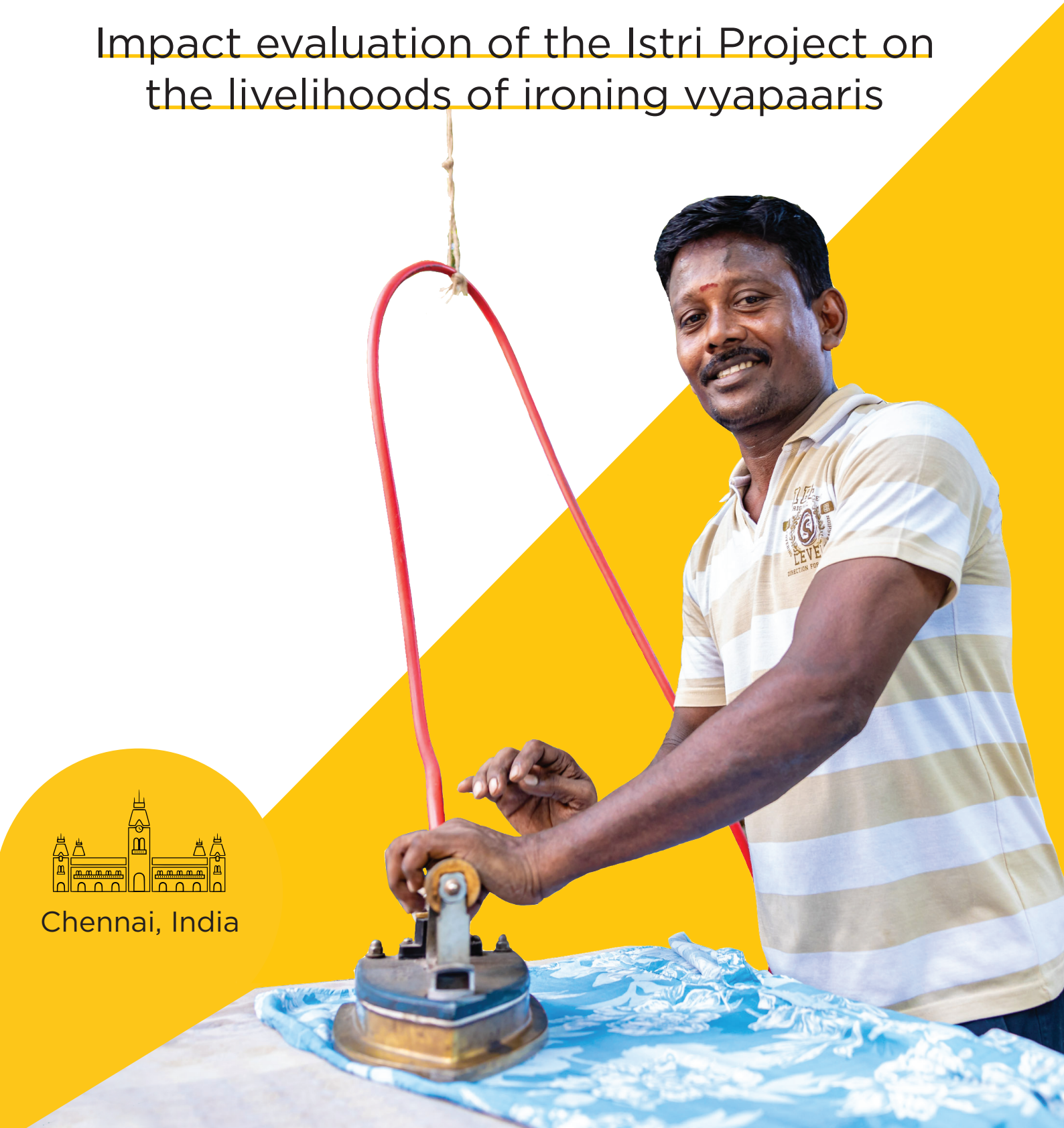
Azim Premji University

Udhyam
Vyapaar

Pressing for Change

Impact evaluation of the Istri Project on the livelihoods of ironing vyapaaris



Chennai, India

About Udhyam Vyaapar

Udhyam Vyapaar (UV) aims to make the mission "Making Bharat Entrepreneurial" come alive among the nano-entrepreneurs – those who earn between INR 5,000 to INR 25,000 a month, whom we call Vyapaaris. UV's mission is to help these Vyapaaris reach their highest human potential, help scale their businesses and make them successful in life - thereby making entrepreneurship respectable and aspirational.

With a design thinking approach, UV goes deep into the lives of identified sub-segments and identifies the areas which are the bottlenecks in either mindset and/or the situations. UV ideates and together with the Vyapaari's ecosystem design a solution, which is then prototyped rigorously and measured for scalable impact potential. UV believes in creating system level scale, with potential for each solution to reach a minimum of 100K vyapaaris and provide a 2 fold benefit: (1) - Income uplift, (2) - Mindset change to become more entrepreneurial.

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1 Executive Summary

This report documents the impact of Udhyam Vyapaar's *Istri Project* on *Vyapaari's* Productivity, Incomes and Expenditure.In 2022, Udhyam Vyapaar introduced a unique innovation in the Chennai Ironing Market – the "LPG-powered Iron Box." This new product offered an alternative to the traditional coal-powered iron boxes that were commonly used by *vyapaari's* in the city. The project was implemented at the ward level with vyapaari's within randomly selected wards offered the choice to switch to LPG-powered Iron box from the coal-powered iron box.

Our analysis shows that the intervention significantly increased productivity, incomes and net returns of the *vyapaaris*. We find that swtiching to LPG-powered Iron box resulted in an increase in the daily productivity by 23.3% or 29 more clothes ironed per day on average. The results from our analysis also suggest a rise in vyapaari's incomes. Specifically, average daily incomes of the *vyapaari's* who switched to LPG-powered Iron Box increased by approximately 23.6% or an absolute increase of INR 184.5. Our analysis also found that the vyapaari's switching to the LPG-powered Iron box saw an increase in their average monthly net returns, constructed as total monthly revenue minus the monthly fuel expenditures, by 28%. Overall, the findings of our analysis suggest that the intervention by Udhyam Vyapaar had a significant and positive impact on Vyapaari's daily productivity and incomes.

2 Impact Evaluation of the Istri Project

2.1 Objectives

The objective of this study is to conduct an impact evaluation of Udhyam Vyapaar's *The Istri Project*. Specifically, the study aims to evaluate the impact of upgrading from coal based to an LPG based Iron Box.

2.2 Evaluation Methodology

This section describes the methodology used in conducting the impact evaluation of the Istri Project. The study was conducted in a staggered format with cohorts onboarded onto the project in multiple stages.

2.2.1 Population

The target population for the intervention were the Ironing Vyapaaris using coal based iron box in the city of Chennai.

2.2.2 Design

The impact evaluation used a difference-in-difference study design to assess the effectiveness of the *The Istri Project*. Wards are randomly selected in the city of Chennai and *vyapaaris* within these wards are offered the choice of opting to switch to the LPG Iron Box from the existing Coal based system. The effect of the Istri Project is measured by comparing *vyapaaris* who selected into the program vis-a-vis those *vyapaaris* who did not adopt the Iron based Box and instead continued to use coal based iron box. The impact evaluation study had two data collection phases, namely a baseline survey conducted in 2022 and the endline survey conducted in 2023.

2.2.3 Survey Sample Size and Data Collection

The impact evaluation initially targeted 1951 istri vyapaari's in Chennai. However, at the end of collection of the baseline and endline surveys, the full sample consisted of 1331 vyapaaris out of which 850 belonged to the control group and 481 in the treatment group.

The overall baseline and endline response rates were 69.2% and 96.2% respectively. Table 1 presents the summary statistics for the complete dataset. The first column pools all the control and treatment groups together, while the second and third columns look at only the control and treatment groups, respectively. Age, gender, type of shop and awareness of LPG are roughly equal around the two sets of groups. Productivity and Income, however, differ. A simple comparison of the second and third column shows that the average daily productivity and monthly incomes are larger in the the treatment group relative to the control group. These differences provide some preliminary evidence of the positive effect of offering the LPG subsidy on economic outcomes.

Table 1: Summary Statistics

	Full Sample	Control	Treatment
Daily Clothes Ironed Per Day	132.9	121.6	152.8
	(40.62)	(31.42)	(46.96)
Monthly Fuel Expenditure (INR)	2508.3	2892.2	1830.0
	(946.7)	(896.0)	(584.3)
Monthly Fuel Quantity (KG)	61.94	74.22	40.23
	(229.4)	(245.1)	(197.1)
Average Daily Income (INR)	840.9	770.4	965.5
	(200.8)	(164.8)	(198.1)
Average Monthly Income (INR)	18957.7	17968.9	20705.2
	(3687.9)	(3307.3)	(3680.4)
Average Net Return (INR)	16449.4	15076.7	18875.2
	(3819.1)	(3574.9)	(3225.4)
Age	44.51	44.55	44.44
	(10.46)	(10.60)	(10.23)
Gender (Male==1)	0.171	0.169	0.173
	(0.376)	(0.375)	(0.378)
Shop Type (Own Cart==1)	0.825	0.827	0.821
	(0.380)	(0.378)	(0.384)
LPG Awareness (Aware==1)	0.860	0.840	0.894
	(0.348)	(0.367)	(0.308)
Observations	1331	850	481

mean coefficients; sd in parentheses

2.2.4 Econometric Strategy

To assess the impact of adopting the LPG-powered iron box on economic outcomes, a Difference-in-Difference (DiD) design is employed. The DiD design has been a popular empirical strategy for researchers in applied microeconomics research (Angrish and Pishcke, 2009). In this study, the "treatment" refers to the LPG-powered iron box intervention at a single point in time. Since both baseline and endline surveys are conducted, we are armed with two discrete time periods - pre- and post- treatment and two treatment groups - those *vyapaari's* who opted into the intervention ("treated") and those *vyapaari's* who did not opt into the intervention ("control"). The effect of the treatment on the outcome of interest is estimated by differencing the change in the average outcomes in the treated group to the change in the average outcome in the control group. The identifying assumption for the DiD model is that on average, in the absence of treatment, the outcome for the treatment group would have changed in the same way as the outcome for the control group does. Formally, the following model specification is used:

$$y_{it} = \beta T_{it} + \alpha_i + \delta_t + \epsilon_{it}$$

where i indexes *vyapaaris*, t indexes the time period, y is the outcome of interest, T is the treatment , α is the vyapaari fixed effect, δ is the time fixed effect and ϵ is the idiosyncratic error.

The coefficient of interest, β, is interpreted as the Average Treatment Effect on the Treated (ATT). It provides the causal effect of the intervention within the population exposed to the program. The estimation of causal effect here rests on three crucial assumptions. Firstly, it is assumed that the intervention i.e. offering of LPG-powered iron box is unrelated to the outcomes of interest (e.g. productivity, income etc) at the baseline. Secondly, there are no spillover effects from the treatment or any variation in the treatment. Thirdly, in the pre-intervention period, time trends in the outcome are the same in treated and control units (also known as the parallel trends assumption). Table 2 presents the results from a balance test that verifies that the observed characteristics (except for the outcomes of

interest) between the two groups are similar and are only separated by their exposure to the treatment. The results from a t-test comparing the differences in means show that there is no statistically statistically significant difference between the treatment and control groups on observed covariates.

Table 2: Balance Table

	(1) Control		(2) Treatment		(3) Difference	
	Mean	SD	Mean	SD	b	t
Age	44.55	10.60	44.44	10.23	0.11	(0.19)
Gender	0.17	0.38	0.17	0.38	-0.00	(-0.15)
Shop Type	0.83	0.38	0.82	0.38	0.01	(0.27)
Shop Members	0.24	0.45	0.28	0.47	-0.03	(-1.25)
Ironing Rates	8.87	1.28	8.94	1.43	-0.06	(-0.77)
Observations	850		481		1331	

2.3 Results

This section presents the research findings of the study for different hypotheses.

***Hypothesis 1*: The *Istri Project* has a positive and significant impact on the productivity of the vyapaaris.**

Column (1) of Table 3 shows the overall effect of the project on daily productivity of the *vyapaaris*. The treatment group in the study design saw their productivity increase by 23% ($e^{\beta}-1$)) relative to the control group. This translates to an average of 29 more clothes ironed per day among the vyapaaris who received the *LPG Based Iron Box* (see Figure 1).

***Hypothesis 2*: The *Istri Project* has a positive and significant impact on the daily and monthly incomes of the vyapaaris**

Column (2) of Table 3 shows the overall effect of the project on average daily income of the *vyapaaris*. The treatment group in the study design experienced an increase in their daily income by INR 184.584 relative to the control group (see Figure 2). Similarly, column (3) of Table 3 displays the effect of receiving the *LPG based Iron Box* on average monthly income. The results indicate an increase in average monthly incomes of the treatment group by a magnitude of INR 3080.249 compared to the control group. This translates to $\approx 18\%$ rise

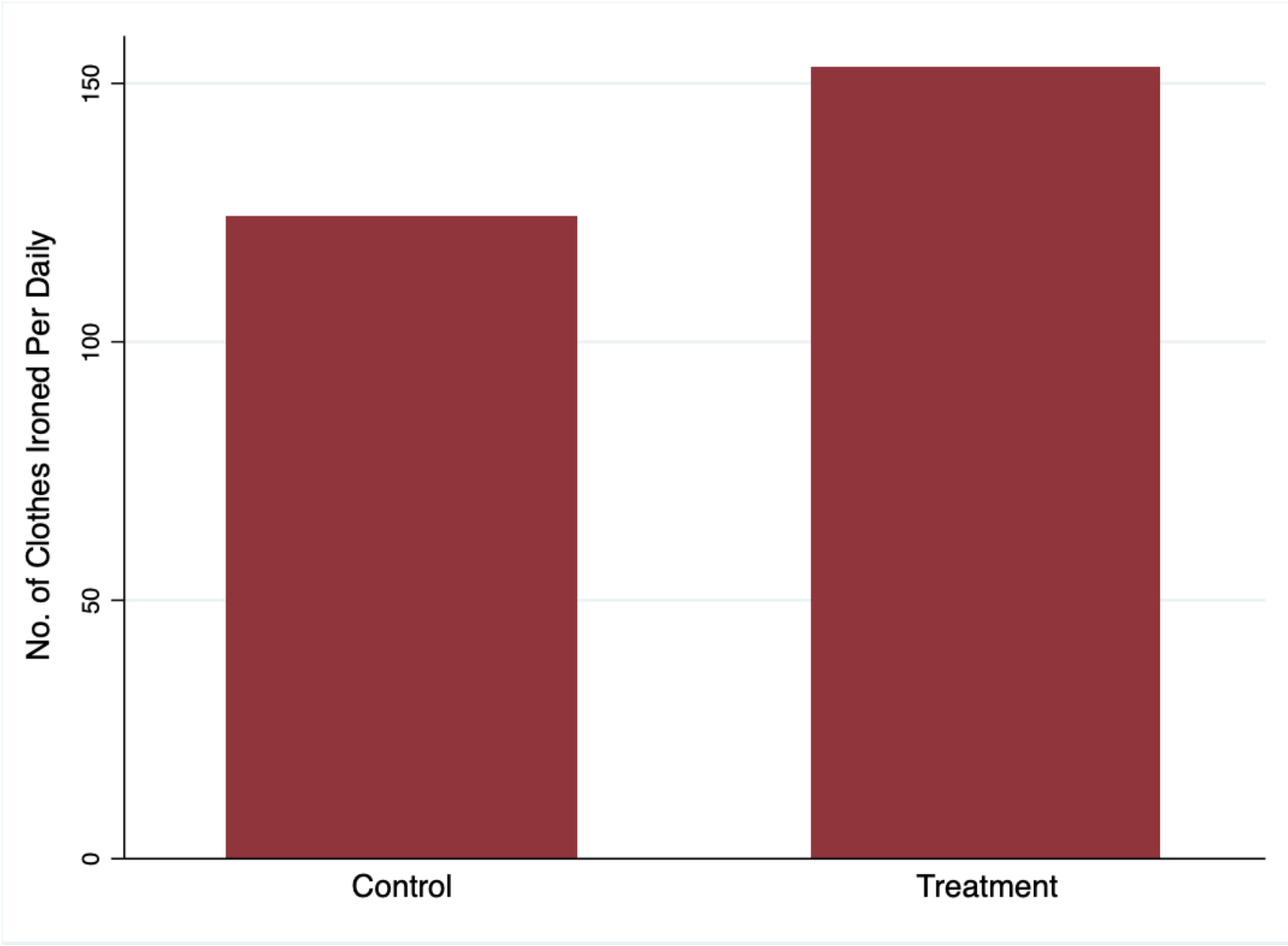

Figure 1: Impact on Productivity

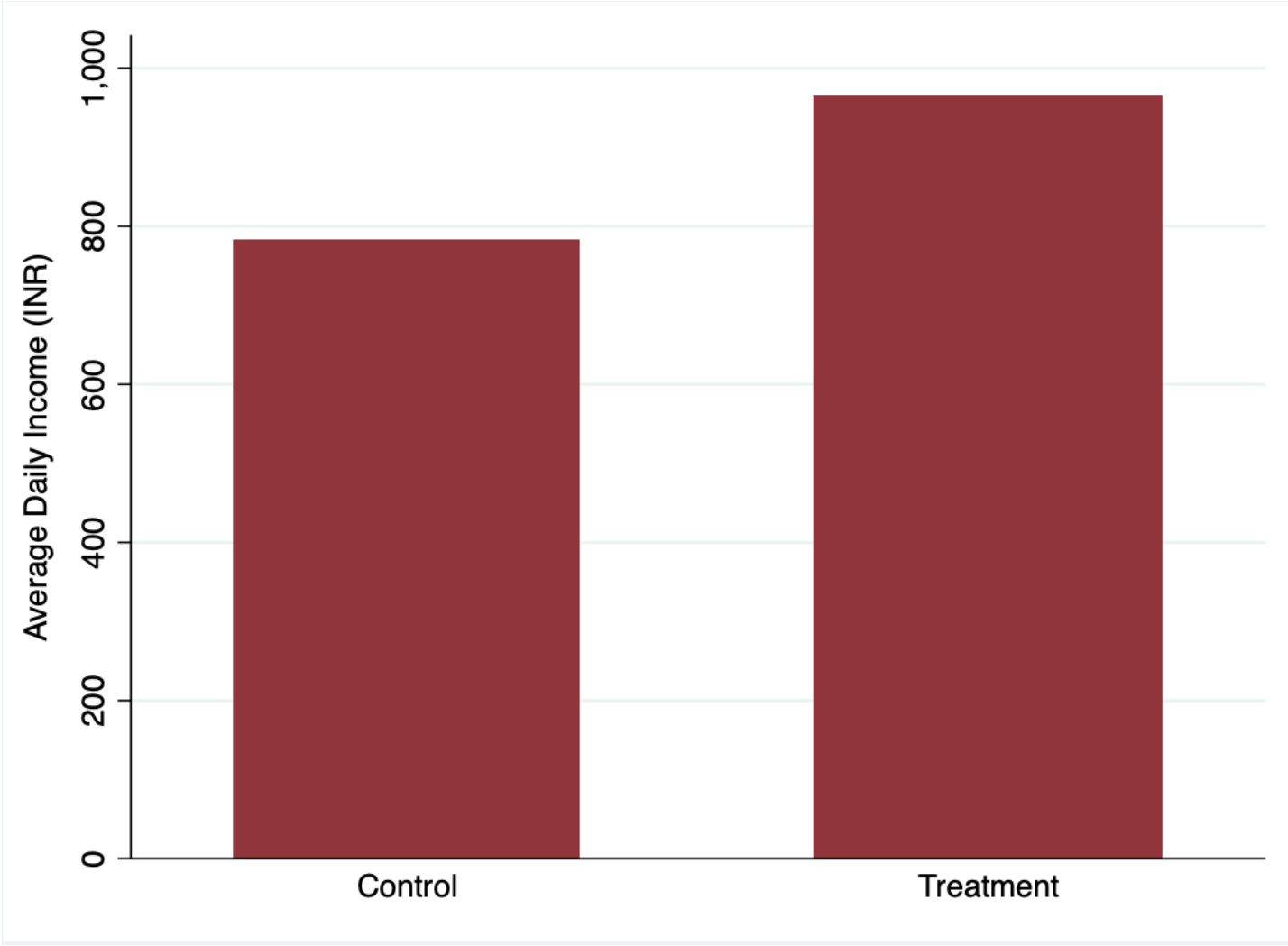

Figure 2: Impact on Average Daily Income

in average monthly income among the vyapaaris adopting the LPG-Istri Box relative to those who continue using Coal-based Istri boxes (see Figure 3). Column (4) of Table 3 also shows a positive and significant effect of the LPG based Iron Box on the average net returns (computed as total income minus expenditure on fuel). Particularly, receiving the LPG based Iron Box results in an increase in average monthly net return of INR 4210.100 i.e. an increase of $\approx 28\%$ relative to those not receiving the LPG based Iron Box.

***Hypothesis 3*: The *Istri Project* has a negative and significant impact on the fuel usage and expenditure.**

Column (1) of Table 4 shows the overall effect of the project on monthly fuel expenditure. Adopting the Istri Box results in a fall in monthly fuel expenditure of approximate INR 887 relative to Coal Box. In Column (2) of Table 4, the findings suggest that *vyapaaris* switching

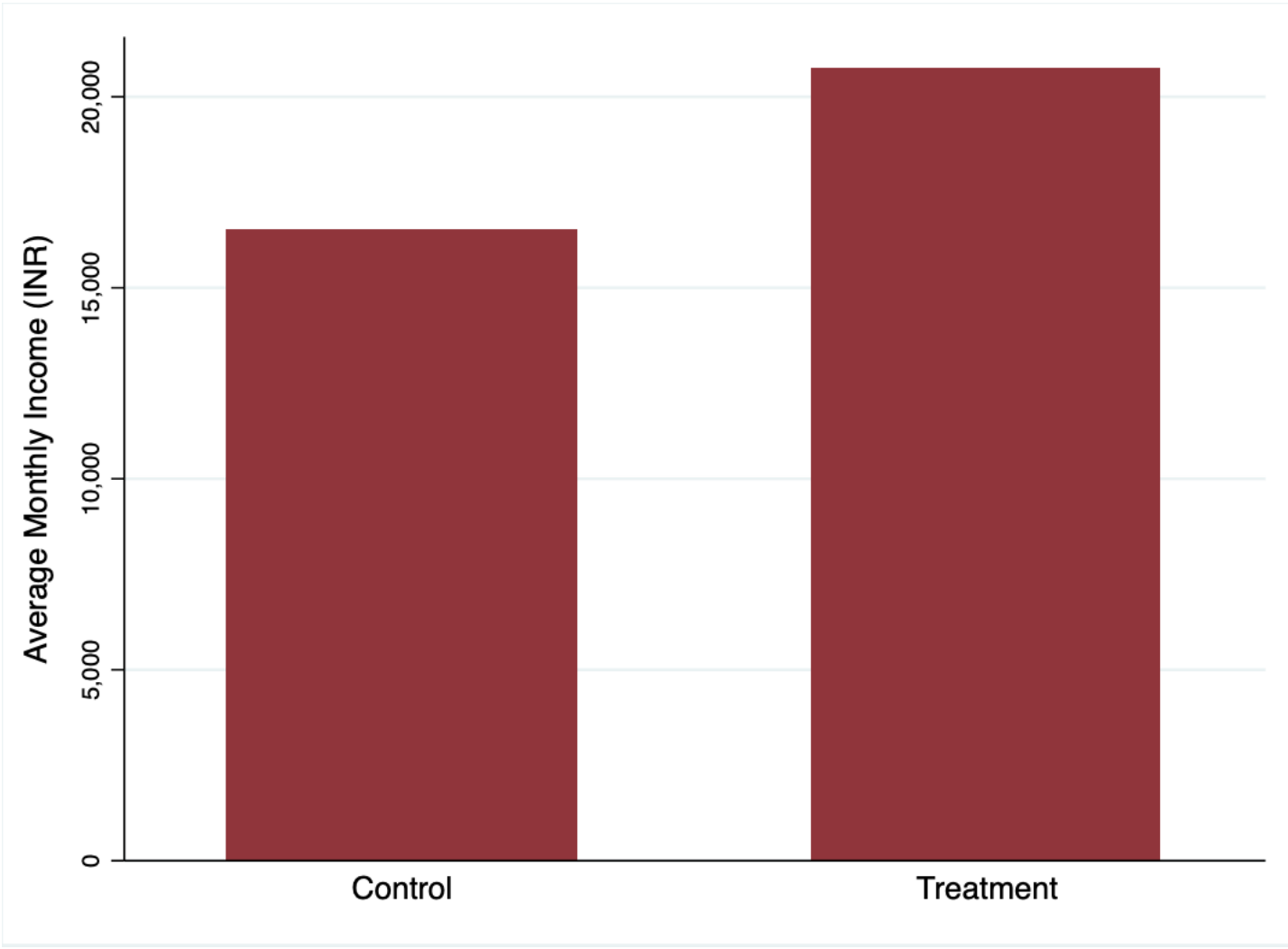

Figure 3: Impact on Average Monthly Income

Table 3: Impact on Income and Productivity

	(1) Daily Prod.	(2) Avg. Daily Inc.	(3) Avg. Monthly Inc.	(4) Avg. Monthly Net Returns
Treatment	0.210***	184.584***	3080.249***	4210.100***
	(0.007)	(10.835)	(229.353)	(191.950)
Constant		780.915***	17624.948***	14665.100***
		(5.417)	(114.676)	(95.975)
Observations	962	962	962	962
R-squared		0.868	0.797	0.799
Year FE	Yes	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes	Yes

Note: Robust Standard Errors in Parentheses clustered at the ward level.
Stars indicate significance *$p < 0.05$ **$p < 0.01$ ***$p < 0.001$

from Coal Based Istri Box to LPG-Istri Box also experienced a fall in the quantity of fuel used by $\approx 45\%$.

Table 4: Impact on Fuel Expenditure and Quantity

	(1) Monthly Fuel Expenditure	(2) Monthly Fuel Quantity Used
Treatment	-1129.850***	-33.609***
	(79.677)	(10.501)
Constant	2959.848***	73.838***
	(39.839)	(5.250)
Observations	962	962
R-squared	0.756	0.693
Year FE	Yes	Yes
Individual FE	Yes	Yes

Note: Robust Standard Errors in Parentheses clustered at the ward level.
Stars indicate significance *$p < 0.05$ **$p < 0.01$ ***$p < 0.001$

3 Qualitative Assessment of the Istri Project

This section supplements the quantitative analysis performed in above section with a qualitative assessment of the Istri Project using the data obtained from the endline survey. Overall, there are three key findings from the endline survey responses.

***Finding 1*: Most of the Vyapaari's that received the *Istri Box* claim to have experienced a significant rise in Income**

Figure 4 displays the share of vyapaaris that received who claim to have experienced a rise in daily income. About 20% of the vyapaaris responded that they did not see any rise in their daily incomes. On the other hand, almost 80% of the vyapaaris answered that adopting the Istri Box had a positive impact on their daily incomes.

***Finding 2*: A large share of vyapaaris that received the Istri Box claim to have experienced a rise in their daily productivity**

Figure 5 displays the share of vyapaaris who claim to have experienced a rise in their daily productivity. The ratio of share of vyapaaris who adopted the Istri box and experienced

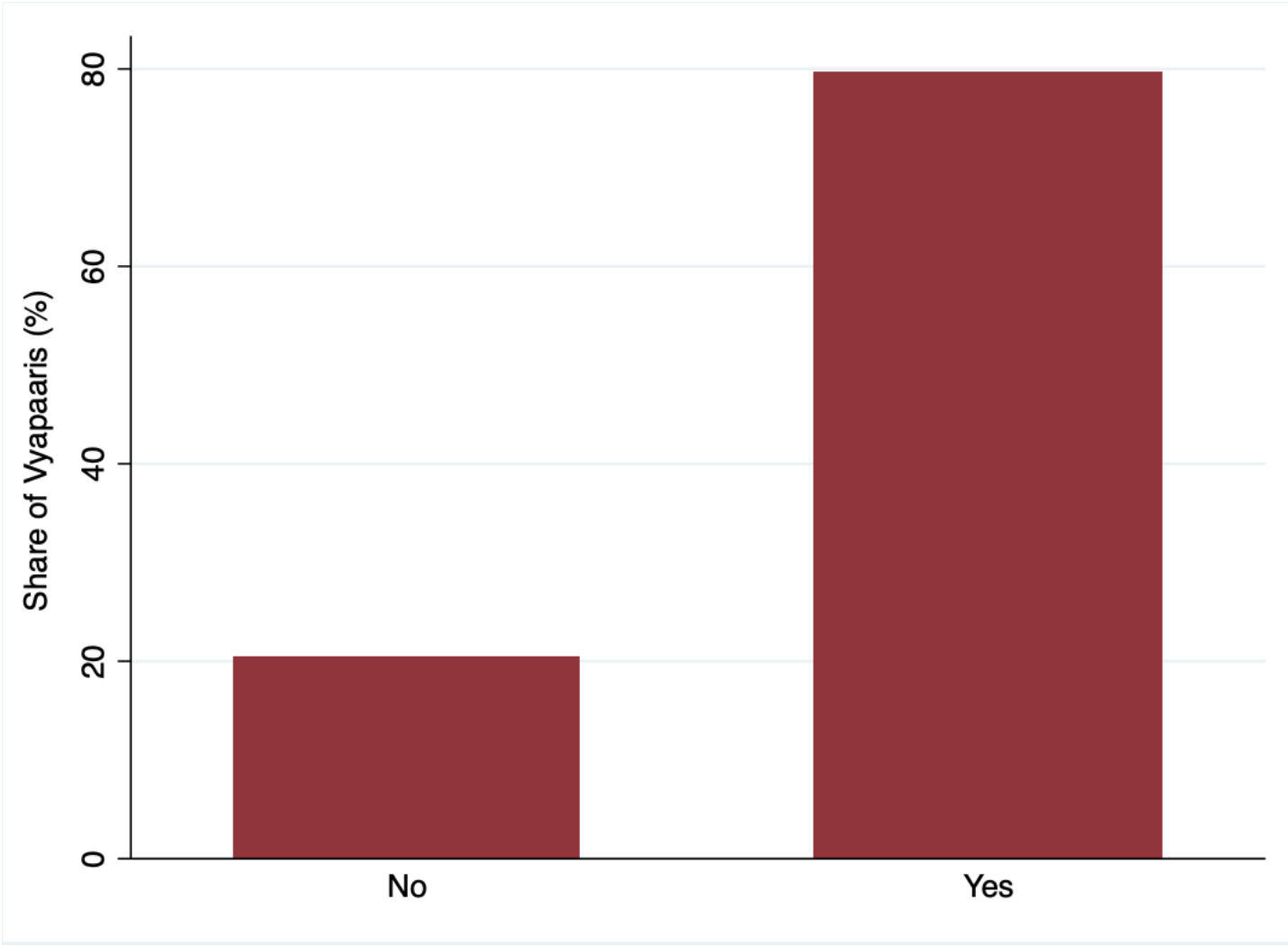

Figure 4: Percentage of Vyapaaris who experienced a rise in Daily Income

an increase in their daily productivity to the share of vyapaaris that self-report of little to no significant impact on their productivity is close to 6. Indeed, the share of vyapaaris whose productivity increased is close to 85% as opposed to the 15% of vyapaaris whose productivity did not change with the adoption of the Istri Box.

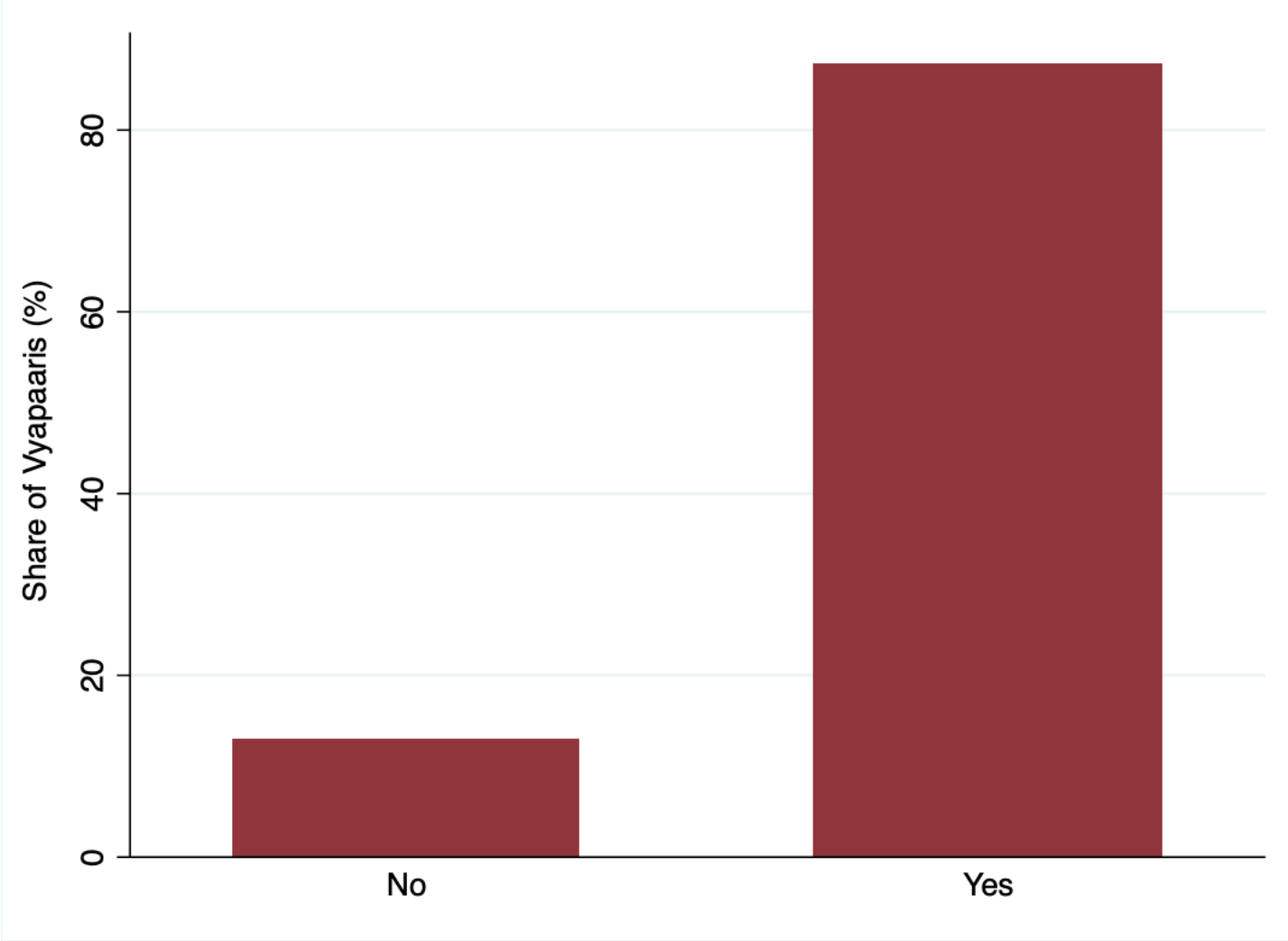

Figure 5: Percentage of Vyapaaris who experienced a rise in Productivity

Finding 3*: Vyapaari's claim to have observed a fall in their fuel expenditure after the adoption of the *Istri Box

Figure 6 presents the descriptive results on vyapaari's experience of the Istri Box's impact on the fuel expenditure. Around 22% felt that the Istri Box did not have any impact on the fuel expenditure while 77% responded that the adoption of the Istri Box significantly reduced the expenditure on Fuel.

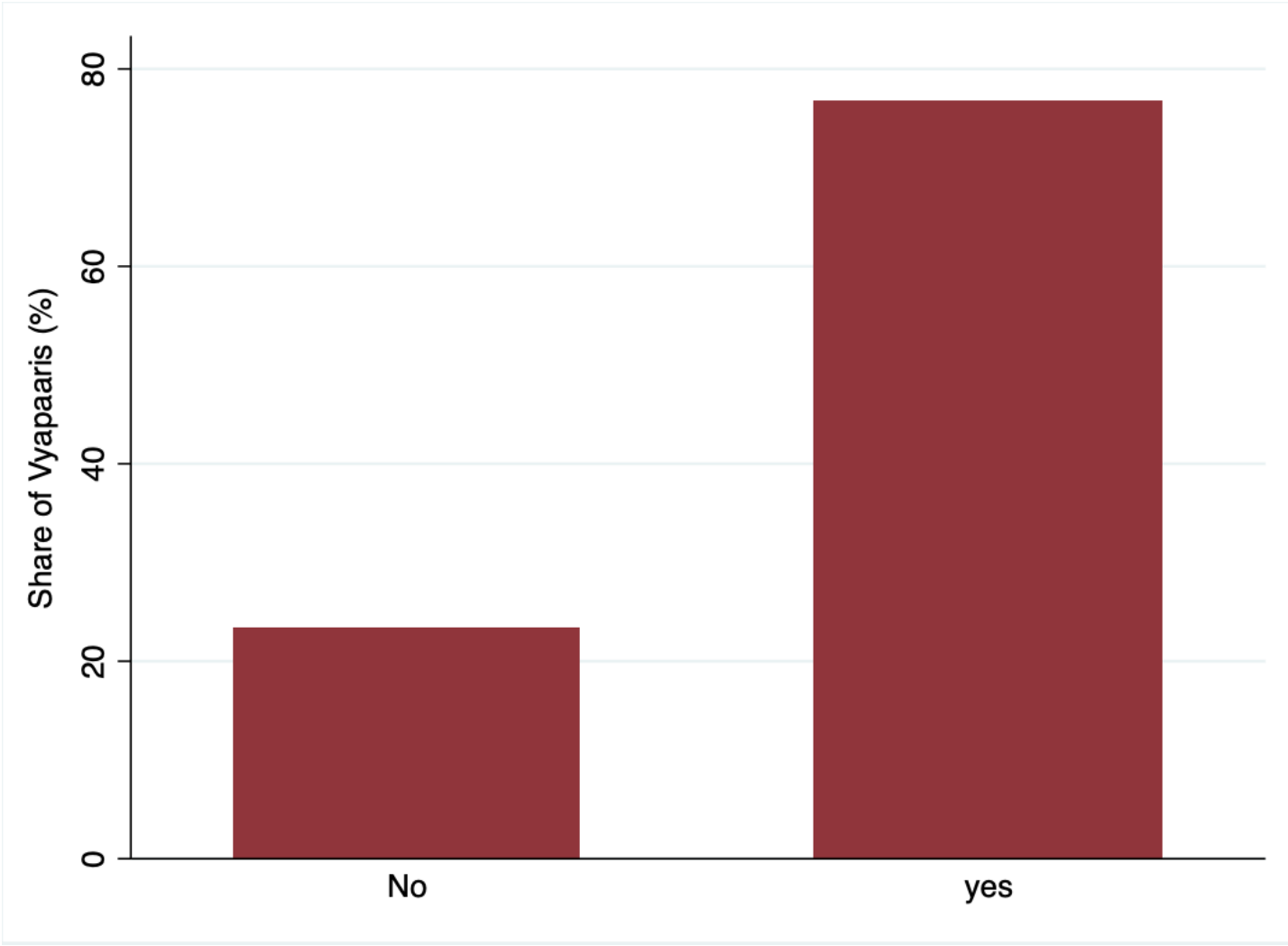

Figure 6: Percentage of Vyapaaris who experienced a fall in Fuel Expenditure

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