



ECONOMICS

Working Paper Series

No. 13-2024

Income shock and Women's Health Spending: Evidence from India*

Shubhangi Agrawal
University of Edinburgh
Sagrawal@ed.ac.uk

Sambit Bhattacharyya
University of Sussex

s.bhattacharyya@sussex.ac.uk

Chirantan Chatterjee
University of Sussex
C.Chatterjee@sussex.ac.uk

Somdeep Chatterjee
Indian Institute of Management Calcutta
somdeep@iimcal.ac.in

Abstract : Conventional wisdom states that healthcare is a luxury good. Spending on healthcare is expected to rise disproportionately with rising income. However, India appears to be a clear outlier with its aggregate national healthcare spending falling during rapid economic expansion. We explore this curious anomaly by estimating the causal effect of income on healthcare expenditure using large longitudinal household

D Q G
SDWLHQCWDGHWLQWLYH GDLVQDVWVH FIRYHRUG LSDWRCQQWKLFIIBU
UHGWLRDQGDWGHGHHSORRYLGHQW IXQG FRQWLWLEXMGRLWRIHCFEZWDA HIIHF
LQ IDPH OHG KR XVHKROGV :H ILQG MKDKRLMDQFQDWGLZLUSHDWGHGHQFRYPU DOO
VSHQGLQJ RQKHQDWKFOH OHGHQRDVWKEFORQWVSRDHLQJKFDIWRK RXWFRPHV
ZRHQ KHDOWKHVQVADWDRJQ DW WKHILQWHQKRYVWVADWDRYUHDWPHQW 2XU
UHXO W XJ JH WKDW KHDOWKFIDFID OHSV QQLQJED DQG WKH JOREDO 6
HQFHV BQGD DVQRU

-(/ RGHV
.H\ ZRUGV ,QFRPH +HDOWK 6SHQGLQJ

Income shock and Women's Health Spending: Evidence from India^{*}

Shubhangi Agrawal, Sambit Bhattacharyya, Chirantan Chatterjee and
Somdeep Chatterjee[†]

30 September 2024

Abstract

Conventional wisdom states that healthcare is a luxury good. Spending on healthcare is expected to rise disproportionately with rising income. However, India appears to be a clear outlier with its aggregate national healthcare spending falling during rapid economic expansion. We explore this curious anomaly by estimating the causal effect of income on healthcare expenditure using large longitudinal household and patient level administrative datasets covering the period 2016-2020. An unanticipated shock in the form of a reduction in mandated employees' provident fund contribution for women is used to identify the causal effect in female led households. We find that an unanticipated income shock is associated with a decrease in overall spending on healthcare in female led households even after controlling for improved health outcomes for women, health-status, healthcare utilization at the intensive margin (i.e., hospital visits to seek treatment). Our results suggest that healthcare spending by females in India and the global south is guided by dynamic preferences and social norms.

Keywords Income, Health Spending, Gender

JEL Codes: I11; I12; I14; I15

^{*}This paper has benefited from comments and suggestions from Indrajit Adhikary, Farzana Afridi, Shilpa Aggarwal, Chon-Kit Ao, Parasuram Balasubramanian, Sourav Bhattacharya, Joseph Flavian Gomes, Samarth Gupta, Rajshri Jayaraman, Tanmoy Majilla, Barsha Saha, Maika Schmidt, Aparajita Dasgupta, Soham Sahu, Arnab Mujherjee, Aditya Srinivas, Deepshikha Bhateja, Tirthatanmoy Das participants in the IHOPE Research Brown Bag Seminar Series, Samvad Series-Inclusion Economics India, Department of Economics Seminar at University of Sussex, Economics Seminar at National Cheng-Kung University in Taiwan, 17th Annual Conference on Economic Growth and Development, Department of Economics at IIM Bangalore, Centre for Monitoring Indian Economy seminar and Annual Conference on Contemporary Issues in Development Economics. The authors acknowledge funding from Wellcome Trust/DBT India Alliance grants Indian Health Outcomes, Public Health and Economics Research Centre (IHOPE). The views expressed herein are those of the authors and the usual disclaimers apply. We thank LV Prasad Eye Institute for their generous support and for providing access to their data. The statements, findings, conclusions, views, and opinions contained and expressed in this article are based in part on hospital electronic medical records data obtained from LV Prasad Eye Institute and have been approved by the ethics committee and IRB administration under the IRB approval number: LEC-BHR-R-05-22-876. Research assistance from Krsna Singh is gratefully acknowledged. We also thank Dr. Raja Narayanan and Dr. Anthony Vipin Das at the L V Prasad Eye Institute.

[†]Agrawal: University of Edinburgh, email: shubhangiagrawal8@gmail.com. Bhattacharyya: Department of Economics, University of Sussex, email: S.Bhattacharyya@sussex.ac.uk. Chatterjee: Department of Economics, University of Sussex; Hoover Institution, Stanford; Max Planck Institute for Innovation and Competition, Munich; IHOPE, Hyderabad, email: C.Chatterjee@sussex.ac.uk. Chatterjee: IIM Calcutta and CDES Monash University, email: somdeep@iimcal.ac.in

1. Introduction

Steady rise in healthcare expenditure during economic expansion is notably a common trend across many countries around the world ([Hall & Jones, 2007](#); [Murphy & Topel, 2003, 2006](#); [Nordhaus, 2003](#)). This undoubtedly aids the familiar conjecture that healthcare expenditure expansion is a consequence of economic growth as healthcare is a luxury good. [Acemoglu, Finkelstein, and Notowidigdo \(2013\)](#) and [Blomqvist and Carter \(1987\)](#) cites The Economist magazine declaring this as “conventional wisdom” in 1993 and stating, “As with luxury good, health spending tends to rise disproportionately as countries become richer.” [Figure 1](#) plots World Bank data on health spending trends across different countries and country groups over the period 2000 to 2020. Indeed, it showcases steady increase in health expenditure as a share of GDP in advanced economies such as the United States and OECD. Emerging economies such

[moglu et al. \(2013\)](#) find healthcare to be a necessity rather than a luxury. A negative relationship could emerge in the event of dynamic preferences whereby preferences tilt in favour of non-healthcare goods following an income shock ([De Rock, Potoms, & Tommasi, 2022](#)). Negative preference tilting effect on healthcare could dominate over any positive income¹effect.

We examine this curious contrarian macro trend even further by taking it to the micro Consumer Pyramid Household Survey (CPHS) data in India in [Figure 2](#). In particular, we correlate healthcare expenditure share with household total income and wage income in two separate specifications and find negative partial effects even though the coefficient on total income is insignificantly different from zero. Admittedly the trend plots and the estimates are not causal. Nevertheless, it is logical to ask why India appears to be an outlier in relation to the “conventional wisdom”?

In particular, this paper estimates the causal effect of income shock on healthcare expenditure at the micro level and for female led households. We are able to exploit an unanticipated policy shock in the form of a reduction in mandated employees' provident fund contribution for women to identify the effect of income on healthcare expenditure in female led households. We use CPHS and hospital electronic medical records to this end. CPHS is longitudinal household survey data covering the period 2016-2020 whereas the hospital electronic medical records offer administrative data for a cross-section of patients visiting a leading chain

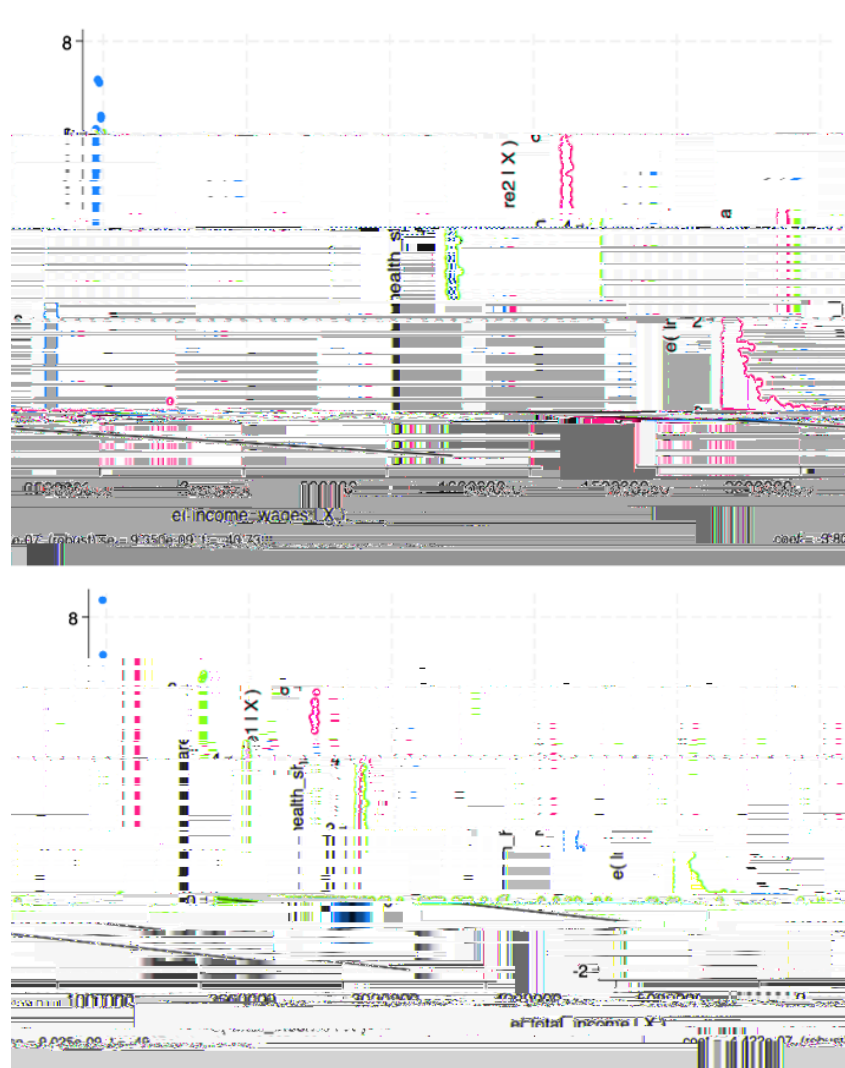


Figure 2: Household Income, Wages and the Share of Healthcare Expenditure:
Consumer Pyramid Household Survey Data 2016-2020

Susser, 1994).

The paper also speaks to the literature on gender identity and resource allocation as women are the recipients of our unanticipated income shock. Banerjee, Niehaus, and Suri (2019) show that the gender identity of the recipient of money can significantly influence the allocation of monetary resources within a household. Banerjee and Du o (2019) document that major anti-poverty transfer programs in developing countries are targeted towards women as women's investment decision and resource allocation appear to be more efficient (Goodman & Kaplan, 2019) and women are agents for change (Luke & Munshi, 2011).

Finally, the paper speaks to conditional and unconditional cash transfer in developing countries literature. It suggests that transfers to women increase their assertiveness in household decision-making dealing with expenditure allocations (Attanasio, Battistin, Fitzsimons, & Vera-Hernandez, 2005; Banerjee & Du o, 2019; Gitter & Barham, 2008; Holvoet, 2005; Rubalcava, Teruel, & Thomas, 2009), has a positive impact on nutritional status of the household (Bouillon & Yáñez-Pagans, 2011; Hazarika & Guha-Khasnobis, 2008; Rubalcava et al., 2009; Yanez-Pagans, 2008) positively affects household human capital investment decisions (Cahyadi et al., 2020; Chatterjee & Poddar, 2021; Handa et al., 2015; Skou as, Davis, & De La Vega, 2001; Standing, 2013), and has a negative impact on consumption of intoxicants (Doepke & Tertilt, 2019; Evans & Popova, 2017; Team, 2012).

The rest of the paper is organized as follows. Section 2 presents the institutional context behind the unanticipated income shock. Section 3 describes the two datasets and presents descriptive statistics. Sections 4 and 5 present empirical strategy and results. Section 6 concludes.

2. Background

This section introduces the institutional setting for the unanticipated income shock. The Employees Provident Fund Act of 1952 established the Employees' Provident Fund Organization in India. This fund administers a defined benefit contribution employees' provident fund for formal sector employees across India. Individual payroll contributions to the fund are made

both by employers and employees and they are realised with interest payment upon the termination of the service at an organization. It is a large pension fund in India, and “at present it maintains 24.77 crore (247.7 million) [member] accounts (Annual Report 2019²-20)”.

On 1 February, 2018, the Government of India announced a reduction in contribution to the employees' provident fund by new women workers joining formal employment from the initial 12% to 8%.³ The aim of this reduction was to increase the take-home-pay of women while encouraging an increase in labour market participation through the incentive. As per the rules, employees drawing less than Rs 15000 per month at the time of joining an organization had to become members of the EPF.⁴ An employee drawing pay above the prescribed limit (at present Rs 15,000) could also become a member with permission of Assistant PF Commissioner, through mutual agreement between the employee and the employer.” Therefore, the policy targeted female workers employed in the formal sector in India. This EPF cut was applicable for the first three years of employment across all occupation class in the formal sector. Such a policy undoubtedly increased disposable income of families that had women working in the formal sector. This would have relaxed the budget constraint of these households and allowed cash to be directed towards healthcare, education, family well-being or consumption of other goods and services.

3. Data

3.1. Economy-wide Data: Consumer Pyramid Household Survey

Data on monthly consumption expenditure of households across India covering the period Jan 2016 to Feb 2020 is sourced from Center for Monitoring Indian Economy's (CMIE) Consumer Pyramid Household Survey (CPHS). CPHS is a rich dataset representing 98.5% of the India's population geographically (Afridi, Mahajan, & Sangwan, 2022; Beyer, Franco-Bedoya,

²<https://www.epfindia.gov.in/siteen/index.php>

³<https://economictimes.indiatimes.com/wealth/personal-finance-news/budget-2018-proposal-new-women-workers-take-home-pay-to-go-up-as-epf-contribution-capped-at-8/articleshow/62737570.cms>

⁴Employee whose 'pay' was more than Rs. 15,000 per month at the time of joining was called non-eligible employee.

To further classify this sample of female households into the treatment and control group, we assign a dummy variable equal to one if the occupation group of a household falls under the formal sector in the period before the policy shock. The household becomes a beneficiary

Table 1: Pre-Treatment Sample Mean of Outcomes for Economy-Wide Data

Average Monthly Expenditure in Pre-Treatment Period (INR)		
Outcomes	Bene ciary HH	Non-Bene ciary HH
Health Outcomes		
Total Health	348.25	316.61
Medicines	144.09	145.97
Doctors fees	14.80	15.58
Medical test	17.71	30.27
Hospitalisation Fees	6.89	7.00
Insurance Premium	11.52	3.80
Health Enhancement	153.23	113.99
Other Outcomes		
Food	5425.96	4626.11
Intoxicants	333.85	253.20
Clothing & Footwear	790.74	594.76
Appliances	154.91	95.04
Restaurants	240.43	156.57
Recreation	101.71	62.81
Bills & Rent	156.02	106.09
Power & Fuel	1853.76	1443.48
Communication	539.31	424.25
Education	718.09	487.85
Hygiene & Beauty	563.62	431.76
Misc	1348.94	998.61

Notes: The table represents the pre-treatment sample means of outcome of bene ciary households and non-bene ciary households for the economy-wide data

4. Empirical Specification

4.1. Empirical Specification for the Economy Wide Case

The institutional structure of the EPF reform defining the eligibility rules for acquiring benefits from the changes in the mandated contribution rates, represents a useful quasi-experiment setting. To identify causal effects, we employ an identification strategy exploiting this quasi-experimental framework and provide reduced form intent-to-treat (ITT) effects of the reform on outcomes of interest. As per the policy rules, females employed in the formal sector were eligible for a reduction in the contribution to EPF from 12% to 8%; effectively increasing their take-home pay and disposable income.

For policy schemes such as these, an eligibility rule can exclude non-beneficiaries but cannot force the eligible individuals into taking the benefit (Chatterjee & Poddar, 2021). Thus, our estimates identify the intent-to-treat (ITT) or the changes in the outcome of being offered the treatment. Such a strategy is used in case of imperfect compliance where all those randomized out do not get the treatment; while those randomized in can choose not to take the treatment (Angrist, Imbens, & Rubin, 1996; Du o, Glennerster, & Kremer, 2007). We identify the female households exposed to the treatment post-Feb'2018 by observing the occupation group that the household belongs to in the period before the policy shock.²⁰

Using a difference-in-differences framework, we study the causal relationship between additional income and changes in a household's monthly expenditure by using the following regression specification:

$$y_{hm} = \alpha_0 + \alpha_1 \text{Beneficiary}_{hm} + \alpha_2 \text{Post Feb '18}_{hm} + \alpha_3 \text{Beneficiary}_{hm} \times \text{Post Feb '18}_{hm} + \alpha_4 \text{Household}_{hm} + \alpha_5 \text{Month}_{hm} + \alpha_6 \text{Household} \times \text{Month}_{hm} + \epsilon_{hm} \quad (1)$$

where y_{hm} is the outcome variable observed at the household-month level. It represents

²⁰We check for any sample selection that may change the household composition in response to the announcement of the policy. We do not find any significant effect, mitigating our concerns. The results are presented in Table A7 in the appendix.

the expenditure of a household in a month on healthcare and other goods & services (in log). Beneficiary_h equals one when a female household has been predominantly classified into the occupation group of formal sector pre-Feb'18 and zero if a female household has been predominantly classified into the occupation group of non-formal sector pre-Feb'18. Post Feb'18_m is a dummy which takes value one if the month-year is after February 2018, zero otherwise. μ_m and μ_h are fixed effects controlling for monthly and household level unobservable including seasonal variations. Standard errors are clustered at the household level.

A literature on two-way fixed effects highlight limitations with weighting paradigm that lead to spurious inferences in the conventional difference-in-differences ([Callaway & Sant'Anna, 2021](#); [De Chaisemartin & d'Haultfoeuille, 2020](#); [Goodman-Bacon, 2021](#)). Note that this is not relevant here because the canonical model performs well in this setting. It is likely to face challenges only if there are multiple periods of treatment or variations in treatment timing or in the presence of non-parallel pre-trends ([Roth, Sant'Anna, Bilinski, & Poe, 2022](#)). None of these appear to be a challenge here.

Household specific time varying shocks could be a confounding factor in the relationship between income and health spending. For instance, households dominated by older members would likely spend more on medicines, hospital bills and doctor's consultations as opposed to younger households. Educated households could also have different spending preferences

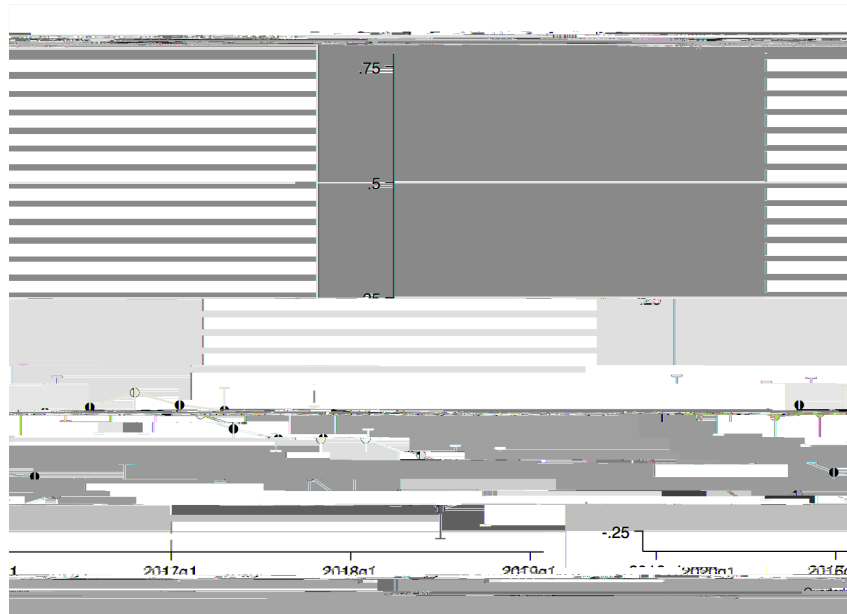


Figure 3: Event Study Estimates: Expenditure on Healthcare The figure plots the point estimates for the expenditure on healthcare for the entire span of our study period. The coefficients have been estimated using the specification including fixed effects and controls. The vertical light blue lines indicate the 95% confidence intervals.

investigation. The out-of-pocket expenditure (in log) has been included as the third dependent variable. Beneficiary i

Table 2: Change in Health Expenditure and Associated Variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
--	-----	-----	-----	-----	-----	-----	-----

in a hospital system. From these results, we can infer that females demonstrate precautionary behaviour by allocating income towards health enhancement of the household i.e. visits to the gym or hiring nutritionists rather than increasing health expenditure in general.

5.1.2. Impact on Other Expenditure

It is expected that an unanticipated income shock would also have an impact on non-health

(clothes, footwear, jewellery) in column (5) and bills and rent (monthly house rent, society charges) in column (6). The estimates indicate that female beneficiary households spend more on food items, power and fuel, appliances and clothing while cutting down expenses on bills and society charges. This suggests that women allocate income towards meeting household necessities which cater to basic requirements. Moreover, we find that the income shock translates to an increase in expenditure on education by 8.2%. It echoes the findings of past works [Baird, McIntosh, and Özler \(2011\)](#); [Benhassine, Devoto, Du o, Dupas, and Pouliquen \(2015\)](#); [Chatterjee and Poddar \(2021\)](#) which suggest that transfers increase investments in education even when they are not conditional on attending school.

We explore the education expenditure result a bit further and focus on a sample of households headed by a female who is a mother (around 32,000 HHs) and compare it with a sample of households headed by a female who is not a mother (around 2,400 HHs). The intention is to check whether the positive education expenditure effect is driven by mothers. We find that while there is an 11.4% increase in expenditure on education for the former sample, the effect

the dependent variable is total health expenditure as a share of income from wages. Using the income data from CMIE's CPHS, we merge the monthly income of households from wages with the expenditure data. The main DV has been constructed by dividing the monthly total expenditure of a household on health by the monthly income of the household from wages. Using this outcome, we report the effect of EPF reduction on the monthly expenditure on

5.1.4. Impact on Healthcare Expenditure by excluding Insurance Effects

and doctor's consultations while reallocating income towards healthcare expenses. These findings provide additional support to our main results by ruling out the alternative mechanism of the insurance effect.

5.1.5. Impact for a Sub-National Sample

To account for institutional factors that may affect the expenditure decision of beneficiary and non-beneficiary households at the time of intervention, we run additional regressions. The launch of Pradhan Mantri Jan Arogya Yojna (PM-JAY) in Sep'2018 guaranteed a sum of Rs 5 lakh as health insurance coverage for secondary and tertiary care to poor households across the states of India.²⁴ Given the presence of a safety net in the form of insurance coverage, a scheme such as this can potentially induce anet healthcare. Thus, we estimate baseline regression by the sample states PM-JAY was

Column (1) in [Table 6](#) reports the coefficient obtained from this exercise. We observe a decline

Table 6: Sub-National Sample Check: Change in Expenditure on Health

	(1)	(2)
	States covered by PMJAY	States covered by LVPEI
DV (in log)	Total Health Expenditure	
Post Feb'18 x Beneficiary HH	-0.133*** [0.022]	-0.307*** [0.072]
Observations	399,363	76,185
R-squared	0.386	0.350
Controls	Yes	Yes

Table 7: Heterogeneity Groups and Robustness Checks

	(1)	(2)	(3)	(4)
DV (in log)	Health Expenditure			

Another cause of concern with our identification strategy can be the selection of the heterogeneous sample of households with more female than male members. We would expect larger effects on households that have only female members. Such households will reflect the true nature of the decision on budgetary allocation by females. We change our sample of assessment by defining the treatment group as the households with only female members that had a maximum number of members employed in the formal sector throughout the pre-period. Panel B in [Table 7](#) highlights the estimates from the difference-in-differences framework for this specification. The coefficient of interest estimated using the baseline equation is in Column (4). Our finding suggests that beneficiary households spend 37.4% less on total health expenditure post an increase in income as compared to non-beneficiary households. Again, the magnitude of the effect is stronger for only female households as compared to our baseline sample. Both heterogeneity checks are in line with the benchmark findings.²⁶

Falsification Test: Another possible concern with our findings can be that the reduction in expenditure on healthcare by beneficiary households may not be due to the receipt of additional income per se. Our strategy is based on identifying the households that have female members (Only + Majority + Dominant). It is based on the hypothesis that the outcomes for the beneficiary households will not be significantly different from zero as compared to non-beneficiary households for this sample as an effect of the policy shock. However, it can be argued that the intervention may not be affecting the targeted group (i.e. households with more female members) and its choices, rather the change in outcomes was a consequence of some other reason. To check whether our strategy captures the true effect of the intervention, we set the target group as the sample of households with more male members (Only + Majority + Dominant). As part of this falsification exercise, we estimate the results using the baseline specification i.e. [Equation 1](#) for this cohort.

We use a difference-in-differences framework where we compare households with male members that were in the formal sector in the pre-period to the male households with members in the non-formal sector. The findings from this exercise have been presented in Panel C in [Table 7](#). The value of beta is close to zero, insignificant and negative. This shows that the policy

²⁶Refer to Table A8 and Table A9 in the appendix for additional robustness checks estimated through assignment of treatment status in an alternate way.

did not have an effect on the sample of male households i.e. the group that was not targeted. Thus, we can infer that our identification strategy captures the true effect of the income shock on the consumption expenditure for the beneficiary households.

5.2. Micro Case Eyesmart Findings

We have shown that at the economy level, households with more female members spend significantly less on health outcomes when they receive additional income. As a next step, we analyse the income allocation at the individual level in a hospital system. This micro-level analysis gives us an understanding of the budgetary decision that a female makes in consideration of her healthcare. Here, we look at the specific case of eye treatments that a female seeks at a private healthcare facility when she receives additional income.

Figure 4 gives the estimates from the regression specification i.e. Equation 2 for the three main outcome variables- investigation amount, surgical amount and out-of-pocket expenditure (in log). The results for the difference in differences framework are estimated at the individual-month-centre level with fixed effects and controls.²⁷ Our findings indicate that female beneficiary visiting the eye hospital spend significantly less on surgical treatments as compared to female non-beneficiaries ($\beta = -0.431$). The out-of-pocket expenditure for the treated group declines by 49.3% post an increase in take-home pay. As indicated in Column (1), the coefficient of expenditure on eye investigation is positive but insignificant ($\beta = 0.069$). These results are in line with our economy-wide findings suggesting that females receiving additional income spend less on healthcare as compared to non-beneficiary females and even when they have had to actually access healthcare as manifest in their hospital visits.²⁸

Following the baseline analysis, we study the heterogeneity in expenditure by females in the hospital system based on demographic characteristics. We also analyse the difference in expenditure across multiple surgical treatments. The idea for the latter in particular is that more inelastic surgical treatment areas (acute care for example) will exhibit a different elasticity of health expenses with respect to income compared to more elastic surgical treatment areas

²⁷See Table A10 in appendix for tabular representation of coefficient estimates

²⁸As a part of robustness check, we estimated the results for the hospital system micro case using Coarsened Exact Matching, the coefficient for expenditure on surgery and OOP remains negative and significant. Results are available on request.

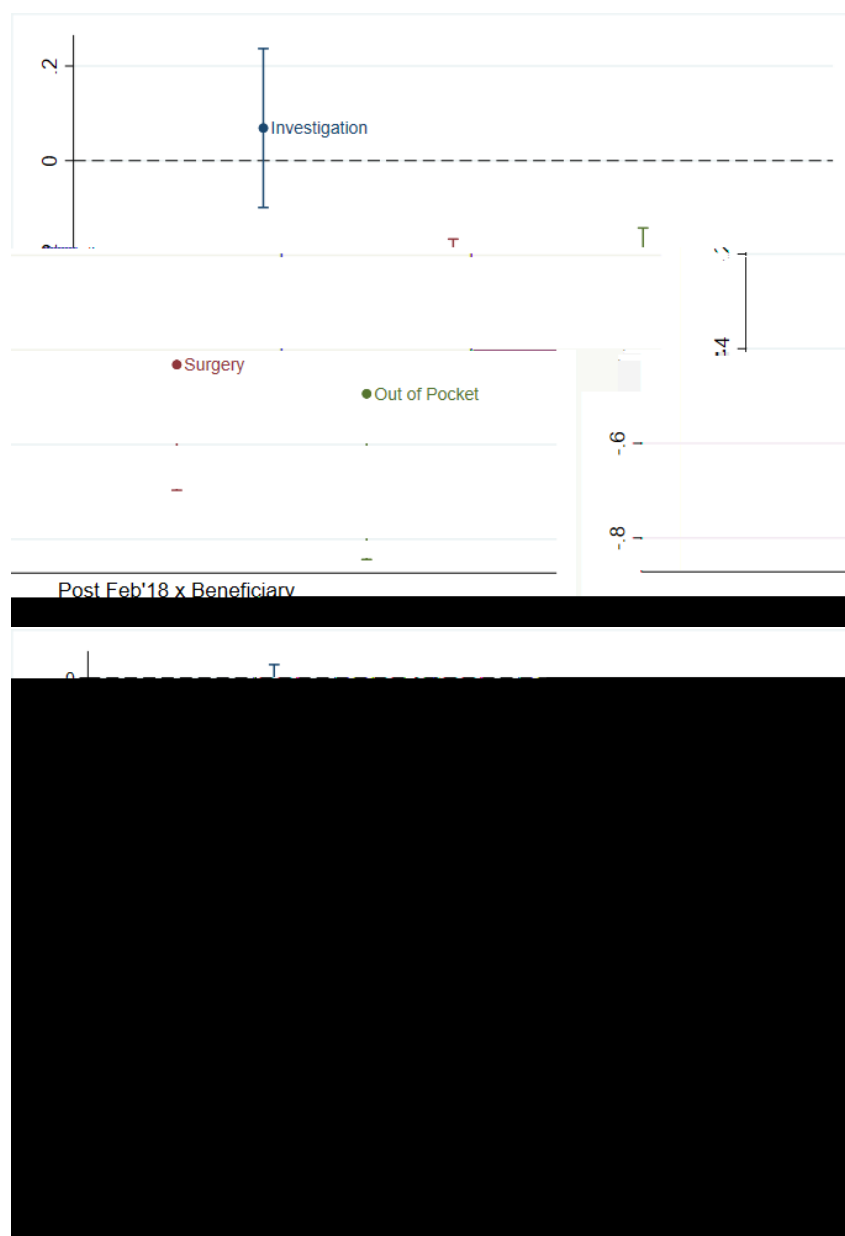


Figure 4: Impact of Additional Income on Health Expenditure for Beneficiaries

is being allocated elsewhere. These findings are in line with [Mondal and Dubey \(2020\)](#) who also find that there exists a large gender gap in hospital expenses, especially in the case of currently married females. This suggests that married females might be contributing the additional income towards family welfare which has also been echoed in past works ([Doepke & Tertilt, 2019](#)).

Table 8: Heterogeneity Check: Change in Expenditure across Surgery Types in LVPEI

	(1)	(2)	(3)	(4)	(5)
DV (in log)	Anterior Segment	Cataract	Cornea	Glaucoma	Occular Surface
Post Feb'18 x Beneficiary	0.927 (1.683)	-0.403* (0.233)	1.341 (0.847)	-0.882 (0.647)	-0.792 (0.798)
Observations	2,936	130,234	5,133	3,115	11,014
R-squared	0.511	0.546	0.313	0.356	0.649
Controls	Yes	Yes	Yes	Yes	Yes
FE	Yes	Yes	Yes	Yes	Yes
DV (in log)	Oculoplasty	Refractive Surgery	Retinal	Strabismus	Trauma
Post Feb'18 x Beneficiary	-1.286*** (0.352)	-0.0767 (0.0990)	-0.475** (0.234)	-0.229 (0.716)	1.400 (0.914)
Observations	16,077	6,693	25,400	3,061	899
R-squared	0.423	0.084	0.316	0.303	0.695
Controls	Yes	Yes	Yes	Yes	Yes
FE	Yes	Yes	Yes	Yes	Yes

Notes: The dependent variables are logs of the outcomes given in each column. The estimation includes fixed effects for the time, state of residence and centre of the hospital along with a set of controls. Standard errors are clustered at the district level. `\*\*\*`, `\*\*`, and `\*` indicate significance at 1%, 10% and 5% respectively. We observe that the coefficient of interest is negative and significant for cataract, oculoplasty and retinal surgery. This suggests that female beneficiaries spend less on expensive surgeries post an increase in income as compared to non-beneficiaries.

Finally, [Table 8](#) highlights the heterogeneity in expenditure across eleven types of surgery. We observe that the coefficient of interest is negative and significant for cataract, oculoplasty and retinal surgery (doctors at LVPEI point out the elective nature of these surgeries to us, highlighting how patients may defer care here in contrast to acute care, especially if they are expensive and patients are paying instead of non-paying patients). This also suggests that female beneficiaries spend less on expensive surgeries post an increase in income as compared to non-beneficiaries. Our results resonate with the findings of [Dupas and Jain \(2021\)](#) who also suggest that women spend significantly less on expensive healthcare procedures.

6. Unanticipated Income Shock and Women's Health Spending: Explaining the Negative Effect

Our empirical examinations rely on the hypothesis that a change in income for women in developing countries, all else equal, does not necessarily lead to an increase in healthcare spending and in some cases may lead to a decline. Given that we are able to rule out that this is entirely due to better health outcomes, our findings presented below indicates that health care appears to be a non-normal good for women in these settings. In this section, we try to motivate this hypothesis borrowing from the theoretical literature on household decision making. We heavily borrow insights from the very recent and relevant work of [De Rock et al. \(2022\)](#) who motivate their analysis of household responses to cash transfers using a household collective decision model.

Intra-household collective decision making in various contexts have been widely studied in

Pathak, & Karra, 2020; Anukriti, Kwon, & Prakash, 2022; Karim, Kwong, Shrivastava, & Tamvada, 2022) or may just simply reflect a revealed preference among women consumers (Caplin & Dean, 2011; Kline & Tartari, 2016). Further, there is evidence in the literature that households are non-unitary and that small transfers to women may often “be appropriated by men and diverted to other purposes” (Banerjee et al., 2019; Chiappori & Mazzocco, 2017; De Mel, McKenzie, & Woodruff, 2009; Lin, Chen, Chiang, & Zhang, 2021). This would also be consistent with our findings that an increase in women's disposable incomes need not necessarily lead to an increase in demand for goods that are otherwise considered ‘normal’ with respect to their income elasticity.

Finally,

of a male member of the household is not necessarily treated in the same way as a marginal increase in the income of a female member. For instance, the female member may be expected to disproportionately contribute to the household public good, relative to the male. Ironically, this may also include contributing to the health care expenses on family members rather than the individual herself. We find some suggestive evidence along these lines where we show that the composition of spending within the household is impacted by this income shock. Women seem to be spending more on health enhancements and the education of their children. Since the simple correlation between healthcare spending and income does not account for potential substitution between components of healthcare spending; at face value it appears that healthcare demand responds non-normally to income shocks for women, although certain components of healthcare spending may still increase. Overall, our results indicate the relationship between income and healthcare spending is much more nuanced than expected. They seem to vary across gender, cultural norms, and income level. Needless to say further research is merited to explore these issues carefully.

References

- Acemoglu, D., Finkelstein, A., & Notowidigdo, M. J. (2013). Income and health spending: Evidence from oil price shocks. *The Review of Economics and Statistics*, 95(4), 1079–1095.
- Afridi, F., Mahajan, K., & Sangwan, N. (2022). Employment guaranteed? Social protection during a pandemic. *Oxford Open Economics*, 1.
- Aizer, A. (2007). Public health insurance, program take-up, and child health. *The Review of Economics and Statistics*, 89(3), 400–415.
- Angrist, J. D., Imbens, G. W., & Rubin, D. B. (1996). Identification of causal effects using instrumental variables. *Journal of the American Statistical Association*, 91(434), 444–455.
- Anukriti, S., Herrera-Almanza, C., Pathak, P. K., & Karra, M. (2020). Curse of the mummy-j: The influence of mothers-in-law on women in India. *American Journal of Agricultural Economics*, 102(5), 1328–1351.
- Anukriti, S., Kwon, S., & Prakash, N. (2022). Saving for dowry: Evidence from rural India. *Journal of Development Economics*, 154, 102750.
- Attanasio, O., Battistin, E., Fitzsimons, E., & Vera-Hernandez, M. (2005). How effective are conditional cash transfers? Evidence from Colombia.
- Baird, S., Friedman, J., & Schady, N. (2011). Aggregate income shocks and infant mortality in the developing world. *The Review of Economics and Statistics*

- (2016). Cash transfers: What does the evidence say? A rigorous review of programme impact and the role of design and implementation features. London; ODI.
- Benhassine, N., Devoto, F., Du o, E., Dupas, P., & Pouliquen, V. (2015). Turning a shove into a nudge? A "labeled cash transfer" for education. *American Economic Journal: Economic Policy* 7(3), 86–125.
- Beyer, R. C., Franco-Bedoya, S., & Galdo, V. (2021). Examining the economic impact of Covid-19 in India through daily electricity consumption and nighttime light intensity. *World Development* 140.

- intra-household and intergenerational spillovers. *Econometrica* 88(3), 1075–1106.
- Chauvet, L., & Guillaumont, P. (2009). Aid, volatility, and growth again: When aid volatility matters and when it does not. *Review of Development Economics* 13(3), 452–463.
- Chiappori, P.-A. (1988). Rational household labor supply. *Econometrica: Journal of the Econometric Society* 56(1), 63–90.
- Chiappori, P.-A. (1992). Collective labor supply and welfare. *Journal of Political Economy* 100(3), 437–467.
- Chiappori, P.-A., & Ekeland, I. (2006). The micro economics of group behavior: General characterization. *Journal of Economic Theory* 130(1), 1–26.
- Chiappori, P.-A., & Mazzocco, M. (2017). Static and intertemporal household decisions. *Journal of Economic Literature* 55(3), 985–1045.
- Das, A. V., & Basu, S. (2021). Indications and prognosis for keratoplasty in eyes with severe visual impairment and blindness due to corneal disease in India. *British Journal of Ophthalmology* 105(1), 17–21.
- Deaton, A. (2003). Health, inequality, and economic development. *Journal of Economic Literature* 41(1), 113–158.
- De Chaisemartin, C., & d'Haultfoeuille, X. (2020). Two-way fixed effects estimators with heterogeneous treatment effects. *American Economic Review* 110(9), 2964–96.
- Deering, J. A. (1981). Health and wealth: An international study of health-care spending. Project HOPE-The People-to-People Health Foundation, Inc.
- De Mel, S., McKenzie, D., & Woodruff, C. (2009). Are women more credit constrained? Experimental evidence on gender and microenterprise returns. *American Economic Journal: Applied Economics* 1(3), 1–32.
- De Rock, B., Potoms, T., & Tommasi, D. (2022). Household responses to cash transfers. *Economic Development and Cultural Change* 70(2), 625–652.
- Diez-Roux, A. V. (1998). Bringing context back into epidemiology: Variables and fallacies in multilevel analysis. *American Journal of Public Health* 88(2), 216–222.
- Di Matteo, L. (2003). The income elasticity of health care spending. *The European Journal of Health Economics* 24(1), 20–29.
- Doepke, M., & Tertilt, M. (2019). Does female empowerment promote economic development?

Journal of Economic Growth 24(4), 309–343.

Dreger, C., & Reimers, H.-E. (2005). Health care expenditures in OECD countries: A panel unit root and cointegration analysis. Available at SSRN 651985

Dubey, J. D., et al. (2020). Income elasticity of demand for health care and its change over time: Across the income groups and levels of health expenditure in India. National Institute of Public Finance and Policy (20/324).

Du o, E., Glennerster, R., & 0/324).ge over

Economics 19(2), 259–270.

Gitter, S. R., & Barham, B. L. (2008). Women's power, conditional cash transfers, and schooling in Nicaragua.

Chinese households Marketing Science

- Pitt, M. M., Khandker, S. R., Chowdhury, O. H., & Millimet, D. L. (2003). Credit programs for the poor and the health status of children in rural Bangladesh. *International Economic Review* 44(1), 87–118.
- Pitt, M. M., Khandker, S. R., McKernan, S.-M., & Latif, M. A. (1999). Credit programs for the poor and reproductive behavior in low-income countries: Are the reported causal relationships the result of heterogeneity bias? *Demography* 36(1), 1–21.
- Preston, S. H. (1975). The changing relation between mortality and level of economic development. *Population Studies* 29(2), 231–248.
- Rivera, J. A., Sotres-Alvarez, D., Habicht, J.-P., Shalvat, J. (2011). City bias?

- Somanchi, A. (2021). Missing the poor, big time: A critical assessment of the consumer pyramids household survey.
- Standing, G. (2013). Unconditional basic income: Two pilots in Madhya Pradesh. In background note prepared for the delhi conference. delhi.
- Susser, M. (1994). The logic in ecological: I. The logic of analysis. *American Journal of Public Health* 84(5), 825–829.
- Team, T. K. C.-O. E. (2012). The impact of the Kenya cash transfer program for orphans and vulnerable children on household spending. *Journal of Development Effectiveness* 4(1), 9–37.
- Vyas, M. (2020). Consumer pyramids household survey: Survey design and sampling. Center for Monitoring Indian Economy Pvt. Ltd Mumbai.

A. Appendix

A.1. Descriptive Analysis for CPHS data

The survey procedure uses a grouping strategy for the socio-demographic variables including gender, age, occupation, education and family size. This facilitates easier classification of similar households into a group and also helps to understand the characteristics of an individual household as a unit. The distribution of our sample into the gender groups (See [Table A1](#)) and the occupation groups (See [Table A2](#)) are presented in the tables below.

Table A1: Classification of Economy Wide Data by Gender Group

HH Group	Gender Groups	Definition
Female Households	Female Dominated	The number of females is more than males but not more than twice
	Female Majority	The number of females are twice the number of males in the household
	Only Female	Does not have any male members
Male Households	Male Dominated	The number of males is more than females but not more than twice
	Male Majority	The number of males are twice the number of females in the household
	Only Male	Does not have any female members
	Balanced Gender	The number of male and female members is equal

Notes: The table represents the classification of the gender groups for the households in our sample.

[Table A3](#) presents the summary statistics of the main outcome variables for our sample from the economy wide CPHS data. The average total expenditure

Table A2: Classification of Economy Wide Data by Occupation Group

Classification of Occupation Group into Formal and Non-Formal Sector	
Occupation Group	Percentage of the sample
Formal Sector	36.68
Business & Salaried Employees	1.58
Industrial Workers	3.67
Legislators/Social Workers/Activists	0.03
Managers/Supervisors	0.46
Non-industrial Technical Employees	1.64
Organised Farmers	2.71
Qualified Self-employed Professionals	0.41
Wage Labourers	14.38
White-collar Clerical Employees	5.92
White-collar Professional Employees	6.91
Non- Formal Sector	63.32
Agricultural Labourers	6.76
Entrepreneurs	8.38
Home-based Workers	1.19
Miscellaneous	5.83
Retired/Aged	7.5
Self-employed Entrepreneurs	13.63
Small Traders/Hawkers	3.47
Small/Marginal Farmers	9.5

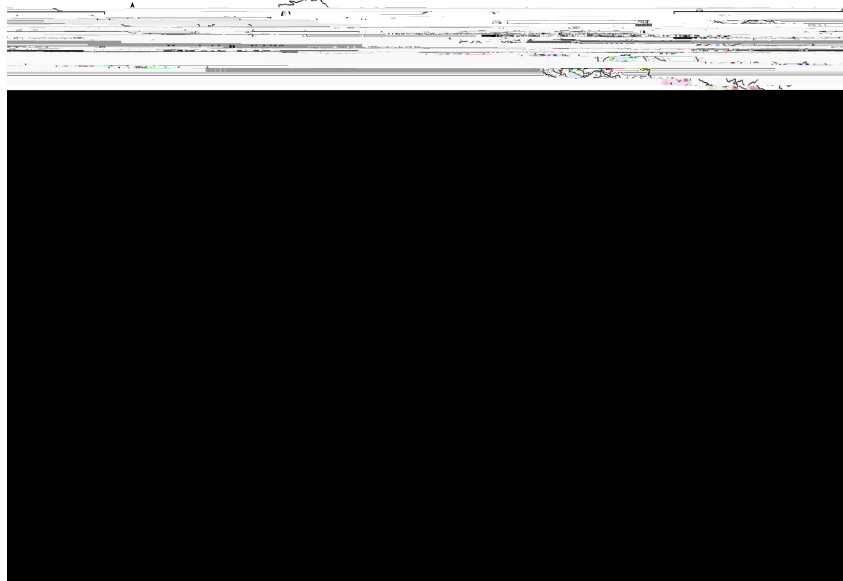


Figure A1: Expenditure Distribution on Health by Beneficiary Households Across India
The map represents the average expenditure by beneficiary female households across India before the policy announcement of EPF reduction in Feb 2018

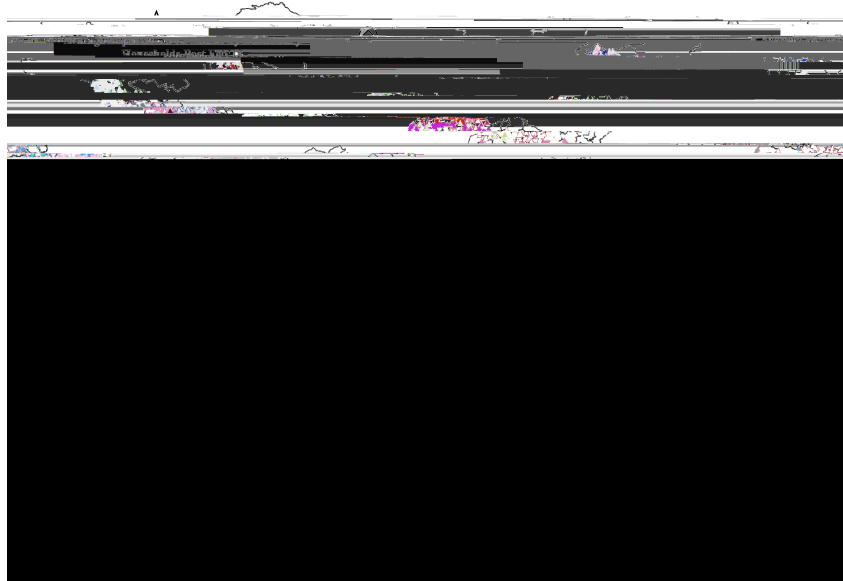


Figure A2: Expenditure Distribution on Health by Beneficiary Households Across India
The map represents the average expenditure by beneficiary female households across India after the policy announcement of EPF reduction in Feb 2018

the p-values. As indicated, the estimates are significant for all three outcome variables. These preliminary results indicate a negative effect of the income shock.

Table A4: Descriptives in Difference-in-Differences Framework

Exp. on Investigation	Pre	Post	Difference	
Bene ciary	469.69	535.27	First Difference	65.58
Non-Bene ciary	96.99	112.00	Second Difference	15.01
	Difference in Differences (t=5.19, p=0.000)			50.57
Exp on Surgery Amount	Pre	Post	Difference	
Bene ciary	26227.53	25454.34	First Difference	-773.19
Non-Bene ciary	7298.72	7836.73	Second Difference	538.01
	Difference in Differences (t=3.65, p=0.000)			-1311.20
Out of Pocket Exp.	Pre	Post	Difference	
Bene ciary	24043.88	22585.77	First Difference	-1458.11
Non-Bene ciary	6445.24	6717.04	Second Difference	271.81
	Difference in Differences (t=5.16, p=0.000)			-1729.92

Notes: The table represents the summary statistics from simple difference-in-differences framework for three main outcome variables for the Micro Case.

[Table A5](#) highlights the sample mean values of the characteristics of women visiting the hospital employed in the formal sector and non-formal sector. As the table, the characteristics including age, marital status, visual acuity and location of bene ciaries and non-bene ciaries are more or less similar. This suggests that the sample is as good as random before the assignment of treatment.

Sample Selection We check for sample selection of households into the data by regressing our baseline equation on a dummy variable which takes value equal to 1 for female households. Column (1) gives the estimates from OLS regression, column (2) gives the main results by including fixed effects and controls and column (3) provides the estimates in log form. We obtain a positive but insignificant coefficient in all three columns. These results indicate that household composition does not change in response to the policy.

A.3. Additional Results

Alternate Treatment Status for Economy-Wide Case As part of the validity checks, we include some additional results by defining the treatment status in two other ways. First, we estimate

Table A5: Pre-Treatment Sample Mean of Characteristics for Micro Data

Pre-Treatment Sample Means		
	Bene ciary	Non-Bene ciary
Age	51.593	52.907
Marital Status	0.745	0.781
Rural	1.627	1.617
Center Category	1.615	1.608
Patient Category	1.569	1.633
Mild or No Visual Impairment 0	0.195	0.242
Moderate Visual Impairment	0.191	0.176
Severe Visual Impairment	0.061	0.040
Blindness 3	0.254	0.236
Blindness 4	0.072	0.080
Blindness 5	0.003	0.004

Notes: The table represents the pre-treatment sample means of characteristics of bene ciaries and non-bene ciaries for the hospital system microdata

Table A6: Sample Selection

Test for Sample Selection			
	OLS	Linear	Log
Post Feb'18 x Bene ciary HH	0.002 [0.001]	0.004 [0.002]	0.003 [0.002]
Observations	1,796,586	1,795,660	1,795,660
R-squared	0.004	0.838	0.838
Controls	No	Yes	Yes
Fixed Effects	No	Yes	No

Notes: Column (1) gives the estimates from OLS regression, column (2) gives the main results by including xed effects and controls, column (3) provides the estimates in log form. Standard errors are clustered at the household

the expenditure on health outcomes using [Equation 1](#) by assigning the treatment status as 1 if a female household had maximum members employed in the formal sector at least once in the pre-period. The control group consists of female households with maximum members in the non-formal sector at least once in the pre-period. In the second specification, we estimate the expenditure on health outcomes by assigning the treatment status as 1 if a female household had maximum members employed in the formal sector consistently through our period of analysis. The control group consists of female households with maximum members in the non-formal sector consistently through our period of analysis. These results are presented [Table A7](#). The

formal and non-formal sector using [Equation 1](#). In this variation, the non-industrial technical employees and qualified self-employed professionals are considered a part of the non-formal sector. [Table A8](#) highlights the results for this estimation. The coefficient of interest remains negative and significant ($\beta = -0.126$), thus supporting our benchmark findings.

Table A8: Change in Health Expenditure: Variation in Classification of Occupation Group

	(1)	(2)	(3)	(4)
DV (in log)	Total Health Expenditure			
Post Feb'18 x Beneficiary HH	-0.147*** [0.011]	-0.133*** [0.020]	-0.143*** [0.011]	-0.126*** [0.020]
Observations	491,398	490,956	491,398	490,956
R-squared	0.029	0.397	0.085	0.402
Controls	No	No	Yes	Yes
Fixed Effects	No	Yes	No	Yes

Notes: We estimate the expenditure on health outcomes by varying the classification of occupation group into the formal and non-formal sector. In this variation, the non-industrial technical employees and qualified self-employed professionals are considered a part of the non-formal sector. The dependent variable in all columns is log of expenditure on healthcare. Csl:ron706 -281rmgmn LSx35A8 r98(remr446 Td52 Tf 2c-250(on)f 77.978.747 T5A8

Table A9: The Micro Case: Impact of Additional Income on Health Expenditure for Beneficiaries

	(1)	(2)	(3)
Sample: All Females Visiting the Hospital			
DV (in log)	Investigation Amt.	Surgery Amt.	Out of Pocket Exp.
Post Feb'18 x Beneficiary	0.0690 (0.0855)	-0.431*** (0.135)	-0.493*** (0.178)
Observations	223,106	223,106	223,106
R-squared	0.273	0.486	0.445
Controls	Yes	Yes	Yes
FE	Yes	Yes	Yes
Sample: Married Females Visiting the Hospital			
DV (in log)	Investigation Amt.	Surgery Amt.	Out of Pocket Exp.
Post Feb'18 x Beneficiary	-0.119 (0.0808)	-0.773*** (0.172)	-0.877*** (0.228)
Observations	168,491	168,491	168,491
R-squared	0.219	0.489	0.443
Controls	Yes	Yes	Yes
FE	Yes	Yes	Yes

Notes: The dependent variables are log of the outcomes given in each column. The estimation includes fixed effects for time, state of residence and center of the hospital along with a set of controls. Standard errors are clustered at the district level. `\*\*\*', `**', and `*' indicate significance at 1%, 10% and 5% respectively. The negative and significant coefficient for out-of-pocket expenditure and surgical expenses in the top panel indicates that female beneficiaries visiting the eye hospital spend significantly less on surgical treatments as compared to female non-beneficiaries. In the bottom panel, the coefficient estimate suggests that the marital status of a woman leads to a stronger negative impact on healthcare expenditure.

impact on height-for-age of children (0.96 cm taller; Progressa-Mexico, 0.44 cm taller boys; FA-Colombia), assisted childbirth (increase from 16 to 23% in six years; PKH-Indonesia), haemoglobin levels (11.12 g/dL; Progressa-Mexico), stunting (23-27% reduction; PKH-Indonesia; 8.6% reduction; Progressa-Mexico) and illness among infants (39.5% reduction; Progressa-Mexico) (Attanasio et al., 2005; Cahyadi et al., 2020; Gertler, 2004; Rivera, Sotres-Alvarez, Habicht, Shamah, & Villalpando, 2004). While these studies document a positive outcome, another strand in the literature has reported no significant effect of similar policy shocks.

Table A10: Estimates on Direct Health Outcomes from Existing Studies

Name of Program	Country	Indicator	Estimate for treated group compared to control	Reference
Progressa	Mexico	Stunting	Children are 8.6% less likely to be stunted.	Gertler (2004)
		Illness	Exposure to intervention for 24 months led to 39.5% reduction in illness for children	Gertler (2004)
		Haemoglobin	Mean haemoglobin level (11.12 g/dL) in children	Rivera et al (2004)
		Height	Infants under 6 months of age are 1.1cm higher	Rivera et al (2004)
Program Keluarga Harapan (PKH)	Indonesia	Stunting	23 to 27 percent reduction in the probability of being stunted	Cahyadi et al (2020)
		Assisted Childbirth	Increase from 16 to 23% in six years	Cahyadi et al (2020)
		Immunization Rate	No significant effect	Cahyadi et al (2020)
Bolsa Alimentacao	Brazil	Weight	An additional month of exposure to the program was associated with a 31g less weight gain	Morris et al (2004)
Familias en Accion	Colombia	Height-for-age	12-month-old boys grew 0.44 centimetres more than negligible effects for children older than 2 years	Attanasio et al (2005)
Credit Transfer Program (Gender Disaggregated)	Bangladesh	Healthcare Visits	Increased from 17.2% to 40.0%	Attanasio et al (2005)
		Body Mass Index	No significant effect	Pitt et al (2003)
		Height-for-age	Credit to women leads to increase in height for boys (1.53) and girls (1.14),	Pitt et al (2003)
Medicaid (Coverage of Asian and Hispanic Community)	USA	Contraceptive Use	No significant effect	Pitt et al (1999)
		Hospitalization	Increasing the number of children with Medicaid 10% results in a 2-3% percent decline in avoidable hospitalizations among children	Aizer (2007)

Notes: The table represents the coefficient estimates on direct healthcare outcomes from existing studies in the literature.

Studies by Pitt, Khandker, McKernan, and Latif (1999) and Pitt, Khandker, Chowdhury, and Millimet (2003) on credit programs in Bangladesh report the impact of gender-segregated decisions on intra-household allocations. Credits to women have no significant effect on the body mass index of children and the usage of contraceptives but a positive effect on the height of children. Similarly, Morris, Olinto, Flores, Nilson, and Figueroa (2004) found a negative association between CCT conditioned upon seeking preventive healthcare in Brazil on weight gain of infants. Finally, a study by Aizer (2007) reported that increasing the coverage of insurance programs (Medicaid) by 10% for children in the USA resulted in a 2-3% decline in avoidable hospitalizations.