Warning labels on super alcohol: a perspective on the application of prevention policies to enhance citizens' trust and improve public health

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Abstract

This research explores the potential impact of introducing warning labels on super alcohol bottles in Italy, with the dual objective of improving citizen satisfaction with government initiatives and reducing harmful alcohol consumption. By leveraging a randomized controlled trial (RCT) across major Italian cities, the study evaluates two key dimensions: public trust in government health initiatives and changes in alcohol purchasing behavior. The research employs two linear models—one assessing citizen satisfaction and the other focused on alcohol purchase —while accounting for demographic, economic, and regional factors. Building on principles of behavioral economics, the study investigates whether these warning labels can serve as an effective nudge to alter consumption patterns, similar to the success of tobacco warning labels. Additionally, the project seeks to enhance the government's brand value by demonstrating proactive public health efforts. Through a combination of survey data and fidelity card transactions, this research provides evidence-based recommendations for policymakers to reduce alcohol-related health risks and improve government-citizen relations in a culturally sensitive context.

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Executive Summary

Citizen dissatisfaction with Italy's National Healthcare System is increasing, with over half of the population expressing concerns about its quality in 2024. To address this issue, we propose a public health intervention: the **introduction of warning labels on super alcohol bottles** to raise awareness about the risks.

This research aims to evaluate the effectiveness of warning labels as a tool for (i) **improving citizen satisfaction** with government initiatives and (ii) **reducing alcohol consumption**. Our study will conduct a Randomized Controlled Trial (RCT) across major Italian cities and two models will assess the effects: one to measure the citizen satisfaction and another to evaluate super-alcohol purchases.

Key findings will offer insights into whether warning labels can enhance trust in government actions and positively influence public health. By focusing on both health and government-citizen relations, this study seeks to **provide actionable recommendations** for policymakers to improve the overall satisfaction of public services and reduce alcohol-related healthcare costs.

Motivation

Citizen satisfaction is a crucial factor for the stability and success of public services, which makes the declining trust in government healthcare systems a **significant challenge**. According to the STADA Health Report of 2024, 52% of the Italian population is not satisfied with the National Healthcare System (NHS), a figure higher than in 2019. The Report suggests that the main drivers of dissatisfaction are the difficulty to book medical appointments, along with inadequate standards and lack of prevention services.

On September 18, a press conference titled "Risk Reduction: From Personal Freedom to the Protection of Public Health" was held in the Chamber of Deputies, organized by the parliamentary intergroup "Lifestyle and Risk Reduction." On this occasion, the president of the intergroup, the Honorable Simona Loizzo, remarked how reducing the disease burden and easing pressure on the NHS depend on accurate information, prevention strategies, and the reduction of inequalities. In line with this view, to address the concerning trend in citizen satisfaction with the NHS, we propose a prevention policy to fight alcohol abuse by inserting text and graphic warnings on super alcohol bottles.

Alcohol abuse, particularly in the case of super alcohol, poses significant health risks, including more than 200 diseases such as liver and heart diseases, various cancers, and mental health conditions ("Global Status Report on Alcohol and Health and Treatment of Substance Use Disorders," WHO). In Italy, where alcohol consumption is deeply rooted in cultural traditions, about 20% of men and nearly 10% of women engaged in harmful drinking behaviors in 2022, with 5% participating in binge drinking. Despite the known risks, alcohol consumption has not declined in the past 20 years (SISMA, Istituto Superiore di Sanità), largely due to misinformation and the persistence of myths surrounding alcohol ("Reporting about Alcohol: A Guide for Journalists," WHO).

By raising awareness and providing clear information about the risks of alcohol consumption, our proposal seeks to increase citizens' satisfaction in two key ways. First, it demonstrates the **government's transparency** and commitment to public health by taking visible, proactive measures to protect citizens. Second, it aims to alleviate the significant pressure that alcohol-related issues pose on the healthcare system. During the press conference at the Chamber of Deputies, Dr. Fabio Beatrice emphasized that 20% of the population engaging in unhealthy behaviors is the primary driver of diseases that significantly increase healthcare costs. Social and healthcare expenses directly linked to alcohol consumption are estimated to represent 1.3% of the European GDP (Istituto Superiore di Sanità). A decrease in alcohol consumption would help ease the burden on the NHS, leading to improved quality and accessibility of healthcare services, and consequently, higher citizen satisfaction.

Our choice of introducing warning labels to reduce consumption is informed by **behavioral economics**, where policies like **nudging** have proven effective in guiding consumers' decisions. By subtly influencing behavior without restricting choice, warning labels can encourage individuals to make healthier decisions. Studies such as Thaler and Sunstein (2008) have shown that nudges help guide individuals toward choices they would make if their rationality were not impaired.

Further justification for using warning labels comes from the success of **similar policies introduced for cigarette packaging**. For example, Ruiping Wang et al. (2021) demonstrated that 58.06% of smokers reported smoking cessation intentions due to graphic warning labels. This success highlights the feasibility of our proposal, especially since both cigarettes and super alcohol are state-regulated products.

Although this intervention shares similarities with tobacco warning labels, further research is needed to understand its impact on citizens' satisfaction. First, we aim to explore whether warning labels can effectively increase perceptions of government transparency and commitment, ultimately improving satisfaction with public services. Second, the effect on alcohol consumption is uncertain. While increasing awareness about risks of alcohol, the attention brought to this issue could backfire into an increase in consumption. Moreover, alcohol consumption is significantly more widespread and socially accepted than smoking, deeply rooted in Italian culture, which could make reducing consumption more challenging. Lastly, there is limited evidence on

how such policies impact the NHS and, specifically, citizen satisfaction with healthcare services. Therefore, we believe that the research we propose is both relevant and necessary to establish the full effects of this policy.

Research Purpose and Objective

In response to the urgent need to mitigate the harmful effects of alcohol consumption, particularly super alcohol, this study aims to evaluate the effectiveness of warning labels in Italy. The research seeks to assess the impact of these labels not only as a public health intervention but also as a tool for enhancing the brand value of the government by improving its relationship with the public. Unlike traditional approaches centered solely on policy, this study explores how warning labels can influence consumer behavior while simultaneously strengthening trust in the government, portraying it as a responsible entity committed to promoting health and safety.

The **first objective** of this research is to investigate whether these labels improve public trust in governmental health initiatives, thereby **increasing the government's brand value**. By focusing on how these interventions influence public perception of the government and health system in general, the study will explore the relationship between consumer behavior and the role of the state in protecting public health.

The **second objective** is to determine whether the introduction of warning labels on super alcohol bottles leads to a measurable **reduction in their purchase**, the aim of the Government decision. This is crucial in assessing the labels' effectiveness as a public health measure aimed at reducing harmful alcohol consumption. In addition, the research will examine the effects of these interventions across various demographic groups in Italy, such as age, gender, and socioeconomic status. Understanding how different segments of the population respond to the warning labels will provide insights into the varying degrees of effectiveness the intervention may have on consumer behavior and **citizen-government relations**.

Ultimately, the goal of this research is to provide **evidence-based recommendations** that can guide Italian policymakers from a Marketing point of view, not only health-oriented: we firmly believe that the positive externalities given by such policy implementation would be both from the point of view of general well-being but also from the Government appreciation.

In fact, by focusing on the dual outcomes of public health improvement and enhancing government-citizen relations, the findings will offer a framework for the adoption of labeling policies that reduce excessive alcohol consumption while also positioning the government as a trusted and caring entity. Given Italy's unique cultural relationship with alcohol, the study recognizes the need for context-specific solutions that account for both behavioral and social dynamics, also for firms that would see a decrease of their sales.

In conclusion, by drawing from behavioral economics and public health intervention strategies, this research aims to offer a scientifically grounded, actionable framework for reducing the harmful effects of super-alcohol consumption in Italy. At the same time, it will demonstrate how such public health interventions can positively influence the government's brand value, enhancing the state's role as a guardian of public well-being.

Data, Methods and Model

Experimental Design & Models

To evaluate the effectiveness of warning labels on super alcohol bottles, we will conduct a **Randomized Controlled Trial (RCT)** by randomly assigning supermarkets to either a treatment group, with new warning labels, or a control group, without labels in different big cities in Italy such as Rome, Milan, Genova, Florence, Naples, Palermo, Torino, Bologna, Bari. This setup allows us to identify the causal impact of the intervention on both customer satisfaction with public services and their purchasing behavior. The experiment will run for **one year**, providing ample time for consumer exposure and data collection.

To assess the impact of labeling policies, we are proposing **two standard linear regression models**, Model 1 measures citizen satisfaction while Model 2 focuses on alcohol purchases. In both models, controls are included to minimize omitted variable bias. Additionally, we added an interaction term that is 0 when assessing the general impact of the treatment, to not influence the interpretation of the coefficient, while it is activated only when studying the reaction of specific subgroups to the treatment.

Model 1: Linear Model for Citizen Satisfaction The **dependent variable** in this model is the citizen satisfaction score, denoted by satisfaction_i. The purpose of this model is to evaluate how the introduction of labels on liquors influences citizens' satisfaction with government actions.

The **target variable** is a dummy variable α_i , which is equal to 1 if individual i is assigned to a supermarket with labels on liquors and 0 if the individual is in the control group with no labels. The controls variables account for individual demographics and experiences.

Once assessed the significance of the target independent variable coefficient and its interpretation, we can also activate specific interaction terms between the treatment dummy α_i and control variables to assess how different characteristics influence the effect of labeling on satisfaction. The interaction terms, however, change

the interpretation of our targeted coefficient β_1 , then the new model must be used to target specific research questions, e.g. the effect of the treatment on a specific age group, or ethnicity.

The model is mathematically structured as follows:

$$\begin{aligned} \text{satisfaction}_i &= \beta_0 + \beta_1 a l \, p h a_i + \sum_{j=1}^5 \beta_{ji} \text{age_bin}_j + \beta_7 \text{gender}_i + \sum_{j=1}^2 \beta_{ji} \text{education}_{ji} + \beta_{10} \text{nationality}_i + \beta_{11} \text{smoking}_i \\ &+ \beta_{12} \text{ethnicity}_i + \beta_{13} \text{income}_i + \beta_{14} \text{pol_part}_i + \sum_{j=1}^4 \beta_{ji} \text{pol_ass}_i + \beta_{17} \text{health_usage}_i + \beta_{18} \text{pub_usage}_i \\ &+ \beta_{19} \cdot \text{health_usage}_i + \beta_{20} \cdot \text{informedness}_i + \sum_{i=1}^{21} \beta_{ji} \cdot \text{region}_{ij} + \sum_{p} \lambda_p (\alpha_i \cdot X_{ip}) + \epsilon_i \end{aligned}$$

Where $\alpha_i \cdot X_{ip}$ is the **Interaction term** between treatment α_i and control variables X_{ip} (such as age, education, or other variables). This term is 0 in the first estimation, while \neq 0 ("activated") once the target coefficient interpretation is analyzed. This allows us to capture how the effect of labeling differs depending on individual characteristics. Moreover λ_p is the coefficients capturing the marginal effect of the interaction term.

Model 2: Linear Model for Purchases of Super Alcohol The second model is designed to assess the efficacy of the labeling policy in reducing alcohol sales, which could contribute to future reductions in government healthcare spending. The **dependent variable** in this case is the total spending on alcohol by the individual. The model is the same as the previous one, with two differences: the dependent variable is now the cumulative super alcohol purchase of the individual *i*, and controls for the level of public commitment are omitted, as they are not reasonably related to the dependent variable.

$$\begin{aligned} \text{purchases}_i &= \beta_0 + \beta_1 a l \, p h a_i + \sum_{j=1}^5 \beta_{ji} \text{age_bin}_j + \beta_7 \text{gender}_i + \sum_{j=1}^2 \beta_{ji} \text{education}_{ji} + \beta_{10} \text{nationality}_i + \beta_{11} \text{smoking}_i \\ &+ \beta_{12} \text{ethnicity}_i + \beta_{13} \text{income}_i + \sum_{j=1}^{21} \beta_{ji} \text{region}_{ji} + \sum_p \lambda_p (\alpha_i \cdot X_{ip}) + \epsilon_i \end{aligned}$$

Variables & Data Collection: Primary and Secondary Sources

We will gather data using a combination of **surveys** and **fidelity card transactions** to measure our dependent variables and control for other relevant factors. Below, we describe how data for each model variable will be collected.

Primary Data Collection

Customer Satisfaction Score (satisfaction_i): This continuous variable, similar to the American Customer Satisfaction Index (ACSI), will be calculated from responses to a survey administered to customers in both treatment and control groups at the end of the study. The survey will assess customers' satisfaction with various aspects of public services, particularly focusing on the government's role in health and safety initiatives.

Respondents will be asked questions to evaluate three key concepts:

- Overall Satisfaction
- Expectancy Disconfirmation
- Comparison to an Ideal

Each concept will be rated on a 10-point scale. These dimensions will be aggregated into a single index using a weighted average, following the ACSI methodology. The index will be normalized to range from 0 to 100, with higher scores indicating greater satisfaction.

- **Purchase (purchase**_i**):** we gather data through **fidelity card** and we cumulate the purchase of the year putting purchase per capita
- Treatment Indicator (α_i): The treatment variable is binary, indicating whether the individual is in the treatment group. It is coded as a dummy variable: 1 if exposed to warning labels, 0 otherwise. This will be based on the supermarket assignment from the RCT and will be matched to each individual's survey response and purchasing data.
- Demographic Controls:

- **Age bins** ($\sum_{j=1}^{5} \mathbf{age_bin}_{j}$): Age will be collected through the **survey or fidelity card**, allowing us to place each respondent into six age categories: 18-19, 20-29, 30-39, 40-49, 50-59, 60+. This variable is coded as five dummy variables.
- Gender (gender_i): Gender data will also be collected via the survey or fidelity card. It is coded as a dummy variable: 1 for female and 0 for male.
- **Education level** ($\sum_{j=1}^{2}$ **education**_{ji}): Respondents will be asked to indicate their highest level of completed education in the **survey or fidelity card**. This will be recorded as a discrete variable: 1 for high school, 2 for bachelor, 3 for master or more. This variable is coded as two dummy variables.
- **Nationality (nationality**_i): Nationality will be collected through the **survey or fidelity card** and coded as a dummy variable: 1 for citizen, 0 for non-citizen.
- Smoking habits (smoking_i): Smoking status will be gathered in the survey, with respondents indicating
 if they are current smokers (1) or not (0). It is coded as a dummy variable. This variable helps control
 for other risk-taking behaviors.
- **Ethnicity (ethnicity**_i): This binary variable will capture whether the respondent identifies as belonging to an ethnic minority (1) or not (0), as indicated in the survey. It is coded as a dummy variable.
- Income (income_i): Income level will be reported by respondents in the survey, collected as a continuous variable representing their annual income.
- Additional Control Variables To control for political and healthcare-related behaviors, we will include:
 - Political participation (pol_part_i): The survey will ask, "Did you vote in the last election?" It is coded as a dummy variable: 1 if yes, 0 if no.
 - Political association (pol_ass_i): Respondents will indicate their political leanings: 1 for left, 2 for center, 3 for right, and 0 for no affiliation. This variable is coded as two dummy variables.
 - **Public healthcare usage (health_usage**_i): Respondents will report how many times they visited a public hospital in the last 6 months. This will be recorded as a continuous variable.
 - Preference for public or private services (pub_usage_i): The survey will include, "Do you generally use more public or private services?" Responses will be binary and it is coded as a dummy variable: 1 for public, 0 for private.
 - Informedness on political issues (health_usage_i): An ordinal scale (1 to 5) will measure how informed respondents feel about political and social issues (1 = completely uninformed, 5 = very well informed).
- **Region** ($\sum_{j=1}^{21} \operatorname{region}_{ji}$): Region of residence will be collected in the survey, coded as a binary variable for each region: 1 if the respondent resides in region j, 0 otherwise. It is encoded as 21 dummy variables. This accounts for geographic differences in alcohol consumption and access to public services.

Data Gathering Process & Measurement Rationale The fidelity card system will provide detailed records of individual alcohol purchases, which will be linked to survey data. Alongside transaction data, targeted surveys will be distributed to all participants at the end of the study. Surveys will be administered both online and in-store, ensuring a high response rate from both treated and control groups. This RCT-based approach, combining fidelity card data with survey responses, enables a rigorous analysis of the policy's impact on both consumption and citizen satisfaction. By using detailed purchase data alongside self-reported satisfaction measures, we ensure that the study captures both behavioral changes and shifts in public perception. This methodology allows us to control for individual, regional, and economic factors, providing robust insights into the effectiveness of warning labels as both a public health and marketing intervention.

Evaluation of Results and Expectation of Main Effects

After estimating the model via **ordinary least squares (OLS)**, we will evaluate the significance of the model using an **F-test**. If the F-test yields a **p-value** less than 0.05, we can conclude that the model is **statistically significant**, meaning there is a small probability that all coefficients are jointly zero.

Next, we will assess the significance of the treatment variable's coefficient using a **t-test**. If the t-test for β_1 (the coefficient on α_i) results in a **p-value** smaller than 0.05, we reject the **null hypothesis** of no effect. This allows us to statistically affirm that the treatment (labeling alcohol) has had a significant effect (positive or negative, based on the sign of β_1) on **customer satisfaction and alcohol spending**. We can interpret the coefficient β_1 as the **average change** in alcohol spending when an individual moves from the control group to the treatment group.

Once the interpretation and significance of β_1 are solid, we can activate the interaction terms that we want, to enable a more clear picture of the effects on specific groups. For the **interaction term**, the significance of the coefficients will also be evaluated using a t-test. If a significant interaction is found, the coefficient can be interpreted as the **additional marginal effect** (positive or negative) of the treatment on individuals who exhibit the characteristic identified by the control dummy variable that the coefficient refers to (e.g., specific age groups, education levels, etc.). These insights will enable us to understand how citizens react to the introduction of the new policy, with a focus on both **customer health** and their relationship with the company.

The following section will provide a detailed explanation of how each variable is expected to influence the effect of warning labels on alcohol consumption. By understanding each variable's role, we aim to identify which groups are most likely to be influenced. This analysis is crucial for **tailoring future interventions** and ensuring their effectiveness across diverse population segments.

We anticipate significant **age deviations**. Young adults are probably more responsive to warning labels, increasing their satisfaction with government initiatives and decreasing alcohol spending. On the contrary, both teenagers and older adults are probably less affected. Teenagers might be less responsive, mainly because they use the NHS less frequently or are less interested in politics and thus their satisfaction will not be affected. Moreover there is usually a lack of awareness of the long-term health risks and they may be influenced more by peer pressure. Older adults, on the other hand, might be less affected because of established opinions and consumption habits.

Moreover, we foresee that individuals with higher **education levels** will be more likely to be more satisfied by this type of initiatives and to reduce alcohol spending in response to warning labels because they understand the importance of Public Health Campaigns, whereas individuals with lower education levels will be less likely to be affected. Similarly, higher-income individuals may be more influenced by warning labels because, despite the greater disposable income, they probably have a higher education level and are more health-conscious; whereas lower individual income are probably more affected because of addiction-related problems.

Furthermore, it is expected that both the **strong regional differences** with respect to the quality of NHS and the strong regional differences in alcohol consumption, that are deeply rooted in the region's cultural traditions, will have an impact. For instance, Veneto's and Emilia-Romagna healthcare systems are better than Calabria o Sardegna's one. In the same, Veneto and Friuli Venezia Giulia's alcohol consumption is much higher than Italy's average; whereas Calabria and Basilicata's is lower. Thus, we assume similar differences in responsiveness to warning labels: probably regions with better healthcare systems show greater awareness and responsiveness to warning labels, and thus their citizens will be satisfies by this government initiative.

In conclusion, we believe that individuals with **smoke habits** will be less responsive to warning labels, as they are already engaging in another risky behavior.

Managerial implications

All these findings have strong managerial implications. First, if the β_1 coefficient from the first model is positive, it means that the warning labels actually lead to higher citizen satisfaction. That indicates **improved public trust** in government health initiatives and could enhance the government's brand value, showing a proactive commitment to public health, which may foster cooperation on other health-related policies. However, the impact should not be overstated; sustained communication and transparency will be key to maintaining this satisfaction.

Second, if the β_1 coefficient from the second model is positive, it means that the warning labels actually lead to a reduction in super alcohol purchases. A reduction in alcohol consumption will lead to a **healthier population**, which can ease the pressure on the healthcare system. In the long term, this could lower healthcare costs and improve service delivery. These savings could then be reinvested to enhance overall service quality, indirectly raising citizen satisfaction by making healthcare more accessible and efficient.

Subsequently, it is fundamental to validate our previous assumptions about the **interaction terms** and thus observe which specific subgroups, for instance younger adults or specific regions, respond worst to the intervention. That will allow for **targeted campaigns**, enabling a more efficient resource allocation and ensuring that the policy has the greatest impact where it's most needed.

However, it may happen that citizens are still dissatisfied or even more dissatisfied despite a positive health outcome. In that case the policy may require a **combined approach** to boost satisfaction, such as better public communication or incentives for healthy behaviors. This could balance improved health with maintaining public trust.

In conclusion, this study has some **drawbacks**. The **impact on firms**, particularly in the alcohol, sales and distribution industry, may be negative, affecting sales and potentially sparking resistance. It will be thus fundamental to manage the relationship with the affected firms and the general public differently: it may be useful to propose some economic bonuses to increase the production of non-alcoholic products. Moreover, long-term effects on healthcare savings may **take time to materialize**. In fact, although a reduction in alcohol consumption may lower disease incidence and healthcare costs, savings will take time to be realized, especially if the NHS remains under pressure from other public health challenges. Finally, **cultural resistance** could limit the success of the intervention. The strong cultural significance of alcohol in Italy, may lead to resistance from both citizens and firms. Public perception of alcohol as a social or cultural norm could reduce the effectiveness of the intervention.

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