.

Table 3. First-order measurement model: loadings, reliability and convergent validity (stage one)

Construct	Item	Loading	Mean	SD	VIF	α	ρ_A	ρ_C	AVE
UBE	UBE1	0.838	3.62	0.95	1.647	0.774	0.775	0.869	0.689
	UBE2	0.813	3.67	0.95	1.522				
	UBE3	0.839	3.76	0.93	1.625				
RDA	RDA1	0.845	3.69	0.95	1.728	0.787	0.788	0.875	0.701
	RDA2	0.838	3.81	0.93	1.582				
	RDA3	0.827	3.84	0.90	1.647				
ULC	ULC1	0.843	3.66	0.94	1.655	0.781	0.782	0.873	0.696
	ULC2	0.836	3.71	0.95	1.644				
	ULC3	0.823	3.78	0.93	1.573				
CHP	CHP1	0.832	3.51	0.94	1.642	0.783	0.783	0.873	0.697
	CHP2	0.844	3.51	0.98	1.674				
	CHP3	0.828	3.64	0.95	1.575				
SC	SC1	0.757	3.48	0.94	1.860	0.894	0.895	0.915	0.573
	SC2	0.778	3.51	0.95	1.893				
	SC3	0.744	3.53	0.96	1.782				
	SC4	0.744	3.52	0.96	1.757				
	SC5	0.763	3.56	0.94	1.877				
	SC6	0.766	3.64	0.95	1.894				
	SC7	0.767	3.62	0.93	1.946				
	SC8	0.736	3.62	0.93	1.748				
PB	PB1	0.833	3.54	0.97	1.631	0.773	0.773	0.868	0.687
	PB2	0.823	3.63	0.93	1.536				
	PB3	0.832	3.74	0.95	1.594				
CB	CB1	0.842	3.55	0.97	1.657	0.779	0.780	0.872	0.694
	CB2	0.842	3.59	0.94	1.653				
	CB3	0.815	3.66	0.97	1.545				

Note: All loadings significant at $p < 0.001$ (5,000 bootstrap subsamples). α = Cronbach's alpha; ρ_A = Dijkstra–Henseler reliability; ρ_C = composite reliability; AVE = average variance extracted. Item means and SDs on 1–5 scales.

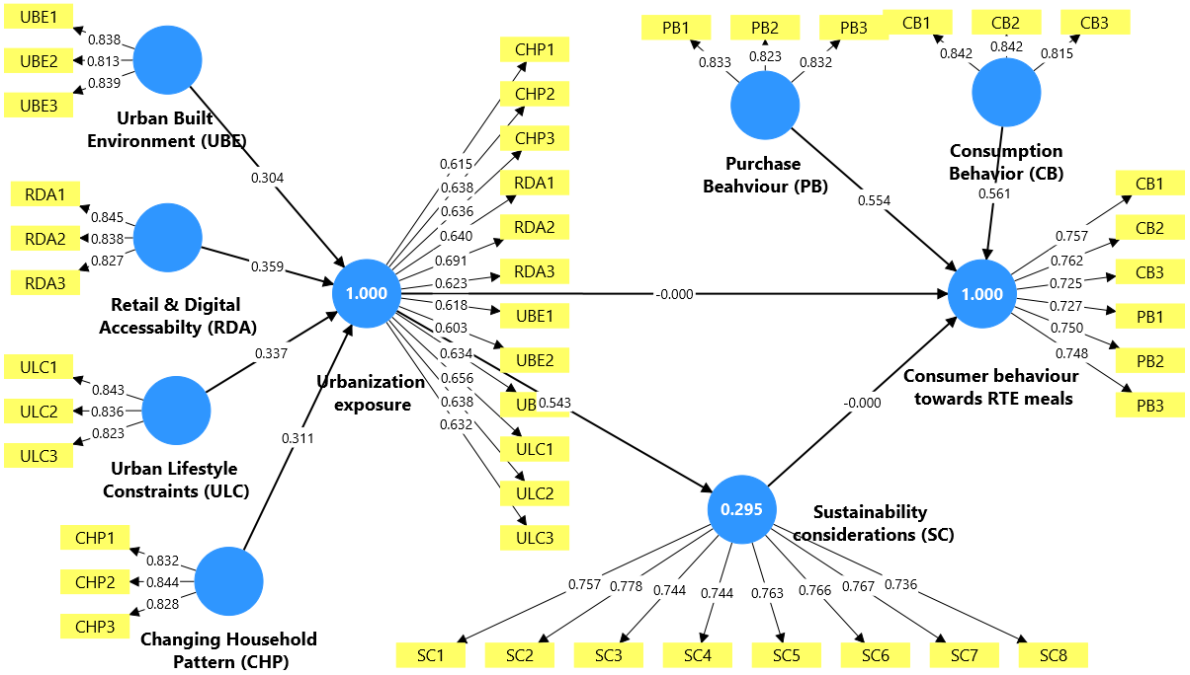


Figure 2. Stage-one measurement model with outer loadings and path coefficients (SmartPLS 4 output)

Note: Repeated-indicator approach; values on arrows from constructs to items are outer loadings; values on inner arrows are path coefficients; values inside circles are R^2. R^2 = 1.000 for higher-order constructs is an artefact of the repeated-indicator specification.

Discriminant validity among first-order constructs was established with both the Fornell–Larcker criterion (Fornell & Larcker, 1981) and the heterotrait–monotrait ratio (HTMT; Henseler et al., 2015). As Table 4 shows, the square root of each construct's AVE exceeded its correlations with all other constructs, and all HTMT values (0.425–0.782) were below the conservative 0.85 threshold. The highest HTMT (0.782) was between purchasing and consumption behaviour — theoretically expected for two facets of the same higher-order behaviour.

Table 4. Discriminant validity of first-order constructs: Fornell–Larcker (lower triangle) and HTMT (upper triangle)

	UBE	RDA	ULC	CHP	SC	PB	CB
UBE	0.830	0.565	0.562	0.555	0.440	0.505	0.536
RDA	0.443	0.837	0.558	0.562	0.649	0.660	0.632
ULC	0.438	0.439	0.834	0.582	0.425	0.682	0.705
CHP	0.433	0.442	0.456	0.835	0.441	0.523	0.526
SC	0.367	0.547	0.356	0.369	0.757	0.471	0.467
PB	0.391	0.517	0.530	0.407	0.393	0.829	0.782
CB	0.416	0.496	0.551	0.412	0.393	0.608	0.833

Note: Bold diagonal values are √AVE. Values below the diagonal are latent variable correlations; values above the diagonal are HTMT ratios.

Stage two: higher-order constructs. Table 5 shows that the first-order dimensions loaded strongly on their higher-order constructs (UE: 0.735–0.794; CBR: 0.895–0.898; all $p < 0.001$) with VIFs below 1.6. UE ($\alpha = 0.760$; $\rho_A = 0.770$; $\rho_C = 0.846$; AVE = 0.580) and CBR ($\alpha = 0.756$; $\rho_A = 0.756$; $\rho_C = 0.891$; AVE = 0.804) met reliability and convergent validity criteria. Retail and digital accessibility carried the largest weight in UE (0.387), followed by urban lifestyle constraints (0.343), indicating that access and time pressure are the most salient facets of urban exposure for this category. Discriminant validity in stage two was satisfied by the Fornell–Larcker criterion (√AVE of UE = 0.761 > r(UE,CBR) = 0.688). HTMT for UE–SC (0.651) and SC–CBR (0.530) was well below 0.85, whereas HTMT for UE–CBR was 0.898 — below the 0.90 threshold suggested for conceptually related constructs and with a bootstrap 95% upper bound (0.955) clearly below 1 (Henseler et al., 2015). This borderline value warrants transparency: it reflects the strong substantive association between urban exposure and RTE behaviour rather than construct overlap (the constructs are measured on different response formats — agreement vs. behavioural frequency — and refer to different referents), but readers should interpret the magnitude of H1 with this in mind.

Table 5. Higher-order measurement model (stage two)

Higher-order construct	Dimension	Loading	Weight	t (loading)	VIF	α	ρ_A	ρ_C	AVE
Urbanization exposure	UBE	0.735	0.287	28.988	1.437	0.760	0.770	0.846	0.580
	RDA	0.794	0.387	49.311	1.450				
	ULC	0.772	0.343	40.986	1.462				
	CHP	0.743	0.291	28.789	1.459				
RTE consumer behaviour	PB	0.895	0.554	88.662	1.585	0.756	0.756	0.891	0.804
	CB	0.898	0.561	98.760	1.585				
Sustainability considerations	SC1–SC8	0.736–0.778	0.152–0.189	32.20–41.27	≤ 1.946	0.894	0.895	0.915	0.573

Note: All loadings and weights significant at $p < 0.001$. Stage-two HTMT: UE–SC = 0.651 [95% CI 0.580, 0.720]; UE–CBR = 0.898 [0.841, 0.955]; SC–CBR = 0.530 [0.443, 0.617].

4.2 Structural model assessment

Inner-model VIFs for the predictors of RTE consumer behaviour were 1.428, ruling out structural collinearity. The model explained 47.9% of the variance in RTE consumer behaviour (R^2 = 0.479) and 29.9% in sustainability considerations (R^2 = 0.299), indicating moderate and weak-to-moderate explanatory power respectively for consumer research (Hair et al., 2019). Effect sizes (Cohen, 1988) were large for UE → CBR (f^2 = 0.550) and UE → SC (f^2 = 0.428) but negligible for SC → CBR (f^2 = 0.011). PLSpredict produced positive Q^2_predict values for all endogenous indicators (Table 6), confirming that the model outperforms naïve mean benchmarks. However, the PLS-SEM RMSE was marginally higher than that of the linear-model benchmark for nine of the ten indicators, which — following Shmueli et al. (2019) — signals *low* out-of-sample predictive power. The model is therefore better regarded as explanatory than as a predictive tool, an important caveat for practitioners. The standardised root mean square residual of the stage-two model was 0.067 (< 0.08); the stage-one repeated-indicator model returned SRMR = 0.102, an expected inflation caused by duplicated indicators, and fit indices in PLS-SEM are interpreted cautiously (Hair et al., 2022).

Table 6. Explanatory power, effect size and predictive relevance

Endogenous construct	R^2	R^2 adj.	Predictor	f^2	Effect	Q^2_predict (indicators)	RMSE PLS vs LM
RTE consumer behaviour	0.479	0.477	UE	0.550	Large	PB 0.372; CB 0.383	PLS > LM (2/2)
			SC	0.011	Negligible		
Sustainability considerations	0.299	0.298	UE	0.428	Large	SC1–SC8: 0.151–0.196	PLS > LM (7/8)

Note: f^2 thresholds 0.02/0.15/0.35 (Cohen, 1988). Q^2_predict > 0 indicates predictive relevance. "PLS > LM" counts indicators for which the PLS-SEM RMSE exceeds the linear-model benchmark RMSE (10-fold, 10 repetitions).

4.3 Hypothesis testing: direct and mediating effects

Table 7 and Figures 3 and 4 report the bootstrapped structural estimates. Urbanization exposure had a strong, positive and significant effect on RTE consumer behaviour (β = 0.640, t = 19.659, $p < 0.001$, 95% CI [0.574, 0.702]); H1 is supported. Urbanization exposure also positively influenced sustainability considerations (β = 0.547, t = 17.661, $p < 0.001$, 95% CI [0.486, 0.608]); H2 is supported. Sustainability considerations exerted a small but statistically significant positive effect on RTE consumer behaviour (β = 0.088, t = 2.063, p = 0.039, 95% CI [0.003, 0.171]); H3 is supported, albeit with a lower confidence bound close to zero and a coefficient below the minimum detectable effect (0.114) for 80% power.

The specific indirect effect UE → SC → CBR was positive and significant (β = 0.048, t = 2.043, p = 0.041, 95% CI [0.002, 0.095]). Because the direct effect remained significant and has the same sign, sustainability considerations exert a complementary partial mediation (Zhao et al., 2010); H4 is supported. The total effect of urbanization exposure on RTE behaviour was 0.688 (t = 28.734, $p < 0.001$), of which the indirect path accounts for only about 7% (VAF = 0.048/0.688 = 6.98%). Substantively, therefore, the mediation is statistically detectable but economically modest, and the indirect effect became marginal (p = 0.051) in the gender-moderation model, underscoring its fragility.

Table 7. Structural model results: direct, indirect and total effects

Hypothesis / path	β	SD	t	p	95% CI	Decision
H1: UE → CBR	0.640	0.033	19.659	< 0.001	[0.574, 0.702]	Supported
H2: UE → SC	0.547	0.031	17.661	< 0.001	[0.486, 0.608]	Supported
H3: SC → CBR	0.088	0.043	2.063	0.039	[0.003, 0.171]	Supported (weak)
H4: UE → SC → CBR (indirect)	0.048	0.024	2.043	0.041	[0.002, 0.095]	Supported — complementary partial mediation
Total effect UE → CBR	0.688	0.024	28.734	< 0.001	[0.639, 0.733]	—

Note: Percentile bootstrap, 5,000 subsamples, two-tailed. VAF = 6.98%. UE = urbanization exposure; SC = sustainability considerations; CBR = consumer behaviour towards RTE meals.

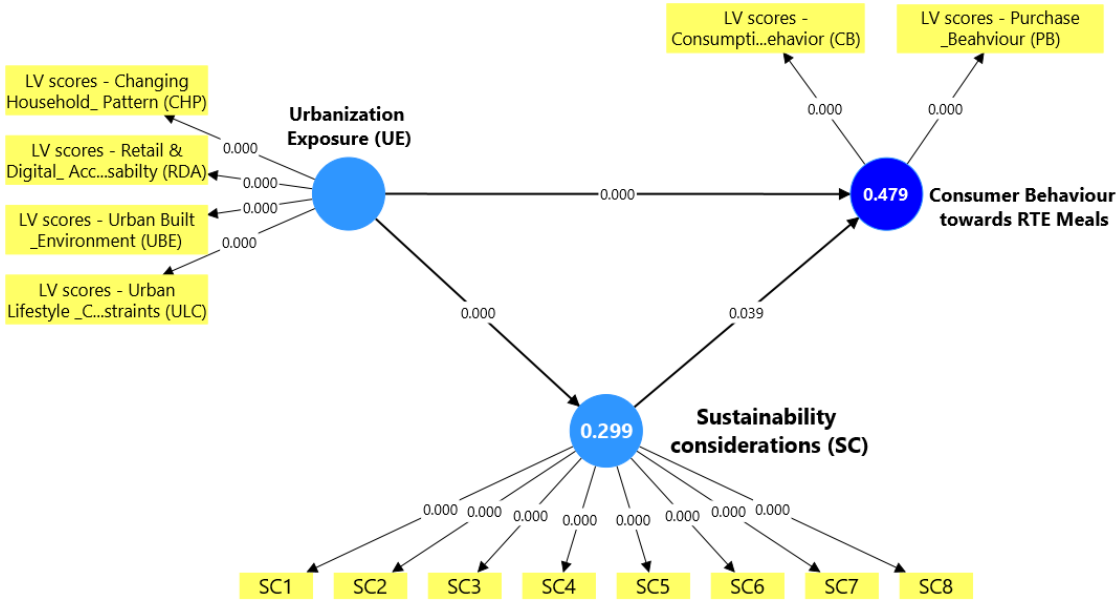
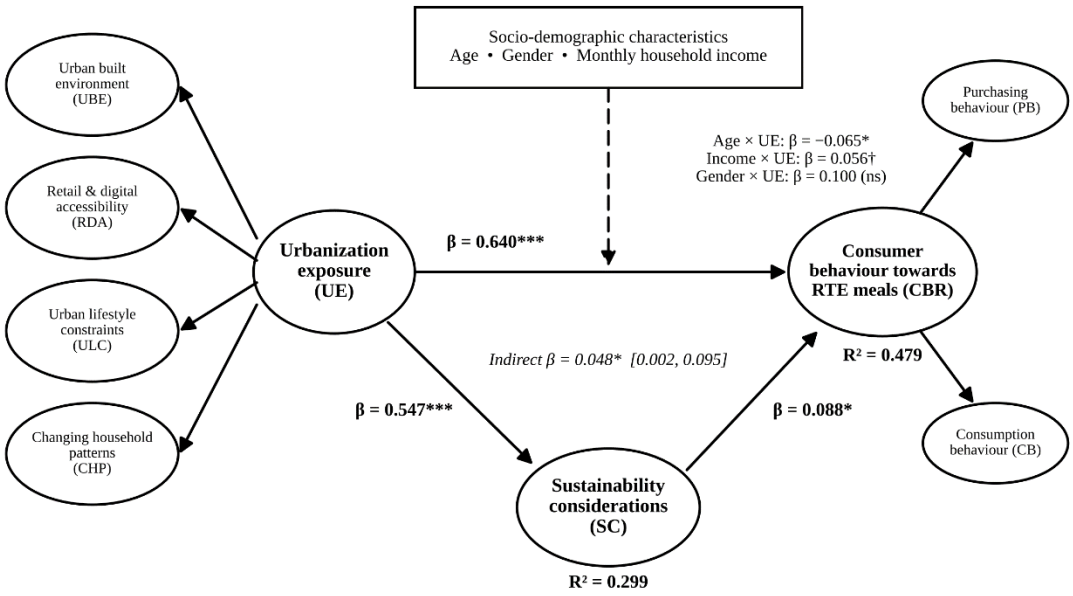


Figure 3. Stage-two structural (mediation) model with bootstrap p-values (SmartPLS 4 output)

Note: Values on arrows are p-values from 5,000 bootstrap subsamples; values inside circles are R^2. First-order latent variable scores (LV scores) serve as indicators of the higher-order constructs.



Notes: *** p < 0.001; * p < 0.05; † p < 0.10; ns = not significant. Standardised coefficients; 5,000 bootstrap subsamples.

Figure 4. Summary of hypothesis-testing results

4.4 Moderating effects of socio-demographic factors

Each moderator was tested in a separate model in which the interaction term (UE × moderator) and the moderator's main effect predicted RTE behaviour, while the mediation paths were retained (Table 8). Inclusion of the interaction terms left the core paths substantively unchanged (UE → CBR between 0.594 and 0.635; UE → SC = 0.547).

Age (H5a). Age exerted a negative main effect on RTE behaviour (β = −0.077, t = 2.323, p = 0.020), and the age × UE interaction was negative and significant (β = −0.065, t = 2.118, p = 0.034, 95% CI [−0.123, −0.003]; f^2 = 0.009). Simple-slope analysis shows that the effect of urbanization exposure on RTE behaviour is strongest among younger consumers (β = 0.704 at one standard deviation below the mean age of 32 years, 95% CI [0.604, 0.797]), declines at the mean age (β = 0.639) and is weakest among older consumers (β = 0.573 at one standard deviation above the mean, 95% CI [0.489, 0.655]) (Figure 6a). The model including age explained 49.0% of the variance in RTE behaviour, and the mediation remained significant (indirect β = 0.048, p = 0.038). H5a is supported: urbanization exposure translates into RTE consumption more strongly for younger urban consumers. The interaction effect size is small-to-medium by the benchmarks for interaction terms (Kenny, 2018).

Gender (H5b). The gender × UE interaction was positive but not significant (β = 0.100, t = 1.543, p = 0.123, 95% CI [−0.031, 0.228]; f^2 = 0.005). The conditional effect of urbanization exposure was 0.594 for men (95% CI [0.506, 0.676]) and 0.695 for women ([0.597, 0.792]); the overlapping intervals (Figure 6c) confirm that the urbanization–RTE link is statistically equivalent across genders. H5b is not supported.

Monthly household income (H5c). The income × UE interaction was positive and significant only at the 10% level (β = 0.056, t = 1.892, p = 0.059, 95% CI [−0.002, 0.115]; f^2 = 0.006). Simple-slope analysis shows that the effect of urbanization exposure strengthens from 0.579 at one standard deviation below mean income ([0.490, 0.665]) to 0.635 at the mean and 0.691 at one standard deviation above ([0.603, 0.774]) (Figure 6b). Because the 95% interval marginally includes zero, H5c receives only marginal (weak) support and is not accepted at the conventional 5% level. Thus, H5 is partially supported: age is a significant boundary condition, income a marginal one and gender not a boundary condition.

Table 8. Moderation analysis (direct path UE → CBR)

Hyp.	Interaction	β	t	p	95% CI	R^2 (CBR)	f^2	Decision
H5a	Age × UE	−0.065	2.118	0.034	[−0.123, −0.003]	0.490	0.009	Supported
H5b	Gender × UE	0.100	1.543	0.123	[−0.031, 0.228]	0.482	0.005	Not supported
H5c	Income × UE	0.056	1.892	0.059	[−0.002, 0.115]	0.484	0.006	Marginal (p < 0.10)

Note: Two-stage interaction approach; 5,000 bootstrap subsamples. Gender coded 0 = male, 1 = female. Income measured in seven ordered brackets. Age measured in completed years. f^2 for interaction terms computed from the change in R^2 when the interaction term is omitted. Kenny (2018) suggests 0.005, 0.01 and 0.025 as small, medium and large interaction effect sizes. Base model R^2 = 0.479.

Figure 5 presents the SmartPLS 4 moderation models for each socio-demographic characteristic.

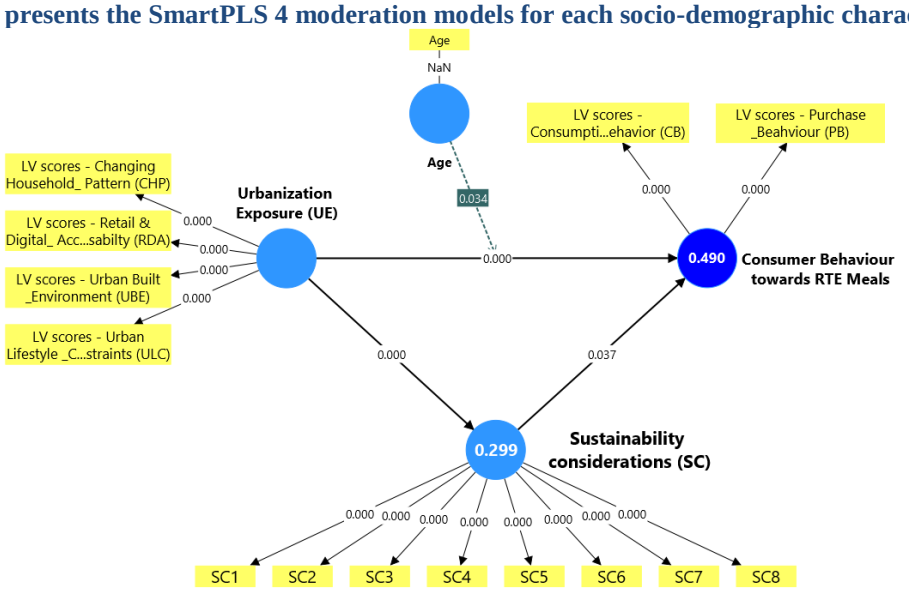


Figure 5a. Moderation model: age as moderator (SmartPLS 4 output, bootstrap p-values)

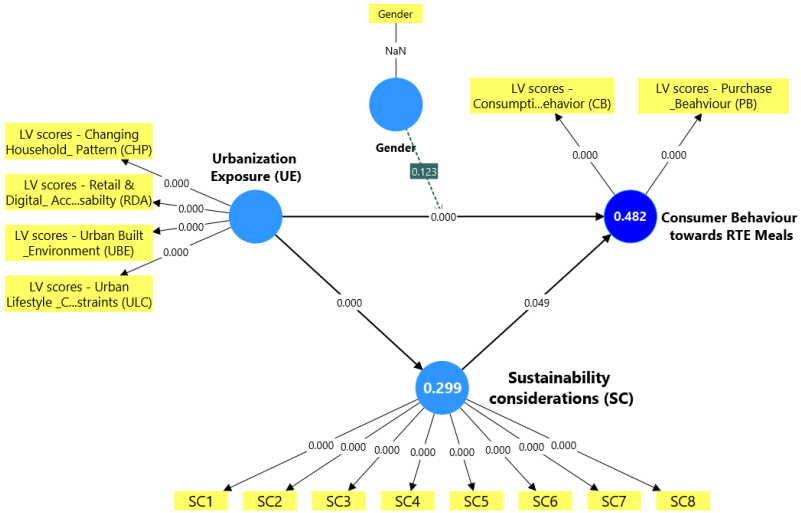


Figure 5b. Moderation model: gender as moderator (SmartPLS 4 output, bootstrap p-values)

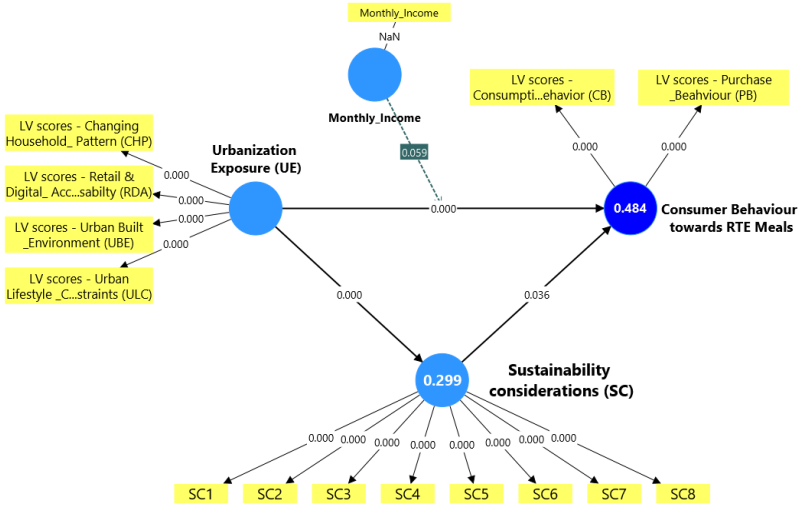


Figure 5c. Moderation model: monthly household income as moderator (SmartPLS 4 output, bootstrap p-values)
Note: Dashed arrows denote the interaction term; values on arrows are bootstrap p-values (5,000 subsamples); values inside circles are R^2.

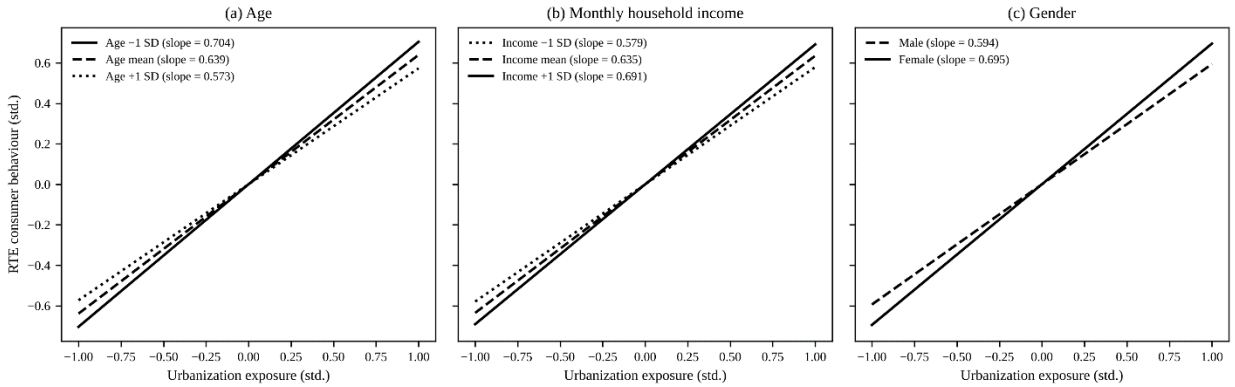


Figure 6. Simple-slope plots for (a) age, (b) monthly household income and (c) gender

Note: Slopes are conditional effects of urbanization exposure on RTE consumer behaviour at ±1 SD of age and income and at each gender category (SmartPLS 4 conditional direct effects).

4.5 Robustness: endogeneity

Endogeneity was explored with the Gaussian copula approach (Becker et al., 2022). The latent score of UE departed only mildly from normality (Cramér–von Mises p = 0.043; skewness = −0.31), a condition under which copula terms are weakly identified and prone to collinearity with the original regressor. The copula term was non-significant for UE → SC (p = 0.800) but significant for UE → CBR (p = 0.035) with a large standard error. Given the weak identification, this result is not taken as conclusive; it is, however, reported transparently as a signal that unobserved

factors correlated with urbanization exposure (e.g., occupational intensity or dietary habits) may also affect RTE behaviour, and that the H1 coefficient should be read as an association-strength estimate rather than a causal effect.

5. DISCUSSION

This study set out to establish whether, how and for whom urbanization exposure shapes behaviour towards RTE meals. Four findings merit critical discussion.

First, urbanization exposure is a powerful, multidimensional driver of RTE behaviour. The large direct effect (β = 0.640; f^2 = 0.550) corroborates the resource-constraint view of convenience consumption (Scholderer & Grunert, 2005; Jabs & Devine, 2006) and extends it in two ways. Conceptually, it demonstrates that urbanization can be measured as an individual-level exposure with meaningful within-city variance rather than treated as a uniform contextual backdrop. Empirically, the higher-order weights show that retail and digital accessibility (0.387) and urban lifestyle constraints (0.343) dominate built-environment density (0.287) and household change (0.291). This pattern is consistent with evidence that market availability shapes convenience food intentions (Contini et al., 2018), with the reorganisation of shopping around deliveries (Kim & Wang, 2024; Verma et al., 2025), and with the descriptive finding that quick-commerce platforms are now the leading RTE channel in Bengaluru. In effect, the *digital* city appears to matter at least as much as the *physical* city. The result also echoes observations from Global South cities that everyday urban routines, rather than income alone, push provisioning away from household cooking (Adeosun et al., 2022a). Nevertheless, the borderline HTMT between UE and RTE behaviour and the exploratory copula signal caution against reading the coefficient as a pure causal effect.

Second, urban exposure activates sustainability considerations. The strong UE → SC path (β = 0.547) supports the S-O-R premise that information- and packaging-dense urban environments raise the salience of plastic waste, recyclability, sourcing and environmental labels (Otto et al., 2021; Nguyen et al., 2020; Izcue & Palmeiro-Silva, 2026). Retail and digital accessibility showed the highest correlation with sustainability considerations among the urban dimensions (r = 0.547), suggesting that exposure to modern and online retail — where eco-claims, packaging alternatives and green delivery options are displayed — is a key conduit (Sen et al., 2026; Tseng et al., 2020). This contradicts a simplistic view that urban convenience-seekers are indifferent to sustainability.

Third, sustainability considerations accompany rather than restrain RTE consumption, and their behavioural traction is weak. The positive but small SC → CBR effect (β = 0.088; f^2 = 0.011) and the modest complementary mediation (VAF ≈ 7%) are central to the contribution. Two interpretations, not mutually exclusive, are plausible. The first is an *engagement* interpretation: consumers who evaluate RTE meals on sustainability attributes are more involved in the category, and their considerations operate on product selection — packaging format, portion size, label credibility — rather than on category avoidance (Stranieri et al., 2017; Ricci et al., 2018). The second is an *attitude–behaviour gap* interpretation consistent with ABC theory: in a context of intense time and access pressures, sustainability considerations lack the force to reduce consumption (Guagnano et al., 1995; Carrington et al., 2010; Kollmuss & Agyeman, 2002). The finding is also congruent with evidence that convenience-oriented lifestyles coexist with higher food waste (Mallinson et al., 2016; Aschemann-Witzel et al., 2018) and that convenience is perceived as a barrier to reusable packaging systems (Pickering et al., 2026). Critically, because the SC → CBR coefficient lies below the minimum effect detectable with 80% power at N = 478, and the indirect effect became marginal in one alternative specification, the mediating role should be regarded as present but fragile; replication with larger samples is required before strong claims are made.

Fourth, socio-demographic boundary conditions are selective. Age significantly and negatively conditioned the urbanization effect (β = −0.065): the effect of urban exposure on RTE behaviour falls from 0.704 among younger consumers to 0.573 among older consumers, and age also has a negative main effect. Younger residents thus convert urban time pressure and digital access into RTE consumption more readily, plausibly because of greater app fluency, less entrenched cooking routines and more irregular work and study schedules, in line with evidence that younger consumers are more embedded in convenience and delivery ecosystems (Reed et al., 2003; Boyar et al., 2025; Lanfranchi et al., 2026). Income produced the theoretically expected amplification — the urbanization effect rises from 0.579 to 0.691 between low and high income levels — but only at the 10% level, implying that in a predominantly middle- and upper-middle-income sample the budget constraint on RTE meals (most of which cost ₹100–₹299 per meal) is not binding for many consumers. The absence of gender moderation is notable given traditional associations of meal preparation with women. In dual-career and shared urban households, where meal provisioning increasingly rests with whoever is time-constrained, urban pressures appear to translate into RTE use similarly for men and women — a convergence also suggested by research on people living alone (Oleschuk et al., 2023). The point estimate was nonetheless larger for women (0.695 vs. 0.594), and larger samples may reveal a small difference.

6. IMPLICATIONS

6.1 Theoretical implications

The study contributes to consumer behaviour and food marketing theory in three ways. First, it advances the measurement of urbanization in consumer research by validating a reflective–reflective higher-order construct of urbanization exposure, demonstrating that urbanization can be modelled as a psychological and behavioural context experienced by individuals. This enables future research to move beyond city-level comparisons. Second, it integrates S-O-R with resource-constraint and ABC theories to show that the same environmental stimulus simultaneously creates convenience demand (a strong contextual pathway) and sustainability awareness (an evaluative pathway), with the former dominating. This dual-pathway account offers a theoretical explanation for why sustainability concern rises

in cities without curbing packaging-intensive convenience consumption. Third, by testing socio-demographics as boundary conditions rather than controls, the study shows that the urbanization–consumption link is age-contingent and possibly income-contingent but gender-neutral, refining demographic segmentation theories in convenience food research (Botonaki et al., 2009; Raimundo et al., 2020).

6.2 Managerial implications

For RTE manufacturers, quick-commerce platforms and modern retailers, four implications follow. (1) Demand is anchored in urban access and time pressure: distribution depth on quick-commerce platforms, delivery speed and availability near IT corridors are likely to yield greater returns than generic awareness campaigns. (2) Sustainability is a differentiator, not a deterrent: since sustainability considerations co-exist with consumption, brands can compete on recyclable or reduced-plastic packaging, right-sized portions that minimise food waste, and credible third-party environmental labels (Drechsel et al., 2025; Büttner et al., 2024), communicated at the digital point of purchase where urban consumers encounter them (Ghosh & Lahiri, 2026). (3) Because the behavioural traction of sustainability is weak, sustainable options should be designed to be the convenient default — e.g., platform-level packaging choices or opt-out cutlery and bags — rather than relying on consumer effort (Pickering et al., 2026; van Doorn et al., 2026). (4) Segmentation should prioritise life stage and, secondarily, income: younger urban consumers in high-exposure localities are the core growth segment for app-led RTE offers, while older consumers may require stronger reassurance on freshness, nutrition and taste; age-specific messaging and product formats, and premium sustainable lines aimed at higher-income urban households, are more likely to be effective than gender-based targeting.

6.3 Policy implications

For urban local bodies and regulators, the findings indicate that urban food environments will continue to channel consumption towards packaged prepared meals. Extended producer responsibility for plastic packaging, standardised and verifiable environmental labelling for packaged foods, and support for take-back or reuse schemes integrated into quick-commerce logistics could align the strong urban convenience trajectory with sustainability goals. Given broader concerns about processed food in urban India (Tak et al., 2022; Kumar et al., 2022), nutritional disclosure for RTE meals sold through digital platforms also merits attention.

7. LIMITATIONS AND DIRECTIONS FOR FUTURE RESEARCH

Several limitations qualify the conclusions. First, convenience sampling, despite deliberate spread across 16 localities, limits statistical generalisation; the sample over-represents younger, educated and higher-income residents, and probability or quota sampling stratified by ward and income is recommended. Second, the cross-sectional, self-reported design precludes causal inference; the exploratory copula result points to possible endogeneity, and longitudinal designs, instrumental variables (e.g., objective ward-level density or dark-store counts linked by PIN code) or field experiments would strengthen causal claims. Third, the weak SC → CBR path is below the minimum effect detectable with 80% power; larger samples are needed to estimate the mediation precisely. Fourth, behaviour was measured through recalled frequencies; purchase-panel or platform transaction data would reduce recall and social desirability bias. Fifth, sustainability considerations were modelled as a single evaluative construct; future research could separate packaging, waste and sourcing considerations, test them as moderators of product choice, and examine whether they predict choice of sustainable RTE variants rather than category frequency. Sixth, only age, gender and monthly household income were examined as moderators; other characteristics such as education and occupation, and moderated mediation (whether socio-demographics condition the indirect path) was beyond the specified model; multi-group analysis with measurement invariance (MICOM) would be a natural extension. Finally, the predictive power of the model was low relative to a linear benchmark, and comparative studies across Indian tier-1 and tier-2 cities would clarify how far the findings travel.

8. CONCLUSION

Urbanization in Bengaluru shapes RTE meal behaviour through two pathways of very unequal strength. A dominant contextual pathway — dense, digitally accessible and time-pressed urban living — drives purchasing and consumption of RTE meals, and its strength depends on consumers' age and, marginally, their income, but not on gender. A secondary evaluative pathway raises sustainability considerations that accompany, rather than curb, RTE consumption and transmit only a small share of the urbanization effect. For brands and policymakers, the implication is clear: in the convenience-driven city, sustainability must be engineered into the convenient choice rather than left to consumer deliberation.

Declarations

Funding: This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

Conflict of interest: The authors declare no conflict of interest.

Ethical approval and informed consent: Participation was voluntary and anonymous; informed consent was obtained from all respondents through screening item S4, and no personally identifying information was collected.

Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

Paperpal, Google Gemini, Jenni AI, and Grammarly were used solely for draft layout structuring, grammatical refinement, and vocabulary enhancement; the author(s) reviewed and edited the final text and take full responsibility for the content of the publication.

Data availability: The data that support the findings of this study are available from the corresponding author upon reasonable request.

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