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Financial burden of risky behaviours: Effects of alcohol and tobacco use on household savings in Ghana

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ABSTRACT

This paper examines the effect of alcohol and tobacco use on Ghanaian adults' savings decisions. The dataset used for the study was obtained from the Ghana Socioeconomic Panel Survey. A recursive bivariate probit regression model was employed to address endogeneity between risky behaviours and savings decisions. The results revealed that participation in drinking and/or smoking significantly reduces the probability of household savings. The Average Treatment Effect shows that individuals who engage in risky behaviours are 34.2% less likely to save than those who do not. For persons who exclusively engage in these behaviours, as indicated by the Average Treatment Effect on the Treated, their average savings decrease by 64.5%. The heterogeneous analysis further reveals that drinking had a more severe financial impact than smoking: drinking reduced the likelihood of saving by 33.2% compared to 25.2% for tobacco. These findings reveal that smoking and alcohol consumption do more than harm health by making households less likely to save. Public-health and fiscal policies that target risky behaviours can deliver double dividends: improve overall health outcomes while concurrently strengthening household financial resilience.

Keywords: *alcohol consumption, household savings, Ghana, recursive bivariate probit regression model and tobacco use*

INTRODUCTION

This study defines participating in drinking and smoking as risky behaviours. Globally, participation in these behaviours is a foremost public health issue. This is because of the considerable health and financial costs they impose on society. Movendi International (2022) reports that globally, the economic costs of alcohol are estimated at $1,306 per adult, translating into 2.6% of GDP. Most of these costs emanate from workplace absenteeism and productivity losses. The World Health Organisation projects that smoking costs more than US$1 trillion worldwide annually, mostly because of lost productivity and healthcare

costs, which especially affects poorer and middle-income countries (U.S. National Cancer Institute & WHO, 2016).

Domestic savings are needed to stimulate economic growth in the short and long run. At the individual level, saving habits are vital for keeping a household financially stable. Savings protect households against unforeseen costs. This helps families to meet future demands. Families can save money to build assets, take investment opportunities, ensure they have enough money for retirement, buy or fix up their houses, pay off debt, and get access to important social services (Mori, 2019; Samantaraya & Patra, 2014). Nevertheless, lifestyle choices can greatly influence an individual's saving behaviour. Involvement in risky behaviours, especially smoking and alcohol use, is a major component affecting a person's ability to save. Though a sporadic drink or a cigarette packet could seem insignificant, the long-term costs of these habits can be rather high, finally having a major unfavourable influence on saving behaviour.

Several studies have examined the various factors that impact household savings, such as Baidoo et al. (2018), Heckman and Hanna (2015), Maftuhin and Kusumawardani (1920), Mori (2013), Mumin et al. (2013), and Samantaraya and Patra (2014). Six categories of determinants of household savings are economic factors, demographics, risk tolerance, financial literacy, policy, institutional factors (including tax policies), cultural, social aspects, and unexpected events and economic shocks. Despite extensive research on household savings, the impact of risky behaviours on savings decisions is still evolving. While some studies have examined different aspects of risky behaviour, none have examined whether it is associated with a person's decision to save at the household level. Compared with economic factors such as income, education and interest rates (Jongwanich, 2010; Lotto, 2022; Samantaraya & Patra, 2014), the impact of lifestyle on saving behaviour has been ignored in previous studies. By analysing how risky behaviours affect household savings and determining whether the effects are different for smokers and drinkers, this paper seeks to close this gap. The hypotheses underpinning this study are that participation in risky health behaviours, specifically alcohol consumption and tobacco use, has a significant negative causal impact on the likelihood of household saving in Ghana. Furthermore, this negative impact varies depending on the behaviour: drinking alcohol is probably going to reduce the probability of saving more than using tobacco.

There are two main ways in which this study advances knowledge. First, it creates a link between financial outcome (savings) and individual behaviour (drinking and smoking). Prior research typically looked at risky behaviours in relation to their effects on health. However, this study examines their impact on financial behaviour, specifically household savings, thereby incorporating behavioural insights into savings models. According to our research, households suffer serious financial consequences resulting from risky behaviour. Hence, this

study advances our knowledge of how non-financial behaviours affect financial outcomes. Additionally, the study used a recently developed recursive bivariate probit model by Coban (2021) to address the endogeneity between risky behaviour and household savings decisions. Understanding how much of a variable's observed impact is attributable to its indirect effect through the endogenous variable, risky behaviours, is made more straightforward by this model's division of marginal effects into direct and indirect components.

METHODOLOGY

2.1 Data source

This study utilised data from the Ghana Socioeconomic Panel Survey (GSPS), a collaborative effort between the Institute of Statistical, Social and Economic Research (ISSER) at the University of Ghana and the Economic Growth Centre at Yale University. The datasets are available on the Harvard University Dataverse project page (Osei et al., 2022). The analysis utilised data from the first three waves (2009/2010, 2014/2015, and 2018/2019), focusing on demographics, household characteristics, and health, among other factors, after excluding records with missing values on key variables. Children were excluded since the study focused on adults aged 18 and above.

Ethical approval for this research was granted by the Research Ethics Review Board of the Simon Diedong Dombo University of Business and Integrated Development Studies (SDD-UBIDS). The study utilised publicly available, fully anonymised secondary data from the GSPS; therefore, informed consent had been obtained during the original data collection by the dataset custodians. All ethical standards regarding the use of secondary data were strictly observed, as no identifiable information was used in the analysis.

2.2 Theoretical framework

The study is grounded in Time Preference Theory (Fisher, 1930). The theory postulates that individuals differ in the extent to which they value present consumption relative to future welfare. Individuals with a high time preference rate place short-term satisfaction ahead of long-term financial stability. Smoking and drinking are examples of risky behaviours that offer immediate benefits at a recurring cost, reducing the amount of money available for savings. According to the current framework, risky behaviours are visible examples of a strong present bias. The tendency to undervalue future benefits lowers one's drive to save money for unexpected expenses. As such, it is predicted that households under the direction of persons with a clear time preference will constantly display lower savings rates. Time preference is also critical in a domestic setting. Intra-household financial conflicts resulting from variations in the intertemporal preferences of its members, especially when one member shows present-biased leanings, may impair a household's capacity to save money. Frequent tobacco or alcohol consumption and high future healthcare costs exacerbate

financial vulnerability by crowding out family savings. Therefore, Time Preference Theory gives a clear basis for anticipating that risky behaviour lowers household savings.

2.3 Econometric Model

This study suggests that risky behaviours could affect household savings decisions. Engaging in drinking and smoking would likely lower household savings because of expenditures on alcohol and cigarettes, as well as likely future medical costs. A recent study by Sekyi et al. (2025) posits that the decision to engage in risky behaviours is endogenous. This suggests that unobserved factors such as risk tolerance or personality traits might affect both the decision to save and the tendency to engage in risky behaviours. If we ignore endogeneity concerns, one may overstate or understate the influence of risky behaviour on household savings decisions. The study uses the recursive bivariate probit model suggested by Coban (2021), in equations (1) and (2), as follows: the reduced form equation for the possibly endogenous variable (risky behaviour) and a structural form equation for the household savings decision.

$$y_1^* = x_1'\beta_1 + \delta y_2 + \mu_1, \qquad y_1 = 1\,[y_1^* > 0] \tag{1}$$

$$y_2^* = x_2'\beta_2 + \mu_2, \qquad y_2 = 1\,[y_2^* > 0] \tag{2}$$

$$\text{With } \begin{pmatrix}\mu_1\\ \mu_2\end{pmatrix} \sim N\left[\begin{pmatrix}0\\ 0\end{pmatrix}, \begin{pmatrix}1 & \rho\\ \rho & 1\end{pmatrix}\right]$$

Where y_1* is the latent variable for household savings decisions with y_1 being its observed outcome; y_2* is the latent variable for risky behaviour (drinking and smoking) with y_2 being its observed outcome; x_1 and x_2 are vectors of independent variables that determine household savings and risky behaviour, respectively. β_1 and β_2 are vectors of coefficients for household savings and risky behaviour, respectively; δ is the coefficient capturing the effect of risky behaviour on household savings. μ_1 and μ_2 are error terms allowed to be correlated [cov $(\mu_1,\mu_2) = \rho$]. This correlation (ρ) accounts for the potential endogeneity between risky behaviour and household savings.

An exclusion restriction, which uses a variable that influences risky behaviour but not savings directly, ensures the model is properly identified. This helps isolate the causal effect and improves the validity of the model's estimation. The study introduced a variable, called social time, which is employed as an instrument. This variable is a dummy, assigned a value of 1 if the household head spends more than an hour per week with any member, and 0 otherwise. We believe that the amount of time the head of the household spends with family members is a reliable indicator of risky behaviour. Spending quality time improves family connections and social support. Thoits (2011) suggests that these supports lower the likelihood of engaging in risky activities. The study proposes that social time impacts risky

behaviour, but it does not influence household savings directly, except through its effect on behaviour.

Because probit models lack a straightforward economic interpretation, the significance of variables is typically evaluated by calculating marginal effects. According to Greene (2018), the Average Treatment Effect (ATE), the Average Treatment Effect on the Treated (ATET), and the Average Treatment Effect on Conditional Probability (ATEC) of the binary endogenous regressor (y_2) are defined in equations (3)-(5):

$$ATE = \frac{1}{n}\sum_{i=1}^{n} \psi(x_1'\beta_1 + \delta) - \psi(x_1'\beta_1) \quad (3)$$

$$ATET = \frac{1}{n_2}\sum_{i=1}^{n_2} \psi\left(\frac{x_1'\beta_1 + \delta - \delta\rho x_2'\beta_2}{\sqrt{1-\rho^2}}\right) - \psi\left(\frac{x_1'\beta_1 - \rho x_2'\beta_2}{\sqrt{1-\rho^2}}\right) \forall y_{2i} = 1 \quad (4)$$

$$ATEC = \frac{1}{n_2}\sum_{i=1}^{n_2} \psi\left(\frac{\psi_2(x_1'\beta_1 + \delta\rho x_2'\beta_2)}{\psi(x_2'\beta_2)}\right) - \left(\frac{\psi_2(x_1'\beta_1 - x_2'\beta_2 - \rho)}{\psi(-x_2'\beta_2)}\right) \quad (5)$$

Greene (2018) suggests that the marginal effects can be decomposed into direct and indirect components. Subsequently, the marginal effects for continuous variables can be calculated as demonstrated in equation (6).

$$ME = \frac{\gamma Pr}{\gamma\binom{x_{1T}}{x_{1E}}} = \underbrace{\frac{\gamma Pr}{\gamma x_{1T}}}_{direct\ effect} + \underbrace{\frac{\gamma Pr}{\gamma x_{1E}}}_{indirect\ effect} \quad (6)$$

The marginal effects for discrete variables can likewise be calculated as shown in equation (7)

$$ME = \underbrace{|\ Pr\ |_{x_{1T}=1} - |\ Pr\ |_{x_{1T}=0}}_{direct\ effect} + \underbrace{|\ Pr\ |_{x_{1E}=1} - |\ Pr\ |_{x_{1E}=0}}_{indirect\ effect} \quad (7)$$

RESULTS AND DISCUSSIONS

3.1 Descriptive statistics

Table 1 presents descriptive statistics for all variables used in the analysis, summarising the demographic, socioeconomic, and health-related characteristics of the sampled adult population in Ghana. About 24.7% of household heads report saving with a financial institution or another formal channel. This finding indicates a low level of formal savings participation. Risky behaviour, which is defined as drinking alcohol and/or using tobacco, was reported by 19.7% of respondents. Even though the average amount of risky behaviour is quite low, subsequent analysis reveals that it has substantial financial repercussions. Males

make up 45% of the sample, and the average age is 42.7 years. With a mean score of 0.603 on a five-point scale, the educational level is typically low. The average dependency ratio is 15.85, reflecting the large number of dependents typical of many Ghanaian households. Regarding health indicators, 33.7% of individuals report a chronic illness. Subjective social welfare, measured on a ten-point ladder, has a mean of 4.03, suggesting moderate well-being. Finally, the instrumental variable, social time, defined as time spent by household heads with household members for more than one hour per week, has a mean of 0.114, showing that only a small proportion engage in regular, time-intensive social interaction

Table 1: Variables, measurement and descriptive statistics

Variable	Measurement	Mean	SD
Dependent variable			
Savings	Dummy: 1 = if household head saves with banking institutions and others; 0 = otherwise	0.247	0.431
Key variable			
Risky behaviour	Dummy: 1 = if a person consumes alcoholic beverages and or smokes or chews tobacco, 0 otherwise	0.197	0.398
Controls			
Gender	Dummy: 1 = male; 0 = otherwise	0.45	0.498
Age	Continuous: positive whole numbers in years	42.733	17.5
Education	Ordinal: measured on a five-point scale ranging from 0 for no formal education to 4 as the highest educational level attained	0.603	0.89
Dependency ratio	Continuous: number of household members age ≤14 and > 64 to those age 15–64 years old	15.851	9.319
Chronic illness	Dummy: 1 = if a person is exposed to chronic illness (sores, irritations and/or numbness); 0 = otherwise	0.337	0.473
Subjective social welfare	Ordinal: measured on a 10-point ladder	4.025	2.812
Wealth index	Continuous positive and negative numbers generated from housing and assets characteristics using Multiple Correspondence Analysis	-0.245	1.242
Instrumental variable			
Social time	Dummy: 1 = if the household head spends more than one hour per week with any member; 0 = otherwise	0.114	0.318

Note: SD is the standard deviation

3.2 Empirical results on the determinants of risky behaviour and savings

Table 2 reports the estimates from the recursive bivariate probit model. The statistically significant Wald chi-square statistic indicates that the model provides a good fit to the data. Moreover, the Wald test of exogeneity for the null hypothesis that $\rho = 0$ is rejected, implying a non-zero correlation between the error terms of the risky behaviour and savings equations. This confirms the presence of endogeneity, validates the use of an instrumental variable, and supports the appropriateness of employing the recursive bivariate probit framework.

From the perspective of household economic models, the findings can be interpreted through both unitary and collective decision-making frameworks. The unitary model treats the household as a single decision-making entity that maximises a joint utility function subject to a common budget constraint. Under this framework, saving, consumption, and expenditure on risky goods such as alcohol and tobacco are assumed to reflect a coherent set of household preferences. In contrast, the collective model recognises that households comprise multiple individuals with heterogeneous preferences, bargaining power, and intertemporal priorities. Consequently, household saving behaviour and engagement in risky activities arise from intra-household negotiation and cooperation rather than from the optimisation of a single representative agent.

Table 2: Recursive probit results of the determinants of risky behaviour and savings

Variable	Risky behaviour	Savings
Risky behaviour	–	-1.470***
	–	(0.071)
Gender	0.677***	0.339***
	(0.024)	(0.032)
Age	0.009***	0.003***
	(0.001)	(0.001)
Education	-0.073***	0.152***
	(0.014)	(0.016)
Dependency ratio	0.006***	0.000
	(0.001)	(0.001)
Chronic illness	0.283***	0.059**
	(0.021)	(0.024)
Subjective social welfare	-0.035***	-0.003
	(0.004)	(0.004)
Wealth index	-0.043***	-0.105***
	(0.009)	(0.008)
Social Time	-0.280***	–
	(0.020)	–
Constant	-1.371***	-0.715***
	(0.045)	(0.030)
Atanrho	1.198***	
	(0.193)	
Rho	0.833***	
	(0.059)	
Wald test of rho=0	38.6315***	
Observations	21,495	
Wald	7,206.18	
Log-likelihood	-21,218.308	

Note: Standard errors in parentheses. *p < 0.1, **p < 0.05, ***p < 0.01.

The empirical findings show that while education, subjective social welfare, wealth, and social time decrease the likelihood of engaging in risky behaviour, gender, age, dependency ratio, and chronic illness increase it. These results show patterns that suggest intra-household heterogeneity, especially along gender and age lines, which influence bargaining dynamics over resource allocation and choices involving risky consumption when interpreted through the collective model. Male-headed households, for instance, may indicate more present-

biased preferences and greater male bargaining power, which may lead to increased engagement in risky behaviours. However, cooperative norms and longer-term planning appear to be supported by higher levels of education and stronger social ties (measured by social time), which reduces risky consumption choices.

The analysis of the factors influencing savings reveals that risky behaviour is a negative predictor of household savings. The intuition under the unitary household framework is that the utility a member derives from immediate consumption, such as a cigarette or a drink, competes directly with future consumption, weakening the incentive to save. The collective model reveals a subtler mechanism. When one member engages in these habits, the household's limited resources are redirected toward that person's consumption or possible health-related costs. This reduces the income available to others and constrains the household's overall saving capacity. In effect, one individual's behaviour creates an intra-household externality that lowers the welfare and financial security of other members. These findings align with earlier studies. Wang et al. (2006) and Zagorsky (2004) found that smoking is associated with lower net worth.

The gender (male) variable positively affects household savings, suggesting that men are more likely to save than women. In a unitary model, this may reflect higher male incomes or stronger savings preferences. Under the collective model, the interpretation is more nuanced. In Ghanaian households, men typically hold greater decision-making authority, giving them more control over resource allocation, including savings. Women's lower saving propensity may therefore stem from limited control over household income rather than weaker preferences. This finding aligns with earlier evidence (Sakyi-Nyarko et al., 2022; Wagner & Walstad, 2023). Persistent gender wage gaps also place men in higher-paying jobs, leaving women with less disposable income after meeting basic needs (Pocock, 2016; Oppong & Bannor, 2022; Mori, 2019).

Age positively influences household savings, a finding consistent with both unitary and collective household models and aligned with the Life-Cycle Hypothesis (Modigliani & Brumberg, 1954). Older individuals approaching retirement are more inclined to save and often hold greater authority within households, giving them a stronger influence over financial decisions. From a life-cycle perspective, people save little when young, as earnings are low and debt levels are high. As incomes rise and financial obligations ease, they increase savings and work towards building retirement security. During middle age, saving rates typically peak, creating a virtuous cycle that strengthens long-term financial stability. Later in life, households reduce savings as they accumulate and draw on assets to support retirement. Thus, saving rates rise with age until middle adulthood, then stabilise or decline.

Education has a positive effect on household savings. This outcome agrees with both the unitary and collective models, but especially fits with the latter. Education improves financial literacy, awareness of intertemporal trade-offs, and individual bargaining power in the collective context. This improves collaborative saving behaviour and lowers informational inequalities within the family. The result supports earlier studies linking education with saving outcomes (Baidoo et al., 2018; Burney & Khan, 1992; Mori, 2019). Education is expected to increase financial literacy by giving individuals the tools necessary to make wise choices about spending, saving, and long-term financial planning. Enhanced financial literacy, for example, helps people better grasp savings vehicles, interest rates, and investment possibilities, hence encouraging more sensible and forward-looking financial conduct (Mori, 2019).

Household savings are positively correlated with chronic illness. The precautionary saving drive, incorporated both unitary and collective household models, can logically account for this result. From the unitary paradigm, chronic illness makes families save as a kind of self-insurance as a precaution against future medical costs and possible loss of income. The collective model offers a complementary explanation: chronic illness can start cooperative financial behaviour where family members especially treasure savings to shield against health-related financial risks suffered by the afflicted individual. On the other hand, wealth has a negative influence on household savings.

3.3 Decomposition of marginal effects

The decomposition of the estimated marginal parameters into their direct and indirect effects is presented in Table 3. The direct effect captures the influence of a variable on savings decisions through its immediate association. In contrast, the indirect effect reflects the variable's impact on savings decisions via its influence on risky behaviour. The overall effect is calculated by summing the direct and indirect effects, allowing us to assess whether these effects offset each other for certain predictors in terms of their estimated probability. For example, the dependency ratio and subjective social welfare do not exert direct effects on saving behaviour but influence it indirectly through their impact on risky behaviour. Specifically, an increase in the dependency ratio indirectly raises the probability of saving, whereas a higher perceived subjective social welfare indirectly reduces it. Consequently, the total effects of the dependency ratio and subjective social welfare become significant in influencing household savings decisions.

Table 3: Decomposition of marginal effects

Variable	Direct Effect	Indirect Effect	Total Effect
Gender	0.024***	0.008***	0.032***
	(0.003)	(0.003)	(0.002)
Age	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)
Education	0.011***	-0.001**	0.010***
	(0.001)	(0.000)	(0.001)
Dependency ratio	0.000	0.000**	0.000
	(0.000)	(0.000)	(0.000)
Chronic illness	0.004**	0.003**	0.008***
	(0.002)	(0.001)	(0.002)
Subjective social welfare	-0.000	-0.000**	-0.001**
	(0.000)	(0.000)	(0.000)
Wealth index	-0.008***	-0.001**	-0.008***
	(0.001)	(0.000)	(0.001)
Social Time	–	-0.003***	-0.003***
	–	(0.001)	(0.001)

Note: Standard errors in parentheses; *p < 0.1, **p < 0.05, ***p < 0.01.

3.4 Impact of risky behaviour on household savings decisions

The treatment effects of risky behaviour on the probability of saving are presented in Table 4.

Table 4: Treatment effects of risky behaviour on savings

Treatment Effects	Parameter	Standard Error
Average Treatment Effect (ATE)	-0.342***	0.015
Average Treatment Effect on the Treated (ATET)	-0.645***	0.046
Average Treatment Effect on Conditional Probability (ATEC)	-0.036***	0.008

Note: ***p < 0.01.

The estimated coefficients are statistically significant across all three treatment parameters, namely the Average Treatment Effect (ATE), the Average Treatment Effect on the Treated (ATET), and the Average Treatment Effect on the Conditional Probability (ATEC), with p-values below 0.01. These results indicate a robust relationship between risky behaviour and the likelihood of saving. These findings also reveal that the probability of savings is negatively impacted by risky behaviour. The ATE results demonstrate that, on average, persons who engage in risky behaviour experience a 34.2% reduction in the likelihood of saving compared to those who do not participate in such behaviour. For persons who only engage in risky behaviour, the impact of engaging in drinking and smoking, measured by the ATET, is -0.645. This result indicates that, on average, the savings of individuals who drink or smoke are 64.5% lower than those of non-drinkers and non-smokers.

3.5 Disaggregated analysis: drinkers vs. smokers

We re-estimated the model by disaggregating risky behaviour into alcohol consumption and tobacco use to assess their individual effects on household saving decisions. Only the treatment effect estimates are reported here; full results are presented in Table 5. The findings indicate that alcohol consumption exerts a substantially greater negative effect on savings than tobacco use. The ATE suggests that smoking reduces the probability of saving by 25.2%, whereas alcohol consumption reduces it by 33.2%. Among actual users, the effects are considerably larger: alcohol consumption decreases the likelihood of saving by 73.4 percentage points, compared with 43.7 percentage points for tobacco use. These results demonstrate that the financial impact of risky behaviours is markedly stronger among individuals who engage in them, with alcohol consumption posing the most severe constraint on household saving.

Table 5: Treatment effects of alcoholic consumption and tobacco use on savings

	Alcoholic consumption		Tobacco use	
Treatment Effects	**Parameter**	**Standard Error**	**Parameter**	**Standard Error**
ATE	-0.332***	0.013	-0.252***	0.007
ATET	-0.734***	0.047	-0.437***	0.035
ATEC	-0.020**	0.008	0.083***	0.026

Note: **p < 0.05, ***p < 0.01.

3.6 Robustness checks and test for instrument validity

We present the estimated results using an alternative econometric approach, specifically the Instrumental Variable Probit (IV Probit) model, to assess the robustness of our findings. Table 6 displays the IV Probit results. When we compare the recursive bivariate probit

estimated coefficients with those from the IV Probit model, the results appear quite similar. This suggests that our estimates are consistent, indicating stable and reliable estimates. The findings show that participation in risky behaviour significantly decreases the likelihood of savings. The Wald test's results for exogeneity confirm that risky behaviour and savings are endogenous. As anticipated, the first-stage regression shows that social time is a negative predictor of risky behaviour, suggesting that increased social time lowers the likelihood of engaging in such behaviour. Notably, the first-stage F-statistics exceed 10, demonstrating that our instrument is strongly associated with risky behaviour, confirming its relevance.

To further evaluate the validity of the instrumental variable and to confirm the presence of endogeneity in risky behaviour, the Smith-Blundell Test (1986) was implemented as an additional robustness procedure. In the first stage, risky behaviour was regressed on the instrumental variable—social time—and all exogenous covariates to obtain the generalised residuals. These residuals capture the part of risky behaviour that may be correlated with unobserved factors influencing household savings. In the second stage, the structural savings equation was re-estimated by including both the predicted risky behaviour variable and the first-stage residuals as regressors. A statistically significant coefficient on the residual term indicates that risky behaviour is endogenous and that the instrument successfully accounts for this endogeneity, thereby supporting its relevance and validity. Therefore, this two-step Control Function procedure provides an additional diagnostic check on instrument validity within the non-linear framework employed in this study. These results are presented in Table 7.

Table 6: Instrumental variable probit regression results

Variable	Risky behaviour	Savings
Risky behaviour	–	-2.622***
	–	(0.014)
Gender	0.191***	0.501***
	(0.006)	(0.016)
Age	0.002***	0.006***
	(0.000)	(0.000)
Education	-0.025***	-0.039***
	(0.003)	(0.013)
Dependency ratio	0.002***	0.004***
	(0.000)	(0.001)
Chronic illness	0.080***	0.199***
	(0.006)	(0.016)
Subjective social welfare	-0.008***	-0.020***
	(0.001)	(0.003)
Wealth index	-0.008***	-0.032***
	(0.002)	(0.008)
Social Time	-0.025***	–
	(0.007)	–
Constant	-0.061	0.033***
	(0.039)	(0.011)
Athrho	2.874***	
	(0.345)	
Lnsigma	-0.963***	
	(0.005)	
Rho	0.994***	
	(0.004)	
Sigma	0.382***	
	(0.002)	
Observations	21,495	
Wald	40,690.18***	
Log-likelihood	-21,148.433	
Wald test of exogeneity (Rho=0)	69.47***	
First stage F-statistics	12.745	

Note: Standard errors in parentheses; *p < 0.1, **p < 0.05, ***p < 0.01.

In addition to providing a theoretical justification for the exclusion restriction, we formally

assessed whether the instrument influences household savings only through risky behaviour. As the model employs a single instrument for a single endogenous regressor, conventional over-identification tests such as the Sargan or Hansen tests are not applicable. We rather estimated an auxiliary reduced-form regression in which Social Time was included directly in the savings equation without risky behaviour. The coefficient on Social Time was found to be statistically insignificant, implying that the instrument does not directly influence savings and thus meets the exogeneity condition (see Table 7, the final column).

Table 7: Results for instrument validity test

Variable	Smith-Blundell Test		Reduced-form regression
	OLS estimates	Probit estimates	Probit estimates
Risky behaviour	–	-0.178***	–
	–	(0.026)	–
Gender	0.191***	4.452***	0.015
	(0.006)	(0.293)	(0.022)
Age	0.002***	0.051***	-0.002**
	(0.000)	(0.003)	(0.001)
Education	-0.025***	-0.349***	0.227***
	(0.003)	(0.040)	(0.012)
Dependency ratio	0.002***	0.035***	-0.004***
	(0.000)	(0.003)	(0.001)
Chronic illness	0.080***	1.765***	-0.105***
	(0.006)	(0.125)	(0.021)
Subjective social welfare	-0.008***	-0.180***	0.016***
	(0.001)	(0.013)	(0.003)
Wealth index	-0.008***	-0.285***	-0.107***
	(0.002)	(0.014)	(0.009)
Social Time	-0.025***	–	0.575
	(0.002)	–	(0.380)
Residuals	–	-23.111***	–
	–	(1.531)	–
Constant	0.033***	-0.538***	-1.301***
	(0.011)	(0.036)	(0.047)
Observations	21,495	21,495	21,495
F-statistics/LR	285.55***	1,557.55***	1,509.49***
R-squared/ Pseudo R2	0.0961	0.0643	0.0623
Log-likelihood	–	-11,340.649	-11,364.678

Note: Standard errors in parentheses; *p < 0.1, **p < 0.05, ***p < 0.01.

CONCLUSION

The study analysed risky behaviours on household savings in Ghana. The dataset was obtained from the Ghana Socioeconomic Panel Survey. The recursive bivariate probit model was utilised to mitigate endogeneity issues. Our study provides evidence that risky behaviours adversely affect the welfare of Ghanaians by reducing household savings. It is striking that alcohol usage has a more negative effect on savings than smoking, suggesting that drinking has a greater impact on household finances, thus creating a greater financial burden for households.

From a policy standpoint, our findings recommend a holistic approach to deal with risky behaviours. While arguments for tobacco taxes, smoking-cessation programmes, and alcohol-advertising restrictions have long rested on public-health grounds, our research adds a compelling economic dimension. By presenting cessation not merely as a health choice but as a smart financial decision, we can better motivate individuals, especially those who prioritise financial security, to adopt healthier lifestyles. This dual-framed approach offers a powerful lever to accelerate both public-health outcomes and economic well-being. Also, integrating financial literacy into public health programmes that target substance use can strengthen the impact of both initiatives. By highlighting the long-term economic opportunity costs of smoking and drinking, such as lost income, higher medical expenses, and reduced savings, individuals may feel a stronger personal stake in adopting healthier habits. When health messages are paired with concrete financial realities, they resonate on two levels: the well-being of the body and the stability of the wallet.

Although this research offers strong evidence on the financial effects of risky behaviours, several limitations warrant consideration. First among the self-reported indicators used in the study are smoking, alcohol use, and saving behaviour. Reporting and remembering bias might affect such information. Though the recursive bivariate probit model using an instrumental variable addresses endogeneity, it cannot account for measurement error in self-reported data. The anticipated results, therefore, might be modest rather than a genuine underlying connection. Second, the empirical study is static; it only catches the concurrent relationship between risky behaviours and household savings. The modelling framework is unable to evaluate dynamic or long-term consequences. For instance, one might ask how financial stability is affected by accumulating exposure to risky activities or how changes in health, income, or life-cycle circumstances change this link. Therefore, the research cannot establish whether the financial effect of risky conduct increases or decreases with age, for instance. Future studies using dynamic panel models or long-term longitudinal data will provide evidence on these intertemporal mechanisms and expand knowledge of how risky habits influence household economic resilience over the life cycle.

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Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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