

Project REPA (Reproduction & Ecology in Province of Aroma) Does Investment in Lactation vary Seasonally in Bolivian Agropastoralists?

Rebecca M. Bedwell^{1,2}, Jonathan Thornburg^{3,4}, and Virginia J. Vitzthum^{1,2}.

¹Department of Anthropology, ²The Kinsey Institute for Research in Sex, Gender, and Reproduction, Indiana University, Bloomington, ³Department of Astronomy, ⁴U Center for Spacetime Symmetries



INTRODUCTION

- Given life-history theory, limited resources and difficult living conditions require that some trade-offs are made in order to maximize reproductive success. Energy is a finite resource that must be allocated efficiently, suggesting that maternal health and other demands must be balanced against the health of a mother's offspring.
- Stress, workload, and nutrition level all play an important role in a woman's ability to provide adequate nutrition through breastfeeding her infant. The local context is a key factor in determining breastfeeding strategies.
- In some studies, but not all, seasonality has influenced infant feeding practices.
- In agropastoral communities in the Bolivian *altiplano*, anovulation rates and the risk for early pregnancy loss are both higher during the planting and harvesting seasons (AJHB 21:548-558), Fig. #1. Nursing behavior may similarly be influenced.
- Hypothesis 1:** Seasonality in energy use (work demands) influences breastfeeding rate in mother-infant pairs within this population.
- Hypothesis 2:** The season (planting/harvesting or winter) in which an infant is born affects relative breastfeeding rate throughout its childhood.
- Hypothesis 3:** Infant age influences breastfeeding rate in mother-infant pairs.

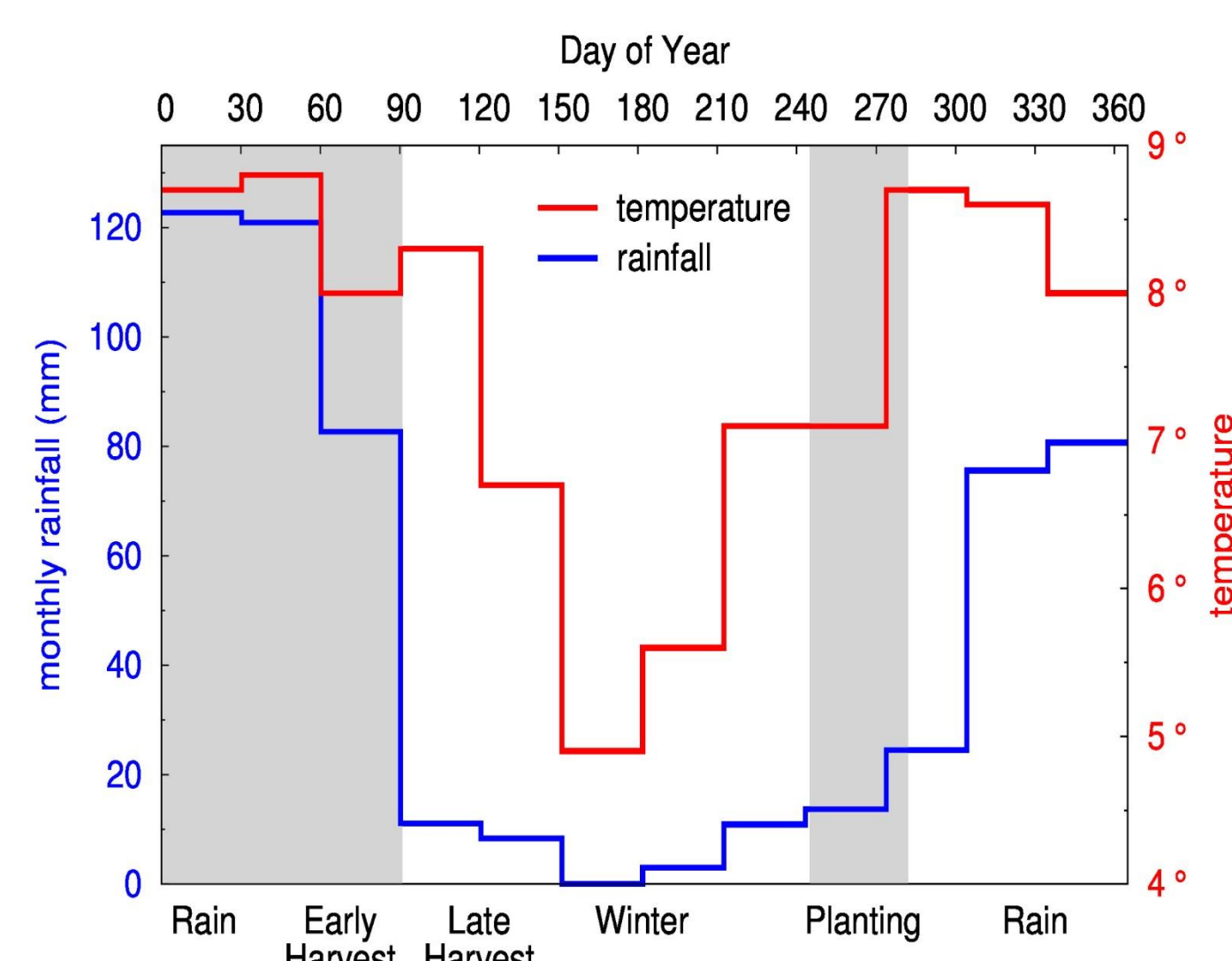


Figure 1. Seasonal risk for EPL and anovulation among Bolivian agropastoralists



Image 1. Map of Bolivia showing location of research sites

MATERIALS & METHODS

- 190 breastfeeding mothers from 30 rural communities in the Bolivian *altiplano* were taught to keep track of how many times they breastfed during the day in a two-day period.
- Ganchos* (safety pins) with either 25 yellow or 40 blue *papelitos* (small strips of paper) were given to each participant to pin on their clothing. Each time a woman's infant breastfed during the day, she would pull off a *papelito*, returning the *gancho* at the end of two days so the number of missing *papelitos* could be recorded.
- Behavior recorded over two-day period for several months (median observation periods per mother-infant pair = 4)
- 879 two-day observation periods were recorded over the duration of a single year.
- Seasonality: agricultural work cycle (see Fig. #1)
- Planting and harvesting season: characterized by more intense labor and lower food supplies
- Winter: less arduous labor, plentiful food from harvest
- Used mixed model command in SPSS v19.0 and hierarchical linear modeling in analyses



Image 2. Study participant breastfeeding



Image 3. Bolivian agropastoralists working in the fields (photo courtesy of JA Fogel, Ohio State U.)

RESULTS

- Hypothesis 1:** Breastfeeding frequency was significantly affected by workload (sig = .026).
- Hypothesis 2:** Birth season had no statistical significance for determining breastfeeding rate at the time of sampling (sig = .995). In other words, the season in which an infant was born did not determine later feeding practices.
- Hypothesis 3:** Infant age does affect day-time breastfeeding rates along seasonal lines, with a roughly two-episode disparity between young infants breastfed in the good season (winter) versus the poor season (planting/harvesting). The difference between night-time breastfeeding rates in the good season versus poor season remained constant, and decreased slightly as the infants aged.
- During the planting/harvesting season, the mean breastfeeding rate was .62 per hour, or 9.9 times per day (in a sixteen-hour day), whereas the mean breastfeeding rate during the winter season was .68 per hour, or 10.9 times per day. These results reflect ~10% decrease in breastfeeding rate from the less arduous season to the more labor-intensive season.

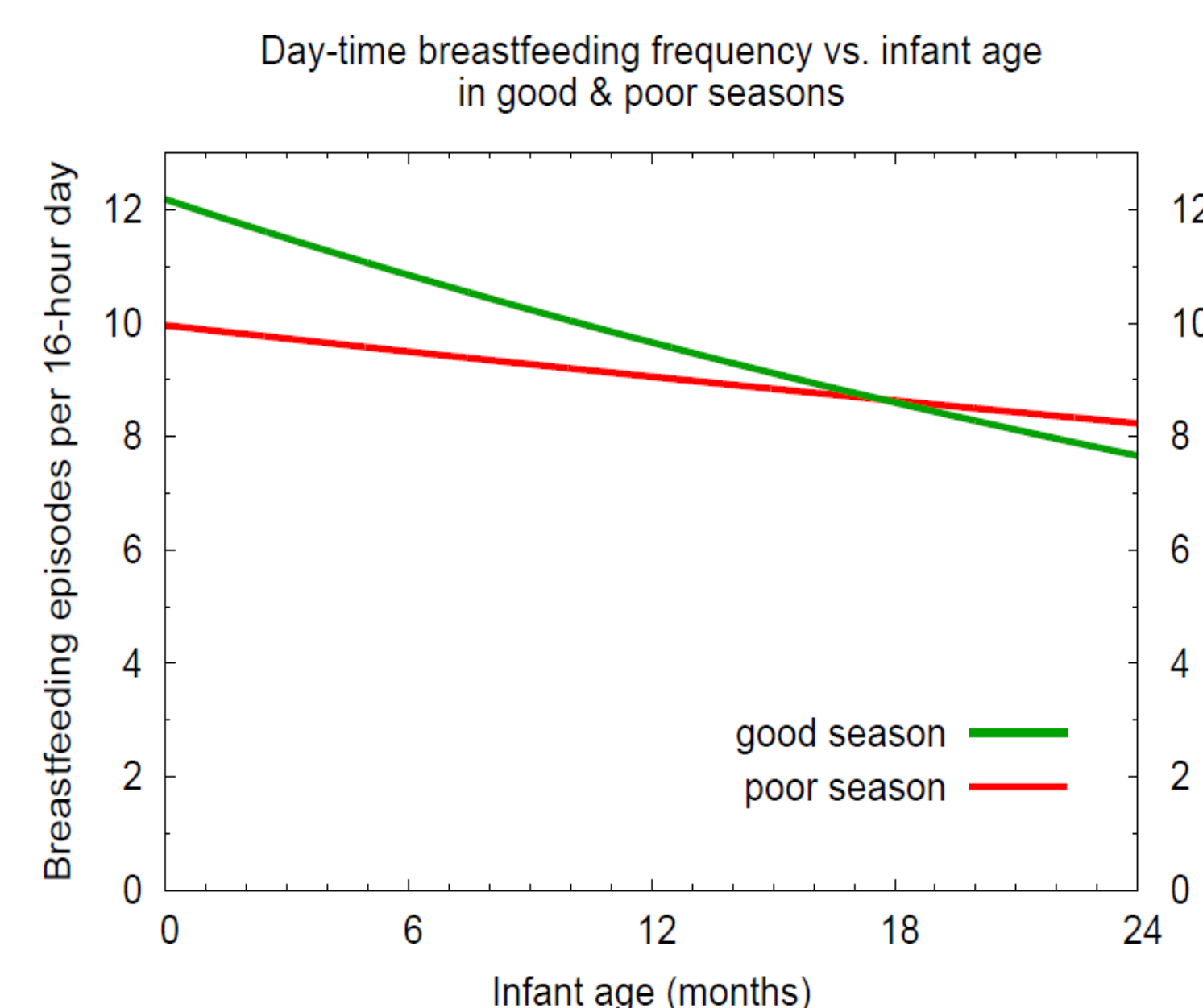


Figure 2. Day-time breastfeeding frequency vs. infant age by season

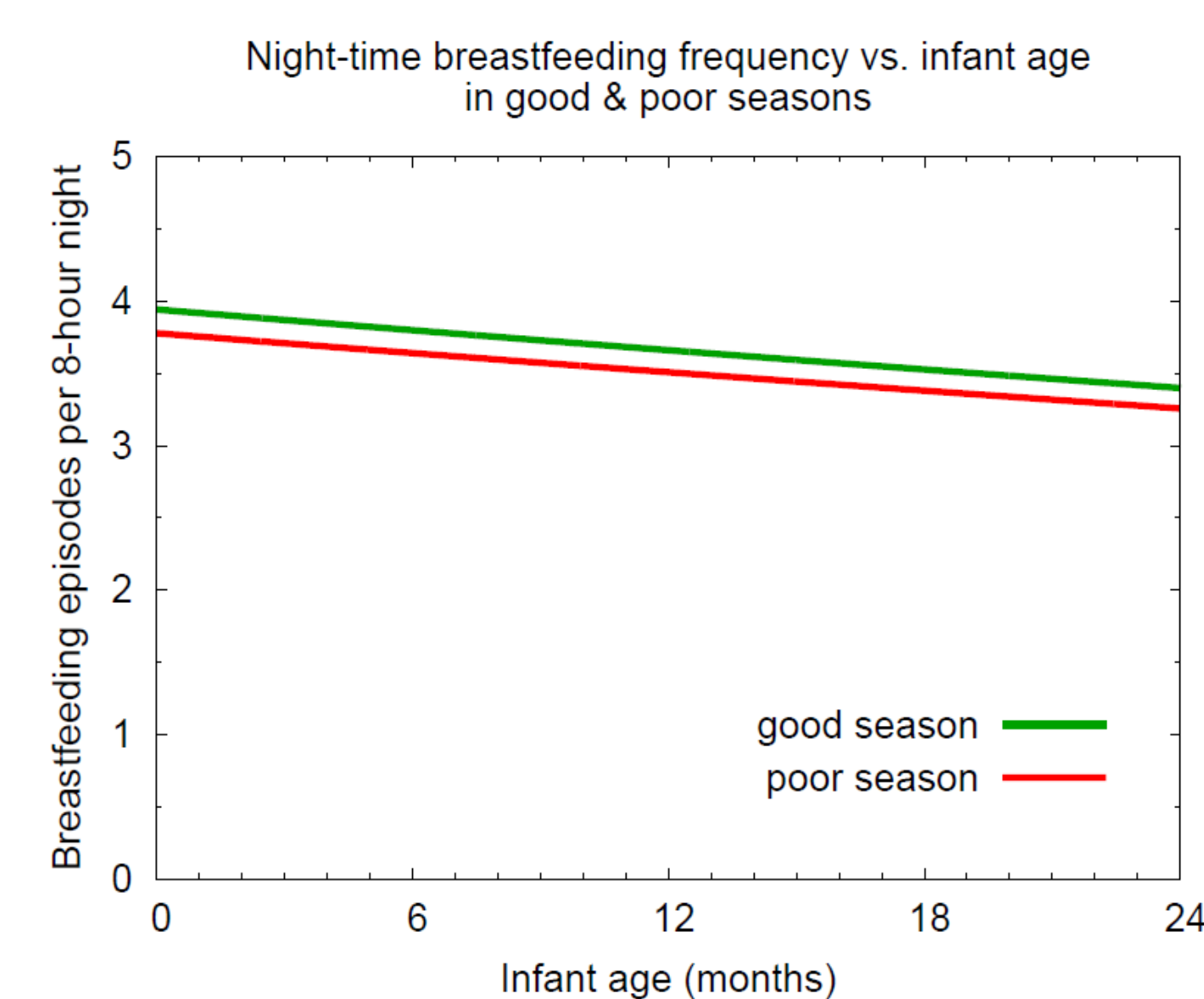


Figure 3. Night-time breastfeeding frequency vs. infant age by season

CONCLUSION

- Infant birth season was not found to affect mother infant pair nursing practices. However, there was a marked difference between breastfeeding rate in the planting and harvesting season and the winter season.
- Infant age did have a significant impact on breastfeeding rate when viewed along seasonal lines. The disparity of breastfeeding rates between the winter season and the harvesting season decreased as the infants grew older.
- These results have implications for mother and infant health, and for elucidating the conditions that maximize benefits for both the mother and her offspring.
- Unlike anovulation and EPL (early pregnancy loss) rates, seasonality of breastfeeding practices is more likely to be determined by time investment than by stress level or nutrition.
- Limitations: duration of feeding episodes was not recorded, so it was unclear if lactating mothers compensated for fewer breastfeeding sessions (lower frequency) by increasing session length (longer duration). Previous studies have shown that the ecological context is very important when it comes to frequency vs. duration in breastfeeding practices.
- These findings contribute to general knowledge as well as academic literature on how breastfeeding practices have multiple influences and that taking a multi-disciplinary approach is important to understanding how this affects the health of mother-infant pairs.

FURTHER DIRECTIONS FOR RESEARCH

- Previous studies have shown that socioeconomic status may influence anovulation rates and EPL rates in rural *altiplano* Bolivian women (AJHB 21:548-558). As with the results of this study, it is perhaps possible that socioeconomic status may also influence breastfeeding behavior among the same population. Not everyone in the 30 rural communities in this study practiced agriculture, so it would be interesting to see if there is any variation.
- Data on supplemental foods was also gathered during the process of this research project. Another possible direction to take this study is to investigate the role of supplemental foods in breastfeeding behavior among mother-infant pairs, and whether there was any seasonal variation in the amount of supplemental foods given to breastfeeding infants.
- Reproductive statuses of participating mothers was also gathered, so future analyses might include comparing breastfeeding rates of pregnant women, breastfeeding women experiencing amenorrhea, and menstruating breastfeeding women.

ACKNOWLEDGEMENTS

We thank the following people for assistance with this project: Aianne Stephenson and Kelsey Britt. The National Science Foundation and The Kinsey Institute of Indiana University, Bloomington. This project was supported by the Anthropology Department of Indiana University, Bloomington

LITERATURE CITED

- Ghosh, Rohini, Mascie-Taylor, C.G. Nicholas, & Rosetta, Lyliane. 2006. Longitudinal Study of the Frequency and Duration of Breastfeeding in Rural Bangladeshi Women. *American Journal of Human Biology* 18: 630-638.
- Panther-Brick, C. 1989. Motherhood and Subsistence Work: The Tamang of Rural Nepal. *Human Ecology* 17(2): 205-228.
- Trevathan, Wenda. 2010. *Ancient Bodies, Modern Lives: How Evolution Has Shaped Women's Health*. New York: Oxford University Press.
- Vitzthum, Virginia, Thornburg, Jonathan, & Spielvogel, Hilde. 2009. Seasonal Modulation of Reproductive Effort during Early Pregnancy in Humans. *American Journal of Human Biology* 21: 548-558.