

# Fertility Preferences and Outcomes in a Rapidly Acculturating Amerindian Population

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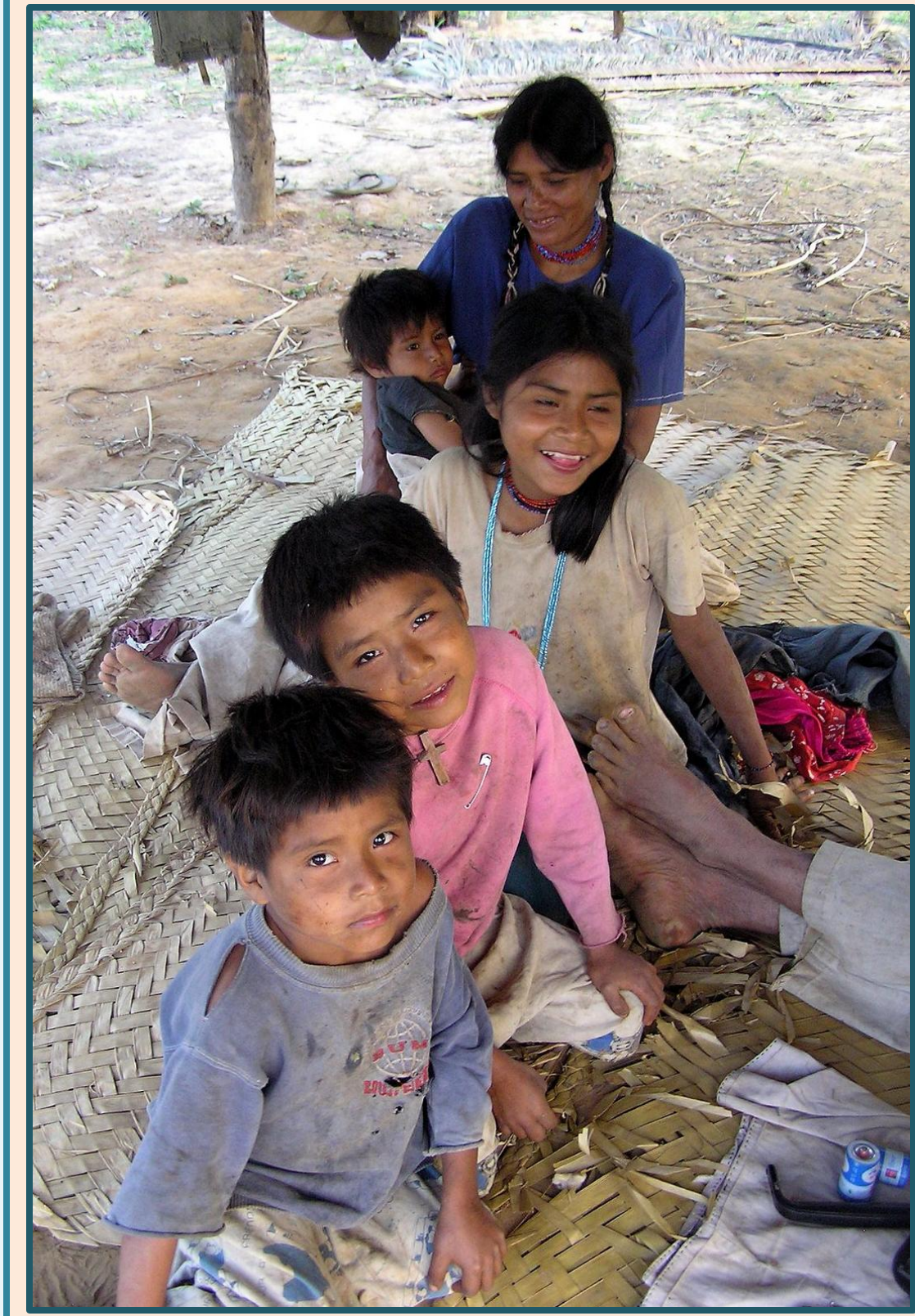
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## Introduction and Hypotheses

The demographic transitions of many South Amerindian groups are following an unusual trajectory. Fertility preferences are changing with market integration, including expected declines in ideal family size (IFS), but mortality remains high and fertility is increasing<sup>1</sup>. These women are greatly exceeding their IFS<sup>2</sup>, with their high fertility negatively affecting their socioeconomic status, health and survival<sup>3</sup>. Moreover, the associated rapid population growth is predicted to accelerate environmental degradation of indigenous homelands due to overpopulation of these limited spaces<sup>3</sup>.

Using data collected among the Tsimane, Amerindian forager-horticulturalists, we investigate three hypotheses for why these women's fertility greatly exceeds their IFS:



### (H<sub>1</sub>) Female reproductive autonomy remains low

**Prediction 1:** Women exceed their IFS due to social pressures to have large parities<sup>4</sup>. With market integration women achieve more autonomy, and husbands' IFS are smaller, thus their fertility declines

### (H<sub>2</sub>) Maternal condition has improved without concurrent improvements in fertility control methods

**Prediction 2:** Market integration improves women's nutrition and health. Women's fecundity increases<sup>5</sup> but with limited access to fertility controls. Thus, women have higher fertility than desired.

### (H<sub>3</sub>) There are low returns on investments in human capital, such that status remains measured in somatic terms

**Prediction 3:** Market integration encourages investment in a few offspring & self<sup>6</sup> but the realized benefits are limited. Somatic wealth remains a vital component of status, thus, fertility remains high.

## Results

### (H<sub>1</sub>) Is women's reproductive autonomy low? → NO

- Women freely state IFS different from that of their husbands'.
  - Significant difference between husbands' and wives' IFS.
  - $t = -3.309$ ,  $d.f. = 171$ ,  $p\text{-value} = 0.001$
- Wives' IFS more strongly correlated with their parity.
  - Wives'  $\beta = 0.287$ ,  $n = 172$ ,  $p = 0.001$
  - Husbands'  $\beta = 0.139$ ,  $n = 172$ ,  $p = 0.04$
- Larger difference in spousal IFS & TFR near town (Fig 2).

### (H<sub>2</sub>) Has maternal condition improved? → YES Is fertility control limited? → NO

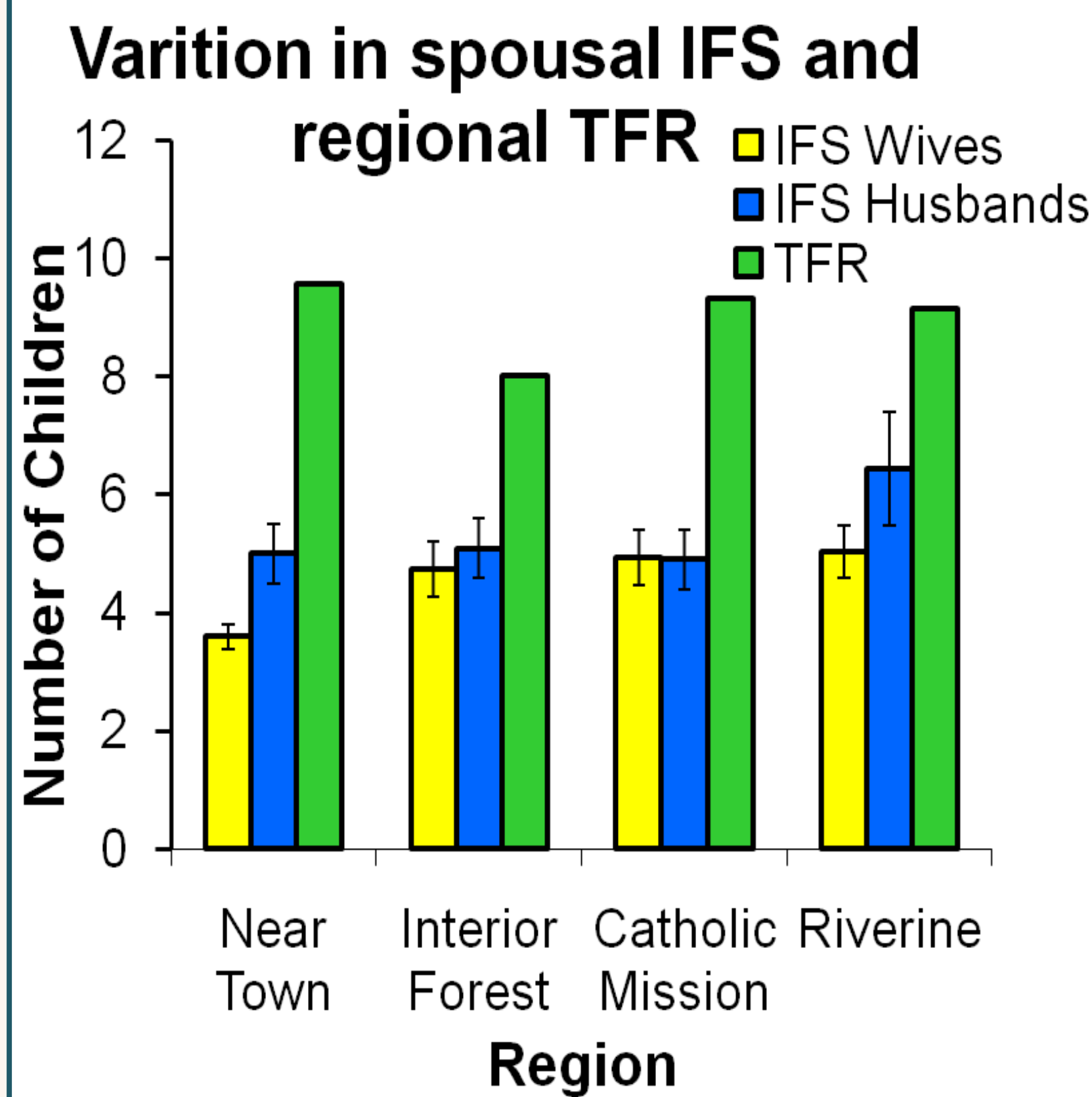
- Controlling for women's current age, age at menarche positively correlates with proximity to town
  - Partial Correlation (age controlled) = 0.33,  $d.f. = 250$ ,  $p < 0.01$
  - Mean age = 12.85 near town compared to 13.74 riverine
- No significant difference in women's BMI by region
- Riverine women had significantly higher percent body fat
  - Riverine mean = 19.78 (ANOVA  $F(2, 200) = 18.00$ ,  $p\text{-value} < 0.01$ ) compared to 16.18 in other regions.
- No correlation in IFS and BMI, or IFS and percent body fat
- Evidence of fertility control (Table 1).

**Table 1:** Women who did not want more children less likely to give birth in the preceding five years than women who did want more.

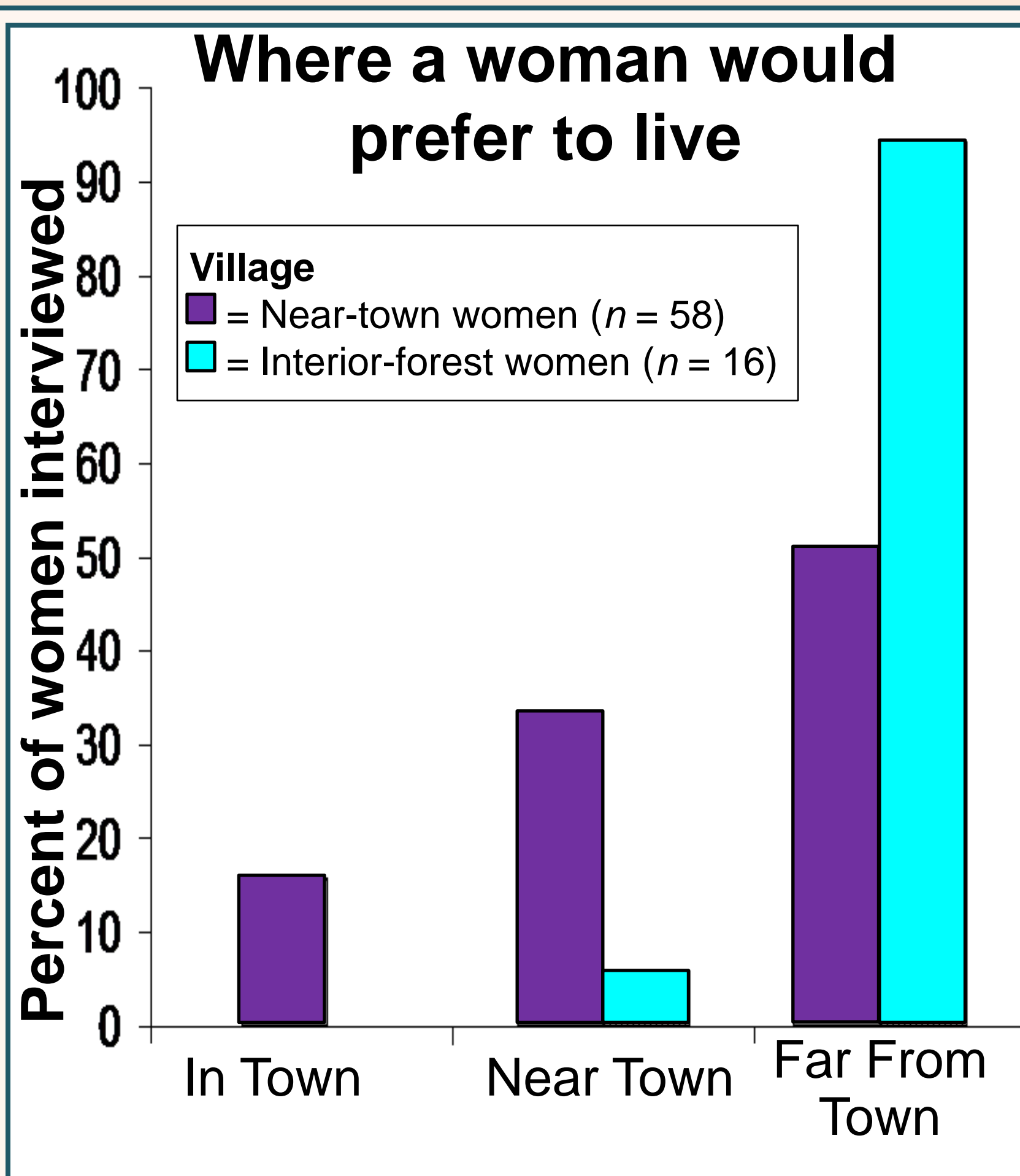
Age	Women who did not want more children		Women who wanted more children		Relative Risk
	n	% Gave of Births	n	% Gave of Births	
15-19	2	0	14	2	N/A
20-24	22	5	50	29	2.55
25-29	37	12	19	9	1.46
30-34	24	6	6	3	2.00
35-39	38	6	9	1	0.70
40-44	21	4	4	1	1.31
Total	144	33	102	45	1.93

### (H<sub>3</sub>) Are the returns on investments in human capital perceived as limited? → YES

- The benefits of having few children are realized.
  - 83% of women said women with few children have better lives.
- Women & men with large families are considered successful
  - 52% of near-town women said one of two sisters, renowned for having many children, was the "best" woman in their village.
- Life in town is considered unfeasible
  - Women believe Tsimane living in town have more difficult lives than nationals living in town, or Tsimane living far from town
  - Women would prefer to live far from town (Fig. 3)
  - Women believe it is more important to teach a child traditional skills than provide them with an education or access to town



**Figure 2.** Women's IFS is smaller near town. However, the variation in IFS between spouses, and between IFS and TFR are larger near town ( $n = 172$ ).



**Figure 3.** Women in both the near-town ( $p\text{-value} < 0.005$ ) and interior-forest villages would prefer to live far from town.

## Method and Population

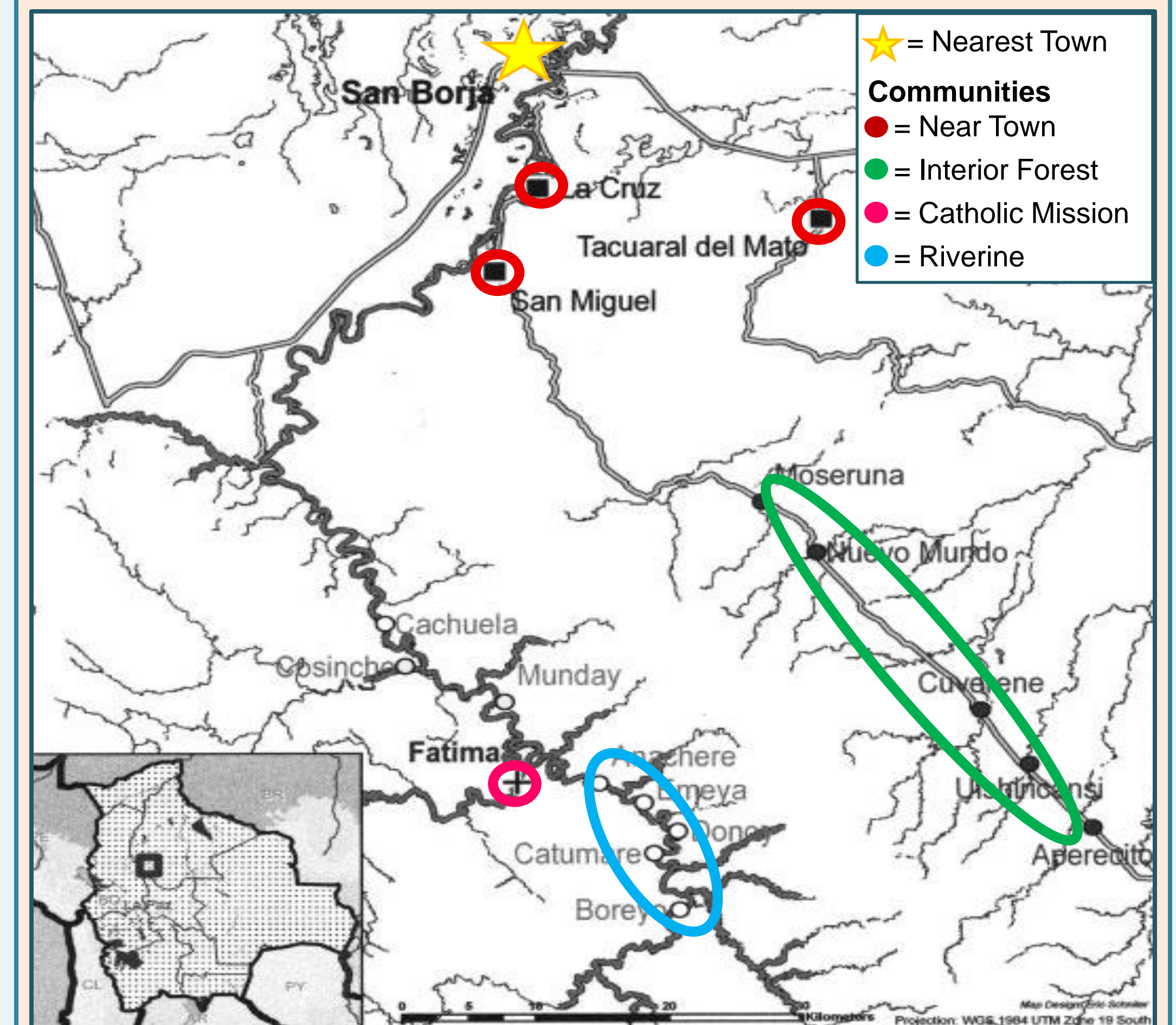
**Demographic interviews :** 305 women & 172 men, from 19 villages, between 2002-2009 (Fig 1)<sup>7</sup>. Part of the Tsimane Health & Life History Project (THLHP).

- Reproductive histories
- Anthropometrics
- Morbidity and mortality
- IFS preferences

**Ranking interviews & focus groups:** 58 women near-town and 16 from the interior-forest in 2005. Assessed measures of success and perceived life options of Tsimane women.

**The Tsimane:** a natural fertility population of Amerindian forager-horticulturalists (pop. 10,000) living in the Bolivian Amazon. Currently undergoing rapid market integration.

- High fertility
  - TFR = 8.4-10.5 (greater near town)
  - Evidence of increasing fertility
- Some mortality decline<sup>7</sup>
  - Infant mortality rate declining, but still at 10-25% (lower near town)
- High population growth ~ 3%
  - Doubling time = 23.45 yrs
- IFS and fertility vary by region.
  - IFS smaller near town
  - Discrepancy between IFS and TFR largest near town



**Figure 1.** Villages with the THLHP. The 19 villages of this paper are grouped in to four regions by ecological & socioeconomic similarities affecting residents' acculturation & market integration.

## Discussion & Conclusions

**Table 2:** Expected & observed results with increasing proximity to town. H<sub>3</sub> is supported, although a combination of all three should be considered. Underlined are predictions supported by the results.

Predictions	(H <sub>1</sub> ) Reproductive Autonomy	(H <sub>2</sub> ) Maternal Condition	(H <sub>3</sub> ) Human Capital	Results
Women's IFS	Smaller	Smaller	Same	Mixed
Fertility	Declines	Increases	Increases	Increases
Difference in IFS between spouses	Small	N/A	N/A	Large
Difference among IFS & Fertility	Small	Large	Large	Large
Evidence of fertility control	N/A	None	N/A	Yes
Attitude towards life in town	N/A	N/A	Negative	Negative

Discrepancies in IFS & fertility among the Tsimane, and increasing Tsimane population growth, due to:

- Improved fecundity in partially market integrated women
- Fuller integration into the market economy being perceived as unfeasible
- Perceived lack of returns on investments in human capital
  - Perceived cost per child remains low
- Success continuing to be measured in somatic terms
  - Predilection for large family size persists

→ "Wealthy" individuals maximize their social status by investing in high fertility

## Policy Implications

**Issue 1:** Many South Amerindian women have fertility much greater than their IFS, & have high maternal & child mortality.

**Issue 2:** Modernizing South Amerindians have high population growth.

We illustrate the problems indigenous women face due to poverty & market integration, but also highlight their fertility preferences. Grasping the preferences of these women & why they believe they are unable to achieve their IFS may be key in marginalized populations.

The desire to reduce fertility is not enough. Women need motivation to invest in controlling their fertility. Enabling the benefits of small families compared to large families to be realized, i.e. encouraging success to have a greater human capital component, may be crucial.

References: (1) Terborgh, A., et al. (1995). *International Family Planning Perspectives*, 21(4), 143-149. (2) McSweeney, K., & Arps, S. (2005). *Latin American Research Review*, 40(1), 3-29. (3) Lu, F. (2007). *Current Anthropology*, 48(4), 593-602. (4) Borgerhoff Mulder, M. (2009). *American Journal of Human Biology*, 21(4), 478 - 487. (5) Vaeleggia, C., & Ellison, P. (2003). In Rodgers & Kohler (Eds.), *The Biodemography of Human Reproduction and Fertility* (pp. 87-104). MA: Kluwer Academic Publishers. (6) Kaplan, H. (1996). *American Journal of Physical Anthropology*, 101(S23), 91-135. (7) Gurven, M., Kaplan, H., & Zelada Supa, A. (2007). *American Journal of Human Biology*, 19, 376-398.

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