# Labor Market Consequences of Pre-School Construction in Peru

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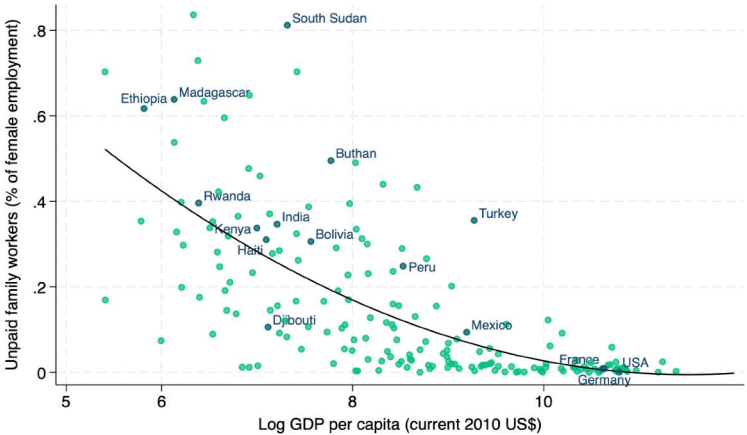
# How does the provision of childcare services impact the poorest regions?

- Female labor force participation has consistently been high in some of the poorest countries in the world.
- High share of employment in most low-income countries comes from contributing family work.

- Contributing family work (farm and non-farm): relatives that assist without pay in a family operated income-producing enterprise for 15 hours or more per week (Ngai, Olivetti and Petrongolo, 2024).

# Contributing Family Work for women is high at lower levels of economic development and decreases rapidly as a country develops

**Figure:** Contributive family work and GDP per capita, 2010




Notes: Data obtained through World Development Indicators, World Bank

# Access to childcare and labor force participation?: Classical question in economics but with little evidence in less developed regions

- What could be the effect in poorer regions where labor force participation is already high?
- Classical question but with little work on the effect of childcare services in poorer and more rural areas.
- Very limited access to public policies or data.

# Access to childcare and labor force participation?: Classical question in economics but with little evidence in less developed regions

- What could be the effect in poorer regions where labor force participation is already high?
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- Very limited access to public policies or data.

## Research Questions

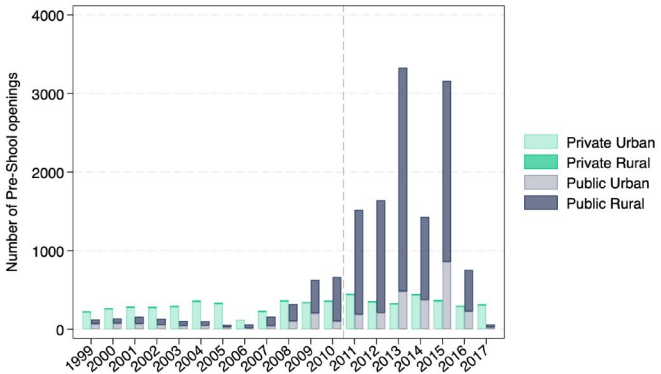
1. Can an increase in pre-schools and childcare services improve the job quality and occupations for women in Peru?
2. What are the causal average impacts of universal subsidy childcare services?

# This Paper

1. Document: increase in pre-school enrollment after a large expansion of public pre-schools in rural Peru.
2. Exploit: at a hyperlocal level a quasi-experiment that provides variation in access to pre-school.
   - Gradual rollout in an expansion of pre-school centers (PSC) across districts and villages
   - Timing and spacial variation in the opening of PSCs
3. Estimate: heterogeneous causal effects on children, women and households' outcomes.
   - Access to a pre-school increases children's enrollment by 17%.
   - This induces women to leave unpaid family work by 15% and increase their labor income.
   - Changes in their labor income are translated into an increase of 20% in total household expenditure per capita.

# The National Government committed to a large expansion of the number of PSCs with the biggest expansion happening between 2011 and 2015

**Figure:** Annual openings of Pre-School centers (PSC) by type of administration and area, 1999-2017

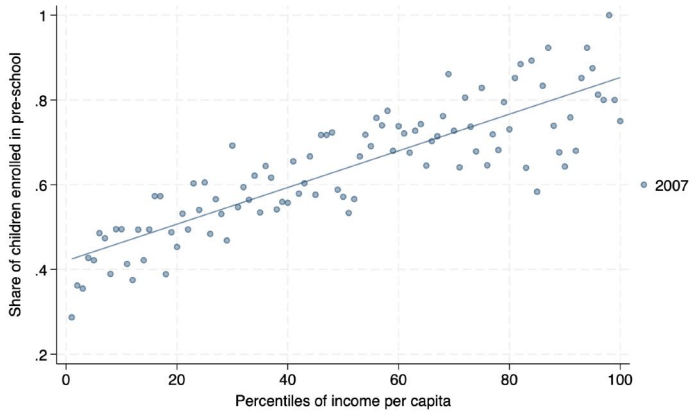



Notes: Own elaboration based on data from the School directory produced by the Ministry of Education

PSC stock

# Access to early childhood education was unequal in Peru before 2010

**Figure:** Share of children 3-to-5 years old enrolled in a PSC, 2007




Notes: Own elaboration based on data from ENAHO 2007

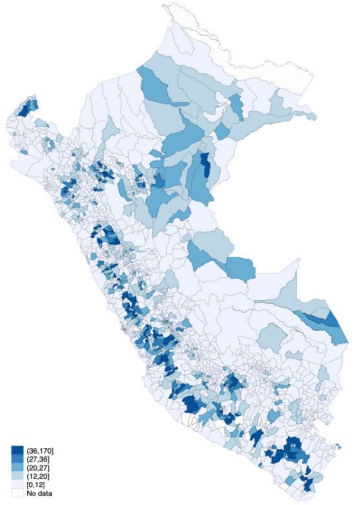



Figure: 2007

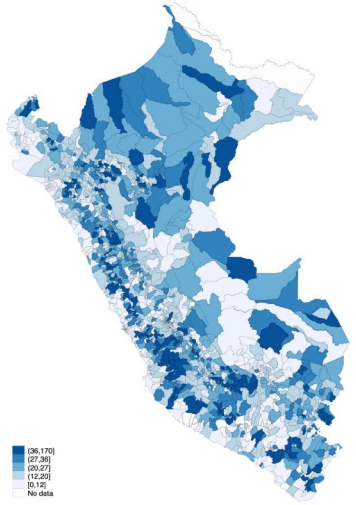
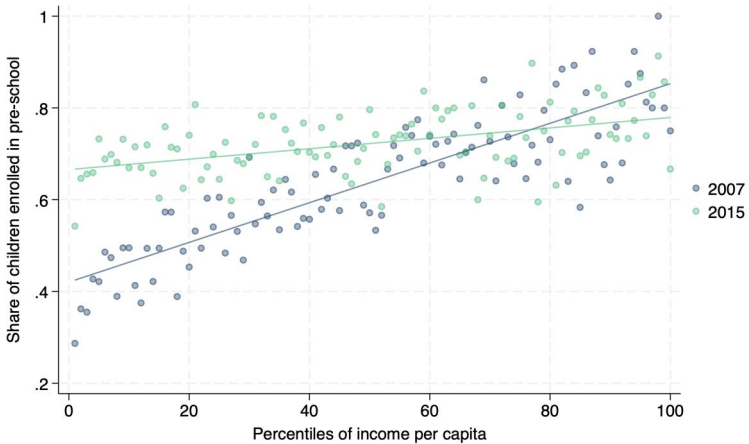



Figure: 2014

Notes: Maps show the number of PSCs per 1,000 children in the district

# By 2015, access to early childhood education had increased for households in the lower part of the income distribution

**Figure:** Share of children 3-to-5 years old enrolled in a PSC, 2007 and 2015




Notes: Own elaboration based on data from ENAHO 2007-2015

# Data

- **ENAHO:** Peruvian National Household Survey. This is the main household survey in Peru to measure poverty and labor market indicators. Households are geocoded at the cluster level.
- **Peruvian Census:** I use the 2007 census to estimate the number of children aged 3-to-5 across all districts in the country.
- **School directory:** Collected by the Ministry of Education using a unique school identifier. Information of every school in Peru. Details on the type of school management, educational levels offered, religious orientation, geocoded locations and foundation dates.

# Measuring Exposure to the PSCs

- Focus in Rural Areas
- I construct a measure of exposure to the program:
  - **PSC within 2-kilometer Euclidean buffer** of the household.
- I link every household to a PSC if the PSC falls within the buffer.
  - For example, if a household is located within 2-kilometers of a PSC that became operative in 2014 $\rightarrow$ coded as having a PSC within two kilometer of the household.
- In practice, I construct 6 dummies indicating if the household is located within 1, 1.5, 2, 3 and 5 kilometers of a PSC location.

# Identification Strategy: Staggered Difference in Difference

$$y_{idt} = \sum_{\tau=-k}^{-1} \beta_\tau PSC_i^{pre} 1(\tau = t - T^*) + \sum_{\tau=1}^{k} \beta_\tau PSC_i^{post} 1(\tau = t - T^*) + \gamma X_{it} + \alpha_d + \theta_{pt} + e_{it} \quad (1)$$

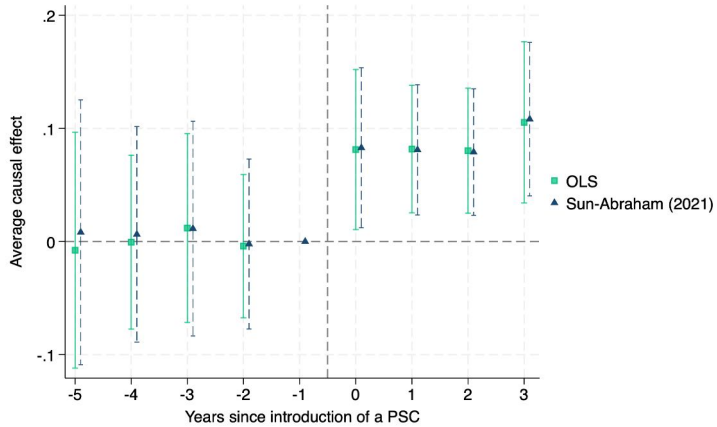
- $y_{idt}$ is an outcome of interest for person $i$ at year $t$ who resides in district $d$
- $PSC_{idt}$ takes the value of 1 if there is a PSC within 2 kilometers of the person's household (and 0 that radius, signaling less or no PSC exposure).
- $X_{it}$ is a set of controls
- $\alpha_d$ is a district fixed-effect
- $\theta_{pt}$ is a province-by-year fixed effect
- $e_{it}$ is a random error term

# First Stage: Pre-school Enrollment and Attendance

- Compare outcomes of interest for **children between 3 to 5 years old** with access to a pre-school up to 2 km from their homes vis-à-vis children of the same age outside that radius (thus, less or no exposed).

# The impact of pre-school in enrollment happens immediately since it's arrival to a locality and, it persists over time

**Figure:** Event study on enrollment for children 3-5 years old given the introduction of a PSC within 2km of the household.




Population ratios Table Buffers

# Second Stage: Impacts in the Labor Markets in Rural Areas

- Compare outcomes of interest for **mothers (and other women) who live in households with the presence of at least one child between 3-to-5 years old** with access to a pre-school up to 2 km from their homes vis-à-vis other mothers (and their families) with children of the same age outside that radius (thus, less or no exposed).

# Overall, the policy did not have an effect at the extensive margin for women who live in rural areas

**Table:** Effects on employment at the rural level

| **Rural level** | |
|---|---|
| | Employed |
| PSC within 2km | 0.002 |
| | (0.011) |
| Mean dep. Var | 0.89 |
| District FE | Yes |
| Province×Year FE | Yes |
| Covariates | Yes |
| Clusters | 190 |
| Observations | 17,688 |

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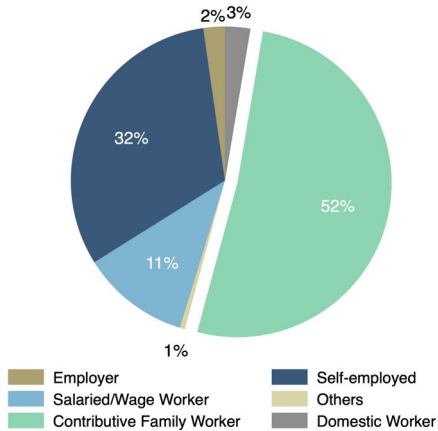
| Clusters | 190 |
| Observations | 17,688 |

**Figure:** Distribution of the type of employment, 2007



# Under a definition of employment as a generator of own income, the pre-school expansion policy shows an 11% impact

**Table:** The Effect of PSC on women's labor outcomes

| | Dependent Variable | | |
|---|---|---|---|
| | Employed | Income Employed | Unpaid Family Work |
| | (1) | (2) | (3) |
| PSC within 2km | 0.002 | 0.045*** | -0.044*** |
| | (0.011) | (0.016) | (0.014) |
| Mean dep. Var | 0.886 | 0.331 | 0.554 |
| Clusters | 190 | 190 | 190 |
| Observations | 17,688 | 17,688 | 17,688 |
| District FE | Yes | Yes | Yes |
| Province X Year FE | Yes | Yes | Yes |
| Covariates | Yes | Yes | Yes |

# Childcare tasks create a barrier that constrains women's market choices

- Access to free public pre-schools, increases enrollment for children 3-to-5 years old.
- Linked to women starting to generate their own sources of income.
- Importance: Women are moving away from a vulnerable status in employment.

- Key Channels:
  - The effect is driven by mothers who don't live with other adults in their households besides the father. Table
  - Larger impact for mothers whose youngest child is in pre-school age. Figure

# The impact on the quality of employment -measured as an own income generator- and labor income increases over time

**Figure:** Effects on Contributive Family Work

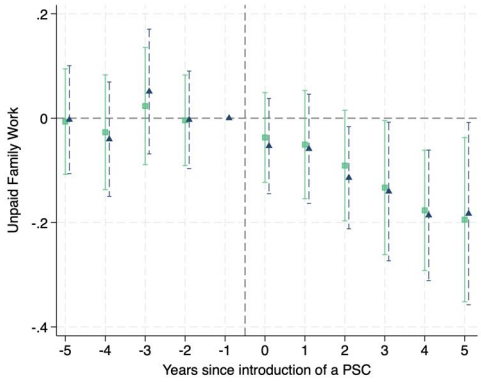
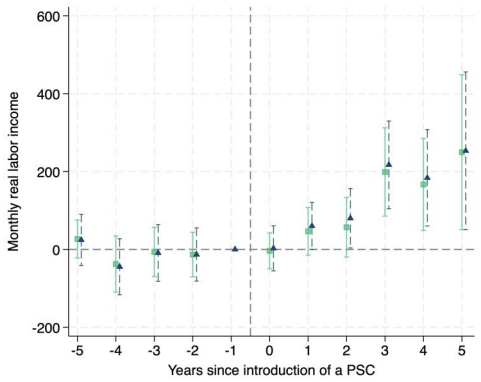



**Figure:** Effects on Monthly Labor Income




OLS ▲ Sun-Abraham (2021)

Table Lab. Inc

# Moreover, the effect on the mother's labor income translates into a rise in household consumption

**Figure:** Effects on Household Expenditure

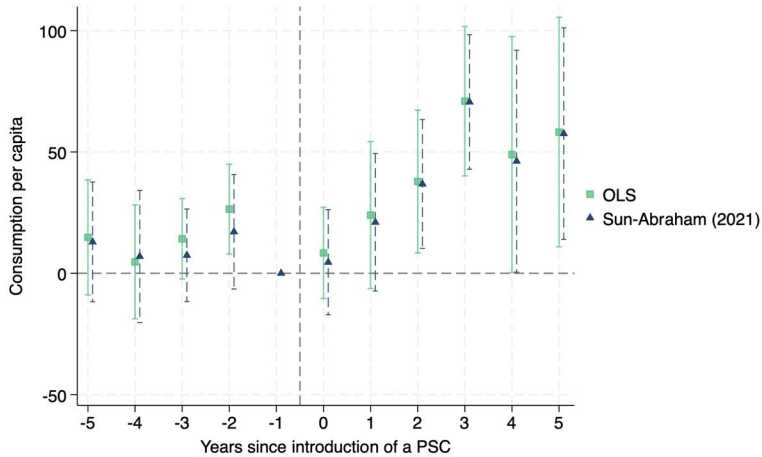



Table | Exp. Groups

# Access to childcare services allows mothers to be more productive

- For women without other childcare options, care responsibilities constrain market opportunities.
- Access to childcare allows mothers to become and/or move to more productive work $\Rightarrow$ evidenced by increase in household consumption.

# Focus Groups reveal that childcare responsibilities affected work while in the farm fields...

"We all would have to bring them [the children] to the fields, we would work there and would leave the toddlers nearby, in the shade, seated with their food and water, until the time we finished working."

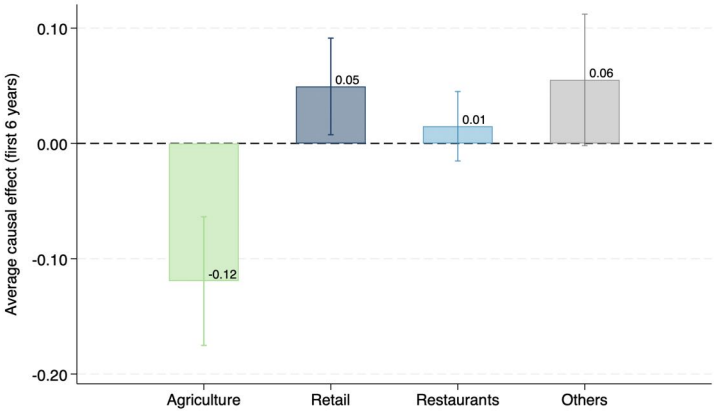
"We had to be checking on them while they were seated there as well. Sometimes, if we had an older child, then we would leave the toddler with them. They have to help, take care of their younger siblings, right?"

# ...and made other types of work more challenging

"It's difficult when they're young. For some time I worked selling clothes, I brought my son with me and I lost him! I was going crazy, I couldn't find him...At the end, I found him hiding under some sample garments. I was so scared!"

# A sectoral analysis shows that the decrease in unpaid family work is connected to a decrease in work in agriculture and an increase in other industries

**Figure:** Aggregate effect on economic sectors (mothers who live without relative caretakers)




Table

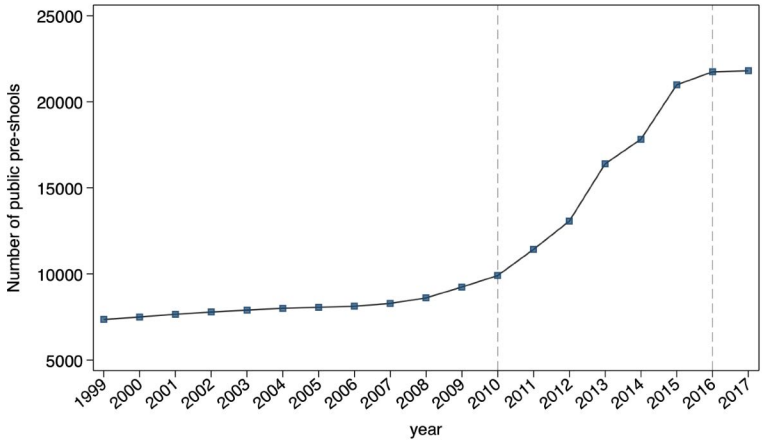
# Conclusion

- High levels of employment among women in rural Peru, however more than half of it comes from contributing family work.
- Access to free pre-school increases enrollment for children at the target age.
- Access to these establishments allows mothers to become more productive, increasing labor income and, consequently, household consumption.

Thank you!
Gracias!

# Appendix

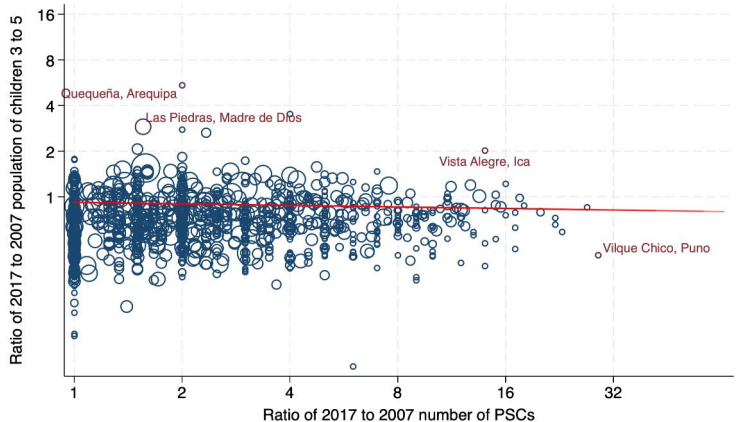
Figure: Total number of public PSC in Peru, 1999-2017




Notes: Own elaboration based on data from the School directory produced by the Ministry of Education

Back

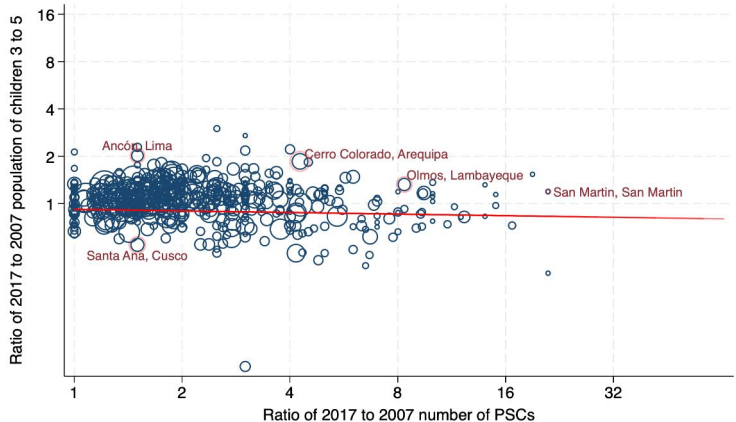
Figure: Population ratio of children 3 to 5 years old vs. ratio of the number of PSCs in rural areas, 2007-2017




Notes: Own elaboration based on data from the Peruvian Census 2007 and 2017 and the Peruvian School registry

Back

Figure: Population ratio of children 3 to 5 years old vs. ratio of the number of PSCs in urban areas, 2007-2017




Notes: Own elaboration based on data from the Peruvian Census 2007 and 2017 and the Peruvian School registry

# First Stage: Overall changes in pre-school enrollment and attendance

| | Dependent Variable | | | | | |
|---|---|---|---|---|---|---|
| | **Enrolled in Pre-School** | | | **Currently Attending** | | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| | National | Rural | Urban | National | Rural | Urban |
| PSC within 2km | 0.079*** | 0.082*** | 0.046 | 0.077*** | 0.074*** | 0.078 |
| | (0.012) | (0.013) | (0.058) | (0.013) | (0.014) | (0.052) |
| Mean dep. Var | 0.49 | 0.48 | 0.61 | 0.44 | 0.44 | 0.55 |
| District FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Province×Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Covariates | Yes | Yes | Yes | Yes | Yes | Yes |
| Clusters | 193 | 191 | 152 | 193 | 191 | 152 |
| Observations | 41,931 | 16,612 | 25,126 | 41,931 | 16,612 | 25,126 |

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Event Study

# First Stage: Overall changes in pre-school enrollment and attendance

| | Dependent Variable | | | | | |
|---|---|---|---|---|---|---|
| | **Enrolled in Pre-School** | | | **Currently Attending** | | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| | < 5km | < 3km | < 1.5km | < 5km | < 3km | < 1.5km |
| | Panel A. National level | | | | | |
| PSC | 0.094*** | 0.087*** | 0.088*** | 0.079*** | 0.080*** | 0.085*** |
| | (0.025) | (0.016) | (0.011) | (0.026) | (0.018) | (0.011) |
| Observations | 41,931 | 41,931 | 41,931 | 41,931 | 41,931 | 41,931 |
| | Panel B. Urban level | | | | | |
| PSC | 0.121 | 0.127 | 0.113*** | 0.140 | 0.133 | 0.127*** |
| | (0.109) | (0.141) | (0.033) | (0.113) | (0.132) | (0.0.30) |
| Observations | 25,126 | 25,126 | 25,126 | 25,126 | 25,126 | 25,126 |
| | Panel C. Rural level | | | | | |
| PSC | 0.105*** | 0.088*** | 0.091*** | 0.100*** | 0.084*** | 0.084*** |
| | (0.027) | (0.016) | (0.013) | (0.026) | (0.017) | (0.012) |
| Observations | 16,612 | 16,612 | 16,612 | 16,612 | 16,612 | 16,612 |
| District FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Province×Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Covariates | Yes | Yes | Yes | Yes | Yes | Yes |

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Event Study

# Gains around 20% in expenditure per capita

| | Monthly Real Consumption per Capita (PEN) | | | |
|---|---|---|---|---|
| | **Distance Buffers** | | | |
| | < 3km | < 2km | < 1.5km | < 1km |
| | (1) | (2) | (3) | (4) |
| | Panel A. Without other adults | | | |
| PSC | 45.46*** | 39.31*** | 30.28*** | 29.85*** |
| | (15.25) | (10.66) | (9.46) | (9.74) |
| Mean dep. Var | 160.69 | 163.78 | 165.49 | 170.17 |
| Clusters | 131 | 149 | 161 | 169 |
| Observations | 2,547 | 3,441 | 4,064 | 4,758 |
| | Panel B. With other adults | | | |
| PSC | 28.94 | 22.99** | 23.61 | 14.45** |
| | (14.62) | (16.70) | (10.50) | (9.25) |
| Mean dep. Var | 157.72 | 161.53 | 162.42 | 166.29 |
| Clusters | 130 | 143 | 158 | 168 |
| Observations | 2,236 | 3,248 | 4,032 | 4,863 |
| District FE | Yes | Yes | Yes | Yes |
| Province×Year FE | Yes | Yes | Yes | Yes |
| Covariates | Yes | Yes | Yes | Yes |

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Event Study

# Change in economic sectors

| | Dependent Variable | | | |
|---|---|---|---|---|
| | **Economic Sectors** | | | |
| | Agriculture | Retail | Restaurants | Others |
| | (1) | (2) | (3) | (4) |
| | Panel A. Without other adults | | | |
| PSC | -0.11*** | 0.04** | 0.01 | 0.06** |
| | (0.03) | (0.02) | (0.01) | (0.03) |
| Mean dep. Var | 0.696 | 0.085 | 0.028 | 0.191 |
| Clusters | 150 | 150 | 150 | 150 |
| Observations | 3,460 | 3,460 | 3,460 | 3,460 |
| | Panel B. With other adults | | | |
| PSC | -0.04 | 0.04 | 0.03* | -0.02 |
| | (0.07) | (0.04) | (0.01) | (0.05) |
| Mean dep. Var | 0.672 | 0.078 | 0.037 | 0.213 |
| Clusters | 143 | 143 | 143 | 143 |
| Observations | 3,311 | 3,311 | 3,311 | 3,311 |
| District FE | Yes | Yes | Yes | Yes |
| Province×Year FE | Yes | Yes | Yes | Yes |

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Figure

# The effect driven by mothers who didn't live with other adults in their households besides the father

**Table:** The effects of PSC on mothers' labor outcomes, by presence of relative caretakers

| | Dependent Variable | | |
|---|---|---|---|
| | Employed | Income Employed | Unpaid Family Work |
| | (1) | (2) | (3) |
| | Panel A. Without other adults | | |
| PSC within 2km | -0.005 | 0.056*** | -0.062*** |
| | (0.012) | (0.019) | (0.020) |
| Mean dep. Var | 0.891 | 0.325 | 0.565 |
| Clusters | 184 | 184 | 184 |
| Observations | 8,850 | 8,850 | 8,850 |
| | Panel B. With other adults | | |
| PSC within 2km | 0.015 | 0.025 | -0.010 |
| | (0.019) | (0.026) | (0.024) |
| Mean dep. Var | 0.882 | 0.338 | 0.542 |
| Clusters | 183 | 183 | 183 |
| Observations | 8,838 | 8,838 | 8,838 |
| District FE | Yes | Yes | Yes |
| Province×Year FE | Yes | Yes | Yes |
| Covariates | Yes | Yes | Yes |

Back Buffers Motherhood

# Buffers

| | All Women | | | Mothers | | |
|---|---|---|---|---|---|---|
| | (1) < 3km | (2) < 1.5km | (3) < 1km | (4) < 3km | (5) < 1.5km | (6) < 1km |
| | | | Panel A. Income Employed | | | |
| PSC | 0.043*** | 0.035*** | 0.028** | 0.049*** | 0.044*** | 0.047*** |
| | (0.016) | (0.014) | (0.013) | (0.018) | (0.017) | (0.015) |
| Observations | 24,805 | 24,762 | 24,760 | 17,711 | 17,682 | 17,684 |
| | | | Panel B. Weekly Hours of Work | | | |
| PSC | 0.389 | -0.173 | -0.262 | -0.601 | -0.443 | -0.053 |
| | (0.821) | (0.540) | (0.595) | (0.983) | (0.600) | (0.573) |
| Observations | 24,817 | 24,775 | 24,773 | 17,715 | 17,686 | 17,688 |
| | | | Panel C. Unpaid Family Work | | | |
| PSC | -0.040** | -0.042*** | -0.037*** | -0.054*** | -0.057*** | -0.056*** |
| | (0.018) | (0.013) | (0.012) | (0.018) | (0.015) | (0.013) |
| Observations | 24,817 | 24,775 | 24,773 | 17,715 | 17,686 | 17,688 |
| District FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Province×Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Covariates | Yes | Yes | Yes | Yes | Yes | Yes |

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Labor Market

# Motherhood

| | Unpaid Family Work | | |
|---|---|---|---|
| | Full Sample | Not Mothers | Mothers |
| | (1) | (2) | (3) |
| | Panel A. Women < 45 years old | | |
| PSC×Mother | -0.068** | - | - |
| | (0.033) | - | - |
| PSC | 0.025 | 0.027 | -0.044*** |
| | (0.033) | (0.035) | (0.015) |
| Mean dep. Var | 0.542 | 0.509 | 0.554 |
| Observations | 24,276 | 6,584 | 17,692 |
| | Panel B. Women < 30 years old | | |
| PSC×Mother | -0.101** | - | - |
| | (0.041) | - | - |
| PSC | 0.024 | 0.027 | -0.076*** |
| | (0.035) | (0.036) | (0.021) |
| Mean dep. Var | 0.539 | 0.519 | 0.554 |
| Observations | 13,416 | 5,756 | 7,760 |

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Labor Market

# Impact on labor income

| | Monthly Real Labor Income (PEN) | | | |
|---|---|---|---|---|
| | **Distance Buffers** | | | |
| | < 3km | < 2km | < 1.5km | < 1km |
| | (1) | (2) | (3) | (4) |
| | Panel A. Without other adults | | | |
| PSC | 129.83*** | 132.37*** | 104.95*** | 100.96*** |
| | (44.86) | (38.29) | (32.49) | (35.37) |
| Mean dep. Var | 93.33 | 99.44 | 102.09 | 107.61 |
| Clusters | 132 | 150 | 162 | 169 |
| Observations | 2,557 | 3,460 | 4,088 | 4,783 |
| | Panel B. With other adults | | | |
| PSC | 78.12** | 50.61 | 23.76 | 13.66 |
| | (34.28) | (46.16) | (29.92) | (25.08) |
| Mean dep. Var | 106.38 | 116.30 | 117.00 | 118.27 |
| Clusters | 130 | 143 | 158 | 168 |
| Observations | 2,285 | 3,311 | 4,116 | 4,970 |
| District FE | Yes | Yes | Yes | Yes |
| Province×Year FE | Yes | Yes | Yes | Yes |

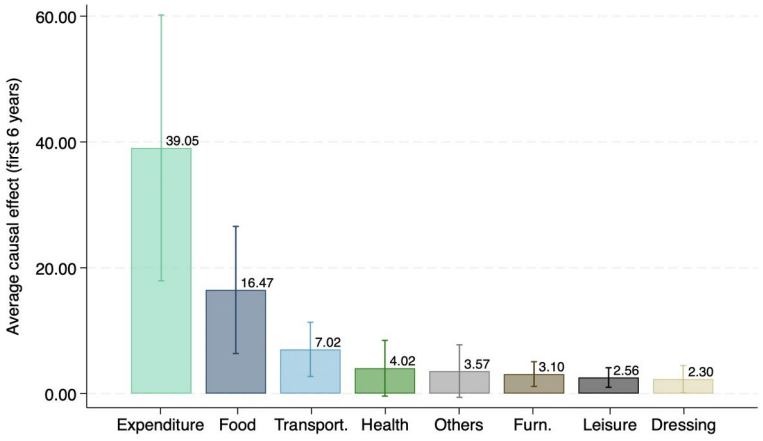
Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Labor Market

# The increase in consumption wasn't just in food, but also in other expenditure groups...

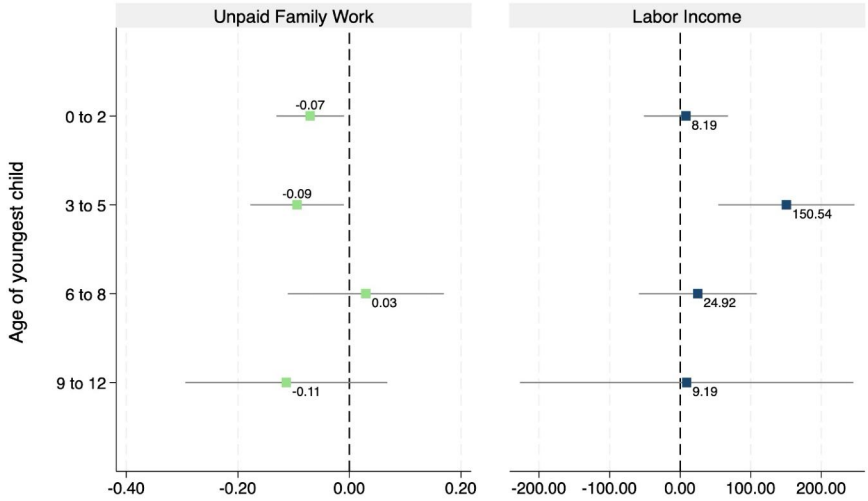
**Figure:** Aggregate effect on consumption groups (households without relative caretakers)




Consumption

# Impact is larger for women whose youngest child is at pre-school age

**Figure:** Aggregate effect on contributing family work and labor income

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