ALCOHOL PACKAGING RESTRICTIONS AND CONSUMER SUBSTITUTION BEHAVIOUR IN RIVERS STATE, NIGERIA: IMPLICATIONS FOR PUBLIC HEALTH POLICY

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Abstract

Spurred by the recent ban on the production and distribution of alcohol in sachets and small-sized containers, this study investigates the relationship between alcohol packaging restrictions and consumer substitution behaviour in Rivers State, Nigeria, with implications for public health policy. A descriptive survey research design was adopted, and data were collected from 384 respondents using a structured questionnaire administered through a mixed-mode approach. The sample size was determined using Cochran's formula, while a multistage sampling technique was employed to capture both urban and rural consumers. Data were analysed using Partial Least Squares Structural Equation Modeling (PLS-SEM). Findings indicate that alcohol packaging restrictions are primarily associated with alternative substance substitution, particularly toward energy drinks and non-alcoholic beverages, followed by product form switching from sach*et al*cohol to bottled or canned alternatives. A moderate behavioural shift was also observed in cross-category substitution, where consumers migrated from sach*et al*cohol to other alcoholic beverages such as beer. In contrast, movement toward informal or illicit alcohol sources, including locally distilled gin, remained statistically insignificant, suggesting continued reliance on formal distribution channels despite the restrictions. The study further reveals that income level significantly moderates the relationship between packaging restrictions and consumer substitution behaviour, with lower-income consumers exhibiting stronger behavioural adjustments due to affordability pressures. These findings suggest that packaging restrictions may influence the pattern and form of alcohol consumption rather than eliminate consumption entirely. The study concludes that alcohol packaging restrictions are associated with changes in consumer consumption patterns and may contribute to broader public health objectives when supported by effective enforcement, consumer education, and complementary harm-reduction interventions. The study, therefore, recommends stronger enforcement mechanisms, sustained consumer education, and complementary interventions aimed at promoting safer consumption alternatives.

Keywords: Alcohol packaging restrictions, Consumer substitution behaviour, Product form switching, Cross-category substitution, Informal/Illicit alcohol substitution, Alternative substance substitution.

Introduction

The commitment of the Nigerian government to reducing the harmful use of alcohol is rooted in its adoption of the World Health Organization (WHO) Global Strategy to Reduce the Harmful Use of Alcohol (WHA63.13), which emphasizes limiting the availability and accessibility of alcohol, particularly among vulnerable populations. Governments across the globe increasingly employ regulatory measures such as taxation, advertising restrictions, and packaging controls to reduce alcohol-related health burdens (WHO, 2018). In Nigeria, recent regulatory interventions have focused on alcohol packaging, particularly the ban on sach*et al*coholic beverages and restrictions on alcohol sold in containers of 200 ml and below by the National Agency for Food and Drug Administration and Control (NAFDAC). These measures are intended to reduce affordability, portability, and ease of access to alcohol, especially among youths and low-income consumers.

The policy is supported by growing public health concerns regarding harmful alcohol consumption in Nigeria. Studies have shown that the availability of low-cost alcohol in small units encourages early initiation into alcohol use and promotes risky drinking behaviour among young people and economically vulnerable populations (WHO, 2018; Babor *et al*., 2010). Excessive alcohol consumption has also been associated with several health complications, including liver diseases, kidney dysfunction, cardiovascular disorders, and behavioural problems (Shield *et al*., 2020). Consequently, restricting small-pack alcohol products is considered a strategic public health intervention aimed at reducing harmful drinking patterns and associated health risks. However, regulatory interventions often generate behavioural adjustments rather than complete elimination of consumption. Consumer demand theory posits that when access, price, or product characteristics change, consumers may shift toward alternative products or consumption patterns (Deaton & Muellbauer, 1980; Grossman *et al*., 1998). Within the Nigerian alcohol market, sach*et al*cohol products have historically served as low-cost options for price-sensitive consumers. Their restriction may, therefore, encourage substitution toward alternative alcoholic beverages, informal alcohol products, or other psychoactive substances rather than outright cessation of consumption.

This creates an important public health concern. While the policy seeks to reduce harmful alcohol use, substitution toward larger-volume alcoholic beverages may increase alcohol intake per drinking occasion. Similarly, a shift toward unregulated or illicit alcohol sources may expose consumers to additional health risks associated with unsafe production and poor quality control

(Babor *et al*., 2010). The effectiveness of alcohol packaging restrictions, therefore, depends not only on limiting access to sachet products but also on understanding the nature of consumer substitution behaviour that may arise from the policy.

Consumer responses to packaging restrictions may also vary across income groups. Lower-income consumers, who constituted a major market for sach*et al*cohol because of affordability, may adopt different coping strategies compared to higher-income consumers. Such behavioural variations make income level an important moderating factor in understanding substitution behaviour following packaging restrictions.

Despite the growing use of alcohol control policies worldwide, empirical evidence on the behavioural consequences of alcohol packaging restrictions remains limited. Existing studies have predominantly focused on the effects of alcohol taxation, pricing policies, advertising restrictions, and availability controls on consumption outcomes (Babor *et al*., 2010; WHO, 2018). Comparatively little attention has been given to packaging restrictions as a regulatory mechanism, particularly in developing countries where sachet and small-sized alcohol products constitute a significant segment of the alcohol market. More importantly, previous studies have largely emphasized changes in alcohol consumption levels while paying limited attention to the various forms of consumer substitution behaviour that may emerge following regulatory restrictions. Consequently, there is insufficient empirical evidence on whether consumers respond to alcohol packaging restrictions by switching product forms, migrating to other alcoholic beverages, patronizing informal alcohol sources, or substituting toward alternative substances.

This knowledge gap is particularly evident in Nigeria, where the recent ban on sach*et al*cohol and small-sized alcoholic beverages represents one of the most significant alcohol packaging interventions in the country's history. Although the policy was introduced to reduce harmful alcohol consumption, little empirical evidence exists regarding how consumers actually adjust their purchasing and consumption behaviour following the restriction. Furthermore, the extent to which income differences influence these behavioural responses remains largely unexplored. This gap is especially important in Rivers State, where alcohol consumption cuts across diverse socioeconomic groups and where both formal and informal alcohol markets coexist. Understanding these behavioural

adjustments is therefore essential for evaluating the effectiveness of the policy and anticipating potential unintended consequences.

Against this backdrop, this study investigates the relationship between alcohol packaging restrictions and consumer substitution behaviour in Rivers State, Nigeria. Specifically, the study examines four dimensions of substitution behavior: product form switching, cross-category substitution, informal alcohol substitution, and alternative substance substitution, and evaluates the moderating role of income level. By providing evidence on the behavioural responses associated with alcohol packaging restrictions in a developing-country context, the study contributes to the alcohol control literature and offers insights for policymakers seeking to minimize unintended consequences of packaging-based regulatory interventions.

Objectives of the Study

The main objective of this study is to examine the effect of alcohol packaging restrictions on consumer substitution behaviour in Nigeria.

The specific objectives are to:

1. Determine the effect of alcohol packaging restrictions on product form switching.
2. Examine the effect of alcohol packaging restrictions on cross-category substitution.
3. Assess the effect of alcohol packaging restrictions on informal/illicit substitution.
4. Evaluate the effect of alcohol packaging restrictions on alternative substance substitution.
5. Examine the moderating effect of income level on the relationship between alcohol packaging restrictions and consumer substitution behaviour.

Research Questions

1. How do alcohol packaging restrictions influence product form switching among consumers?
2. What effect do alcohol packaging restrictions have on cross-category substitution?
3. To what extent do alcohol packaging restrictions drive consumers toward informal or illicit alcohol markets?
4. What is the effect of alcohol packaging restrictions on alternative substance substitution?
5. How does income level moderate the relationship between alcohol packaging restrictions and consumer substitution behaviour?

Research Hypotheses

Ho1: Product form switching among consumers is not significantly influenced by alcohol packaging restrictions.

Ho2: Cross-category substitution among consumers is not significantly influenced by alcohol packaging restrictions.

Ho3: Informal/illicit alcohol substitution is not significantly affected by alcohol packaging restrictions.

Ho4: Alternative substance substitution is not significantly influenced by alcohol packaging restrictions.

Ho5: The relationship between alcohol packaging restrictions and consumer substitution behaviour is not significantly moderated by income level.

Conceptual Review

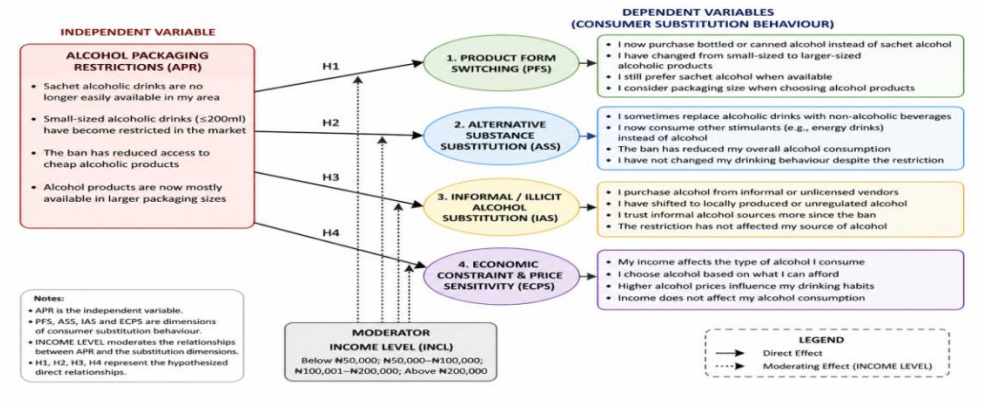

Fig 1: Conceptual Model of Alcohol Packaging Restrictions and Consumer Substitution Behaviour
Source: Authors' Conceptualization

Alcohol packaging restrictions, within the context of contemporary alcohol policy in Nigeria, refer to regulatory measures that control the size, format, and distribution of alcohol packaging. These include restrictions on sach*et al*coholic beverages and limits on small-volume containers (particularly those of 200ml and below) In Nigeria, such measures are primarily implemented by the National Agency for Food and Drug Administration and Control (NAFDAC) as part of broader public health efforts to reduce harmful alcohol consumption, particularly among youths and low-income

populations. The rationale behind these restrictions is grounded in the view that smaller packaging formats lower the economic and psychological barriers to alcohol consumption, thereby increasing frequency of use and enabling discreet consumption. By restricting these formats, policy assumes that access and consumption intensity will decline, particularly among price-sensitive consumers.

Consumer substitution behaviour refers to the adaptive responses of individuals when changes in availability, affordability, or accessibility of products influence consumption decisions. In the context of alcohol packaging restrictions, consumers may not necessarily reduce total alcohol consumption, but may reallocate their choices toward available alternatives. This behavioural adjustment is widely recognized in consumer demand theory, which posits that consumers respond to constraints by shifting consumption across substitutes rather than eliminating demand entirely (Deaton & Muellbauer, 1980; Grossman *et al*., 1998).

One key dimension of this behaviour is product form switching, which occurs when consumers shift between different packaging formats of alcohol products within the same category. For example, consumers may move from sach*et al*cohol to bottled alcoholic beverages or vice versa, depending on relative affordability and availability. This reflects how restrictions on specific packaging formats can reshape consumption choices without necessarily reducing overall alcohol intake. Closely related is cross-category substitution, which refers to shifts between different categories of alcoholic beverages, such as beer, spirits and other regulated alternatives. When access to preferred or cheaper packaging formats is constrained, consumers may reassess relative prices and availability across product categories, leading to substitution across alcoholic beverage types.

Another important dimension in developing economies is informal alcohol substitution. This occurs when consumers shift from regulated commercial alcoholic products to unregulated or locally produced alcoholic beverages. Such substitution is particularly relevant in contexts where informal alcohol production is widespread. This behavioural response raises public health concerns because informal alcohol products may vary significantly in quality, safety, and alcohol content due to limited regulatory oversight. Alternative substance substitution refers to situations where alcohol consumption is reduced or replaced with non-alcoholic beverages or other consumables that fulfill similar social or psychological needs. While this mare not be frequent, it reflects the possibility that

some consumers may respond to packaging restrictions by reducing alcohol dependence or shifting to non-alcoholic alternatives, especially where health awareness or risk perception is high.

Finally, alcohol packaging restrictions function as a regulatory intervention that alters the consumption environment by limiting specific product formats. However, consumer responses are not uniform. Instead, they manifest in multiple behavioural pathways, including product form switching, cross-category substitution, informal alcohol substitution, and alternative substance substitution. These responses are further shaped by socio-economic factors such as income level, which influences purchasing power, access to alternatives, and sensitivity to regulatory constraints (Pettigrew *et al*., 2021).

Bottom of Form

This study is anchored on *Consumer Choice Theory*, a core microeconomic framework that explains how individuals allocate limited income across competing goods and services to maximize utility under budget constraints (Becker, 1962). The theory assumes that consumers are rational utility maximizers who make trade-offs among available alternatives based on income constraints and perceived utility. Within this framework, consumption decisions are influenced not only by price, but also by product attributes such as availability, convenience, and packaging format. Changes in any of these factors prompt consumers to reassess available options and adjust their consumption patterns accordingly. Thus, packaging operates as a critical attribute that shapes accessibility and perceived value of alcohol products. In relation to alcohol packaging restrictions, the removal of sach*et al*cohol and small-volume containers reduces consumer choice sets and alters the utility derived from remaining alternatives. Consumer Choice Theory, therefore, explains the likely behavioural response as a substitution effect, where consumers shift toward other alcoholic products or alternative consumption channels that offer comparable satisfaction. However, the theory also recognizes that substitution behaviour is not uniform, as differences in income levels and access conditions influence how individuals respond to regulatory changes. This provides a theoretical basis for examining income as a moderating variable in understanding consumer substitution behaviour following alcohol packaging restrictions.

Empirical literature on alcohol regulation consistently demonstrates that restrictive alcohol policies tend to reshape consumption patterns rather than eliminate alcohol use. Across both

developed and developing country contexts, evidence suggests that consumers respond to regulatory constraints through substitution across product types, consumption channels, and in some cases alternative psychoactive substances.

Early econometric evidence from the United States by Nelson (2001), using panel data from 45 states between 1982 and 1997, showed that state-level alcohol monopolies reduced consumption of spirits but simultaneously increased wine consumption, with mixed effects for beer. This provides foundational empirical evidence that alcohol consumers reallocate demand across beverage categories in response to regulatory constraints rather than reducing total consumption. More recent behavioural evidence reinforces this substitution pattern. Bruhn *et al*. (2026), using household-level panel data and a difference-in-differences design, examined consumer responses to the Bud Light boycott in the United States. The study found a substantial decline in purchases of the targeted brand (34-37%), but partial substitution toward alternative beer brands. However, substitution was incomplete, indicating that behavioural responses to alcohol-related shocks involve both reallocation and partial consumption reduction.

Evidence from public health enforcement contexts further shows that restrictive alcohol policies may generate unintended shifts toward illicit substances. Granger and Price (2017), using county-level Poisson and Negative Binomial regression models in Mississippi, found that bans on hard liquor sales were associated with increases in crystal methamphetamine laboratory activity. Although context-specific, the findings suggest that substitution effects may extend beyond alcohol markets under certain regulatory conditions.

Qualitative empirical evidence also supports behavioural displacement effects. Brennan *et al*. (2016), through focus groups and semi-structured interviews with alcohol service professionals and homeless populations in the United Kingdom, found that restrictions on inexpensive high-strength alcohol led to adaptive behaviours including switching beverages, seeking alternative sources, and in some cases substituting toward drugs or criminal means to obtain alcohol. This highlights the behavioural flexibility of dependent consumers under restrictive interventions.

In African contexts, empirical evidence remains limited but growing. Uny *et al*. (2025), using documentary analysis and stakeholder interviews in Malawi, found that sach*et al*cohol bans reshaped consumption patterns but did not fully eliminate informal market circulation, indicating partial

enforcement leakage rather than complete substitution into illicit markets. This suggests that regulatory effectiveness is strongly conditioned by enforcement capacity.

Further quantitative evidence from Cameroon by Sosso and Meka'a (2024), using a dynamic computable general equilibrium model calibrated with household survey data, demonstrated that alcohol taxation reduces consumption of harmful products but disproportionately affects low-income households. This provides empirical support for income-sensitive behavioural responses to alcohol regulation and highlights distributional consequences of such policies. In Nigeria, Wigbout and Ogunyemi (2021), using survey data from university students, found that product size, price, and disposable income significantly influence consumer preference for affordable packaged beverages. This provides contextual empirical support for the role of income in shaping consumption decisions in the Nigerian alcohol market.

Beyond behavioural substitution, empirical toxicological evidence from Nigeria suggests that some alternative alcohol products commonly consumed following restrictive alcohol policies may pose significant health risks. Adeyemi, Afolabi, and Balogun (2023), using an experimental animal-model design involving thirty male Wistar rats exposed to alcoholic herbal bitters over a 28-day period, found significant increases in serum creatinine, urea, bilirubin, total protein, and albumin levels among treated groups. The findings indicated potential liver and kidney dysfunction associated with prolonged consumption of alcoholic herbal bitters such as Alomo and Jekomo. Similarly, Odey *et al*. (2024) reported elevated liver enzymes and lipid abnormalities among rats exposed to herbalized alcoholic beverages in Nigeria, further confirming hepatotoxic effects. These studies provide important public health insight by suggesting that substitution toward alternative alcoholic products following packaging restrictions may not necessarily reduce health risks, but may instead shift consumers toward other potentially harmful alcohol products.

Across these studies, a consistent empirical pattern emerges: alcohol regulatory interventions tend to produce multidimensional substitution effects rather than absolute reductions in consumption. These include product form switching, cross-category substitution, and, in some contexts, movement toward informal or alternative psychoactive substances. However, the magnitude and direction of substitution vary depending on enforcement strength, socio-economic conditions, and consumer income levels.

Methodology

This study adopted a descriptive survey research design to examine the relationship between alcohol packaging restrictions and consumer substitution behaviour in Rivers State, Nigeria. Rivers State was selected due to reported high consumption of sachet and small-volume alcohol products and its heterogeneous socio-economic composition of urban and rural communities (NAFDAC, 2021). The population comprised adult alcohol consumers (18 years and above) who had consumed alcohol within one month prior to data collection. The sample size was determined using Cochran's (1977) formula for an infinite population at a 95% confidence level and 5% margin of error, yielding 384 respondents. This was increased to 420 to account for non-response. A multistage sampling approach was employed by stratifying the state into urban and rural areas. Respondents were then selected using intercept and convenience sampling in markets, motor parks, workshops, recreational centres, and community gathering points to capture diverse consumption patterns. This approach was necessary due to the absence of a sampling frame for alcohol consumers and the informal nature of alcohol purchasing behaviour.

Data were collected using a structured questionnaire administered through a mixed-mode approach (Google Forms and face-to-face). The instrument measured alcohol packaging restrictions and four dimensions of substitution behaviour: product form switching, cross-category substitution, informal/illicit alcohol substitution, and alternative substance substitution. A 4-point Likert scale was used to eliminate neutral responses. Content and face validity were established through expert review, while reliability was assessed using Cronbach's Alpha. Data were analysed using descriptive and inferential statistics. Partial Least Squares Structural Equation Modelling (PLS-SEM) was employed due to its suitability for complex relationships and moderation analysis. The measurement model was evaluated using Cronbach's Alpha, Composite Reliability (CR), and Average Variance Extracted (AVE), while discriminant validity was assessed using the Fornell-Larcker criterion and Heterotrait-Monotrait (HTMT) ratio. The structural model was examined using path coefficients, t-values, p-values, coefficient of determination (R^2), predictive relevance (Q^2), Standardized Root Mean Square Residual (SRMR), and Normed Fit Index (NFI). Bootstrapping was used to test the significance of relationships, and moderation analysis assessed the effect of income level through interaction terms.

Results and Data Analysis

Table 1: Descriptive Statistics (n=384)

Construct	Mean	Std. Dev
Alcohol packaging restrictions (APR)	2.41	1.12
Product form switching (PFS)	2.88	1.18
Cross-category substitution (CCS)	2.56	1.09
Informal alcohol substitution (IAS)	2.14	1.03
Alternative substance substitution (ASS)	2.91	1.15
Income level (INC)	1.92	0.84

Source: Authors' computation (2026)

The descriptive statistics indicate moderate perceptions of APR among respondents (Mean = 2.41). Product form switching (Mean = 2.88) and ASS (Mean = 2.91) recorded the highest mean values, suggesting that consumers adjusted primarily by switching alcohol formats or adopting alternative stimulant products following the restrictions. CCS also recorded a moderate level (Mean = 2.56), indicating movement across alcoholic beverage categories. IAS recorded the lowest mean score (Mean = 2.14), suggesting relatively limited migration toward illicit or unregulated alcohol products. The mean score for INC (Mean = 1.92) further indicates that the sample was largely dominated by lower-income respondents.

Measurement Model Assessment

The measurement model was evaluated using internal consistency reliability, convergent validity, and discriminant validity.

Table 2: Internal Consistency Reliability and Convergent Validity

Construct	Items	Cronbach's Alpha	Composite Reliability	AVE
Alcohol Packaging Restrictions (APR)	4	0.812	0.874	0.635
Product Form Switching (PFS)	4	0.781	0.861	0.610
Cross-Category Substitution (CCS)	4	0.756	0.845	0.578
Informal Alcohol Substitution (IAS)	4	0.721	0.832	0.553
Alternative Substance Substitution (ASS)	4	0.804	0.872	0.629
Income Level (IL)	4	0.768	0.851	0.589

All constructs exceed recommended thresholds for Cronbach's Alpha (≥0.70), Composite Reliability (≥0.70), and AVE (≥0.50), indicating satisfactory reliability and convergent validity.

Table 3: Discriminant Validity (Fornell-Larcker Criterion)

The square root of AVE for each construct exceeded inter-construct correlations, confirming discriminant validity.

Construct	APR	PFS	CCS	IAS	ASS	IL
APR	0.797					
PFS	0.482	0.781				
CCS	0.436	0.521	0.760			
IAS	0.210	0.268	0.301	0.744		
ASS	0.533	0.489	0.455	0.276	0.793	
IL	0.392	0.344	0.318	0.205	0.401	0.768

Source: Authors' computation (2026)

Table 4: Discriminant Validity (Heterotrait-Monotrait – HTMT)

Construct	APR	PFS	CCS	IAS	ASS	INC
APR	-					
PFS	0.612	-				
CCS	0.557	0.671	-			
IAS	0.288	0.352	0.401	-		
ASS	0.689	0.634	0.592	0.366	-	
IL	0.498	0.441	0.406	0.267	0.511	-

Source: Authors' computation (2026)

All HTMT values are below the conservative threshold of 0.85, indicating that discriminant validity is established among all constructs. This confirms that Alcohol Packaging Restrictions, Product Form Switching, Cross-Category Substitution, Informal Alcohol Substitution, Alternative Substance Substitution, and Income Level are empirically distinct constructs. The highest HTMT

value (APR-ASS = 0.689) remains within acceptable limits, further supporting the adequacy of the measurement model.

Model Fit and Predictive Relevance

Table 5: Model Fit and Predictive Relevance Indicators

Indicator	Value	Interpretation
SRMR	0.061	Good model fit
NFI	0.842	Acceptable fit
Q^2 (PFS)	0.19	Weak predictive relevance
Q^2 (CCS)	0.15	Weak predictive relevance
Q^2 (IAS)	0.04	Low predictive relevance
Q^2 (ASS)	0.22	Weak–moderate predictive relevance

Source: Authors' computation (2026)

The SRMR value (0.061) indicates a good model fit, while NFI suggests acceptable model adequacy. The Q^2 values indicate that the model has weak to moderate predictive relevance, with stronger predictive power for alternative substance substitution compared to informal substitution behaviour.

Structural Model Assessment

The structural model was evaluated using path coefficients, t-values, p-values, and R^2 values.

Table 6: Coefficient of Determination (R^2)

Endogenous Variable	R^2	Interpretation
PFS	0.232	Weak to moderate
CCS	0.190	Weak
IAS	0.058	Weak
ASS	0.284	Weak to moderate

Source: Authors' computation (2026)

The model explains between 5.8% and 28.4% of variance in consumer substitution behaviours. Following Hair *et al*. (2019), these values indicate weak to weak-to-moderate explanatory

power, suggesting that while alcohol packaging restrictions significantly influence behaviour, additional socio-economic and environmental factors also play important roles.

Hypothesis Testing

Table 7: Structural Path Coefficients

Hypothesis	Path	β	t-value	p-value	Decision
Ho1	APR → PFS	0.482	6.38	0.000	Rejected
Ho2	APR → CCS	0.436	5.11	0.000	Rejected
Ho3	APR → IAS	0.210	1.61	0.108	Accepted
Ho4	APR → ASS	0.533	6.92	0.000	Rejected

Source: Authors' computation (2026)

Alcohol packaging restrictions significantly influence product form switching, cross-category substitution, and alternative substance substitution. However, the effect on informal alcohol substitution is not statistically significant. This indicates that consumer behavioural adjustment occurs mainly within formal and alternative consumption channels rather than through illicit alcohol markets.

Table 8: Moderating Effect of Income

Path	β	t-value	p-value	Decision
APR × IL → PFS	0.221	2.52	0.012	Supported
APR × IL → CCS	0.198	2.11	0.035	Supported
APR × IL → IAS	0.145	1.72	0.085	Not Supported
APR × IL → ASS	0.256	2.89	0.004	Supported

Source: Authors' computation (2026)

Income level significantly moderates the relationship between alcohol packaging restrictions and most dimensions of consumer substitution behaviour. This suggests that lower-income consumers are more responsive to packaging restrictions due to budget constraints, while higher-income consumers show weaker behavioural adjustments.

Discussion of Findings

The study found that alcohol packaging restrictions significantly influence product form switching among consumers in Rivers State. Rather than reducing alcohol consumption, consumers largely shifted from sachet products to bottled and canned alcoholic beverages. This indicates that the policy primarily altered packaging formats rather than overall consumption behaviour. The finding aligns with Nelson (2001) and Bruhn *et al*. (2026), who observed that consumers redirect demand toward available alternatives when preferred alcohol products are restricted. It also supports Consumer Choice Theory, which posits that individuals select utility-maximizing alternatives within existing constraints. This suggests that packaging restrictions alone may restructure alcohol consumption patterns without substantially reducing demand.

The results further show a significant relationship between alcohol packaging restrictions and cross-category substitution. Consumers shifted from sach*et al*cohol to other alcoholic beverages such as beer, bitters, and spirits, indicating strong substitutability within the alcohol market. This reflects a redistribution of demand across beverage categories rather than consumption reduction. Similar evidence is reported by Nelson (2001) and Opondo *et al*. (2022), who found that alcohol-control policies often shift consumption across categories. The finding reinforces the substitution effect in Consumer Choice Theory and suggests that isolated packaging restrictions may have limited effectiveness when alternative alcoholic products remain widely accessible.

In contrast, alcohol packaging restrictions showed no significant relationship with informal alcohol substitution. This suggests limited movement toward illicit or locally distilled alcohol following the policy. The result differs from Narasimha *et al*. (2023), who reported increased illicit alcohol consumption under restrictive regimes in India. The variation may be attributed to differences in enforcement strength, market structure, and consumer risk perception. In Rivers State, consumers may still perceive regulated alcohol as safer and more socially acceptable than informal alternatives. This implies that the policy did not significantly expand informal alcohol markets, although localized informal consumption cannot be completely ruled out.

Alternative substance substitution recorded the strongest effect among all outcomes. Consumers appeared to shift toward stimulant beverages and related substitutes following restrictions. This suggests a broader behavioural displacement effect, where consumption patterns are

redirected rather than eliminated. Similar findings are reported by Granger and Price (2017) and Asante and Kusi (2023), who observed substitution toward other psychoactive products following restrictive alcohol policies. The result extends Consumer Choice Theory beyond alcohol markets, showing that consumers seek alternative sources of utility when consumption constraints arise. From a policy perspective, this highlights the risk of unintended substitution into other potentially harmful substances if regulatory frameworks are not holistic.

Finally, income level significantly moderates the relationship between alcohol packaging restrictions and substitution behaviour. Lower-income consumers exhibited stronger behavioural adjustments, while higher-income consumers were less affected. This reflects the affordability-driven nature of sach*et al*cohol consumption and the greater flexibility of wealthier consumers. The finding is consistent with Sosso and Meka'a (2024) and Wigbout and Ogunyemi (2021), who emphasize income as a key determinant of alcohol consumption behaviour. It further supports Consumer Choice Theory by showing that economic constraints strongly shape consumption responses. The result also suggests that alcohol packaging policies may produce unequal behavioural effects across socio-economic groups, particularly affecting economically vulnerable consumers.

Conclusion

The study shows that alcohol packaging restrictions influence consumer substitution behaviour across different dimensions. Consumers tend to switch from sach*et al*cohol to bottled or canned alcoholic drinks and non-alcoholic alternatives such as energy drinks, while shifts to informal or illicit alcohol markets are not significant. This suggests that the policy changes consumption patterns rather than reducing alcohol use. Therefore, its public health impact depends on complementary interventions that address substitution effects and associated risks.

Recommendations

1. Regulatory authorities should continue enforcing alcohol packaging restrictions, as the findings show that such measures significantly influence consumer consumption behaviour.
2. Packaging restrictions should be accompanied by broader public health interventions aimed at reducing harmful alcohol consumption generally, rather than merely changing product formats. This would help minimize potential health risks associated with substitution toward larger-volume alcoholic products or alternative substances.

3. Government and relevant stakeholders should encourage the availability and affordability of non-alcoholic substitutes, particularly for low-income consumers who are more vulnerable to substitution behaviour.
4. Future alcohol control policies should account for income disparities, since lower-income consumers exhibit stronger behavioural responses to packaging restrictions.
5. Awareness initiatives should complement regulatory interventions by educating consumers on the broader health implications of harmful alcohol consumption, irrespective of packaging format.
6. Regulatory agencies should continuously monitor behavioural responses to packaging restrictions in order to detect emerging substitution patterns and address enforcement gaps that may encourage residual circulation of banned products.

Limitations of the Study

The study employed convenience and intercept sampling, which limits generalizability beyond Rivers State. Additionally, the cross-sectional design captures only short-term responses and cannot assess long-term changes in substitution behaviour following the packaging restrictions. Nevertheless, the study combined urban and rural respondents, employed established measurement and PLS-SEM techniques, and provided valuable contextual insights into consumer responses to alcohol packaging restrictions in Rivers State, Nigeria.

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