

Project: The relationship between maternal and child sleep in Bangladesh

This project examines the relationship between objective measures of maternal and child sleep in urban Bangladesh. The IPSA award enabled our research teams to incorporate maternal sleep assessment into an ongoing prospective cohort study of preschool children in Dhaka. The broader study investigates socioecological predictors of sleep health among preschool children to inform the cultural adaptation of a sleep promotion intervention for the local context.

While wearable data collection has become popular in high-income settings, strategies for collecting wearable data in low-income settings remain relatively unexplored. The support from IPSA was instrumental in designing this scalable pipeline which allowed collection of sleep data from 77 mothers using the Garmin vivosmart[®] 5. Mothers are instructed to wear the device continuously during the same week that their children undergo sleep assessment with actigraphy. Mothers contributed a median of 5 nights of recording (IQR 3–7). Data collection is ongoing, and we aim to collect sleep data from all 300 mothers enrolled in the cohort.

Bangladeshi mothers go to bed late, approximately 80 minutes (SD 65 min) after midnight, and achieve relatively short sleep duration, about 6 hours per night (SD 1.22 h). Similar to their toddlers, maternal sleep timing shows substantial night-to-night variability, with mean bedtime variability of 73 minutes (SD 49 min).

Parents report near-universal co-sleeping, with mothers and children sharing a bed. Among the 20 mother–child pairs for whom we currently have synchronized recordings (approximately 125 days of paired data), coupling between maternal and child sleep timing is evident. On average, mothers fall asleep about one hour after their children (mean 73, SD 89 minutes) and wake approximately two hours before them (mean 124, SD 100 minutes). Figure 1 illustrates nightly differences in bedtime across multiple mother–child pairs, while Figure 2 shows that mothers typically wake earlier than their children across recorded nights. We observed two distinct patterns. Some mothers and toddlers go to sleep around the same time (top row, Figure 1). Another group of mothers go to sleep 1–2 hours after their toddlers, while the child remains asleep (bottom row, Figure 1).

Analysis of actigraphy data from 177 toddler show that toddlers of working mothers slept 24 minutes less at night (95% CI –44, –4.4; $p=0.017$) and napped 17 minutes longer during the day (95% CI 5.2, 29; $p=0.005$) than toddlers of stay-at-home mothers. Once paired maternal–child sleep data are available for the full cohort, we will examine whether maternal sleep timing and synchrony differ by maternal employment status.

In addition to sleep timing and duration, the Garmin devices capture physiological data across the 24-hour day, including sleep stages, step counts, heart rate, and heart rate variability. Figure 3 illustrates the multidimensional wearable data collected for one participant. Such high-resolution behavioral and physiological data are rarely available in low- and middle-income country settings. Findings from this project will inform the cultural adaptation of a behavioral sleep health intervention and contribute to future research aimed at improving maternal and child sleep in low-resource settings.

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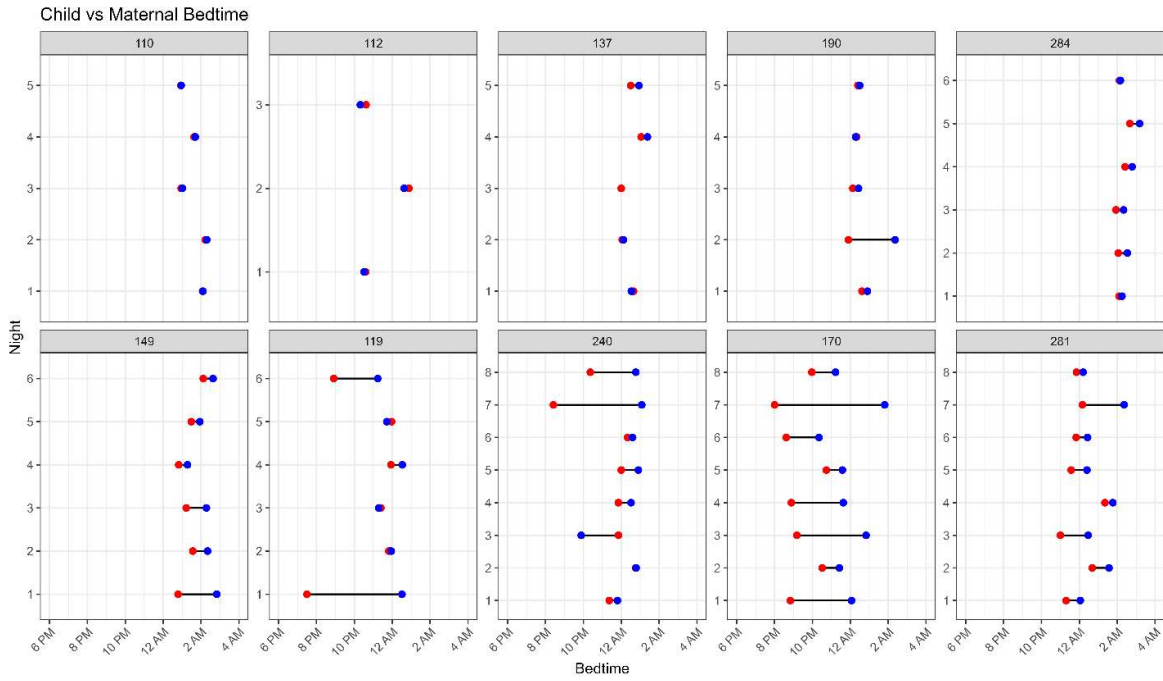


Figure 1. Nightly differences between child and maternal bedtimes in mother-child pairs. Each panel represents an individual mother-child pair with synchronized sleep recordings. Blue points indicate maternal bedtime and red points indicate child bedtime across recorded nights. Two patterns are observed: in some pairs mothers and children go to bed at similar times (top row), conversely in others mothers go to sleep 1–2 hours after their children (bottom row). Panel titles indicate participant identification numbers.

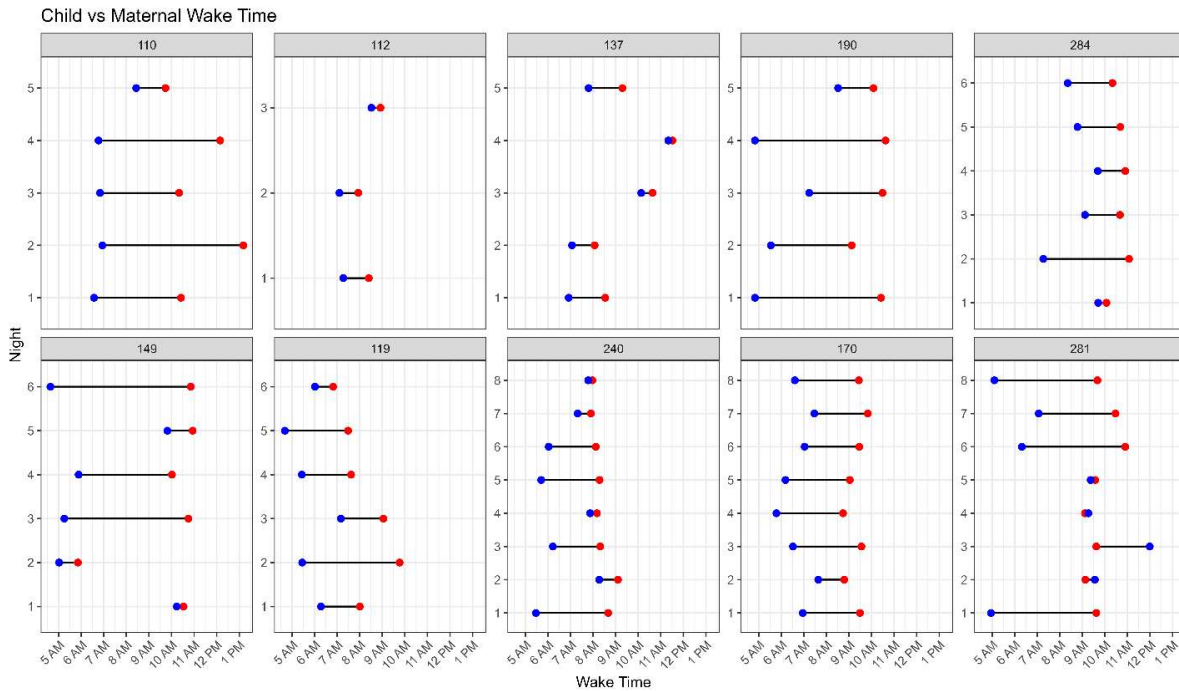
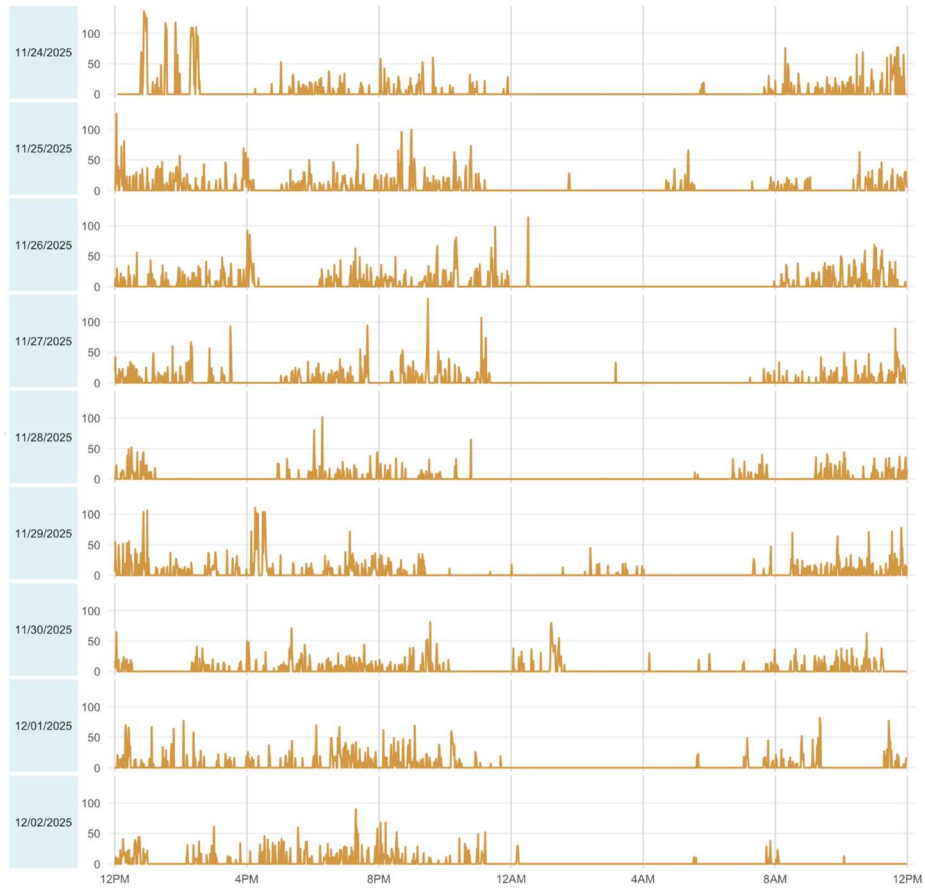


Figure 2. Night-to-night differences between maternal and child wake times in mother-child pairs. Each panel represents an individual mother-child pair. Blue points indicate maternal wake times and red points indicate child wake times across recorded nights. Across most pairs, mothers wake earlier than their children.

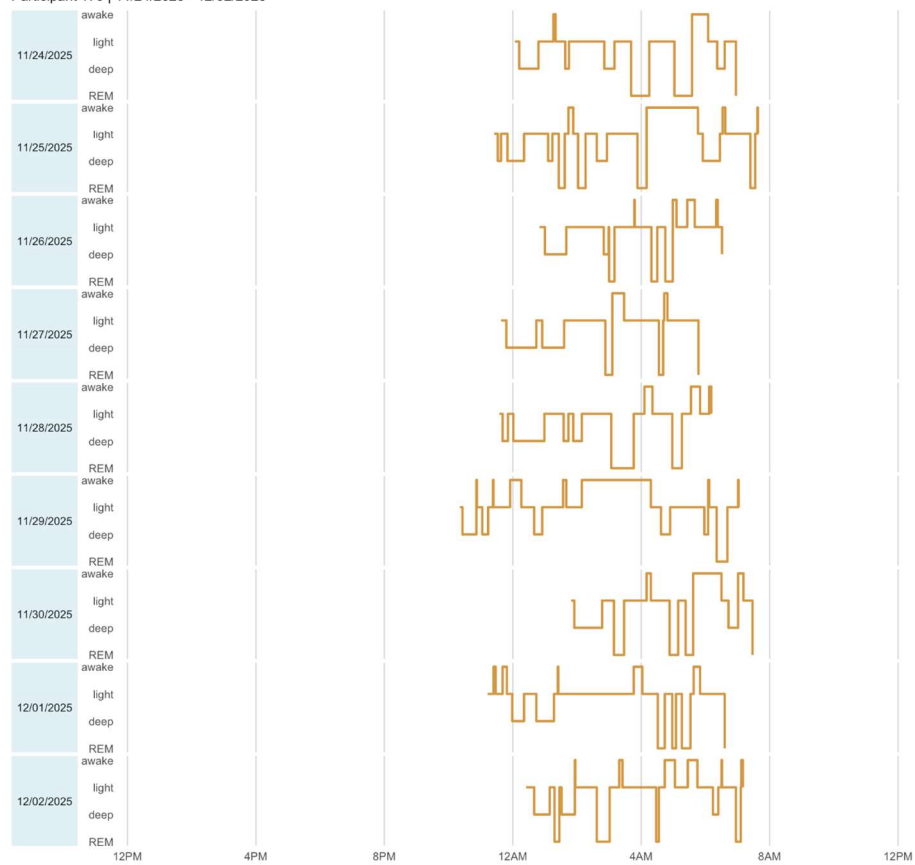
teps
participant 170 | 11/24/2025 - 12/02/2025

Panel A
Steps



Sleep Stage Hypnogram
Participant 170 | 11/24/2025 - 12/02/2025

Panel B
Sleep



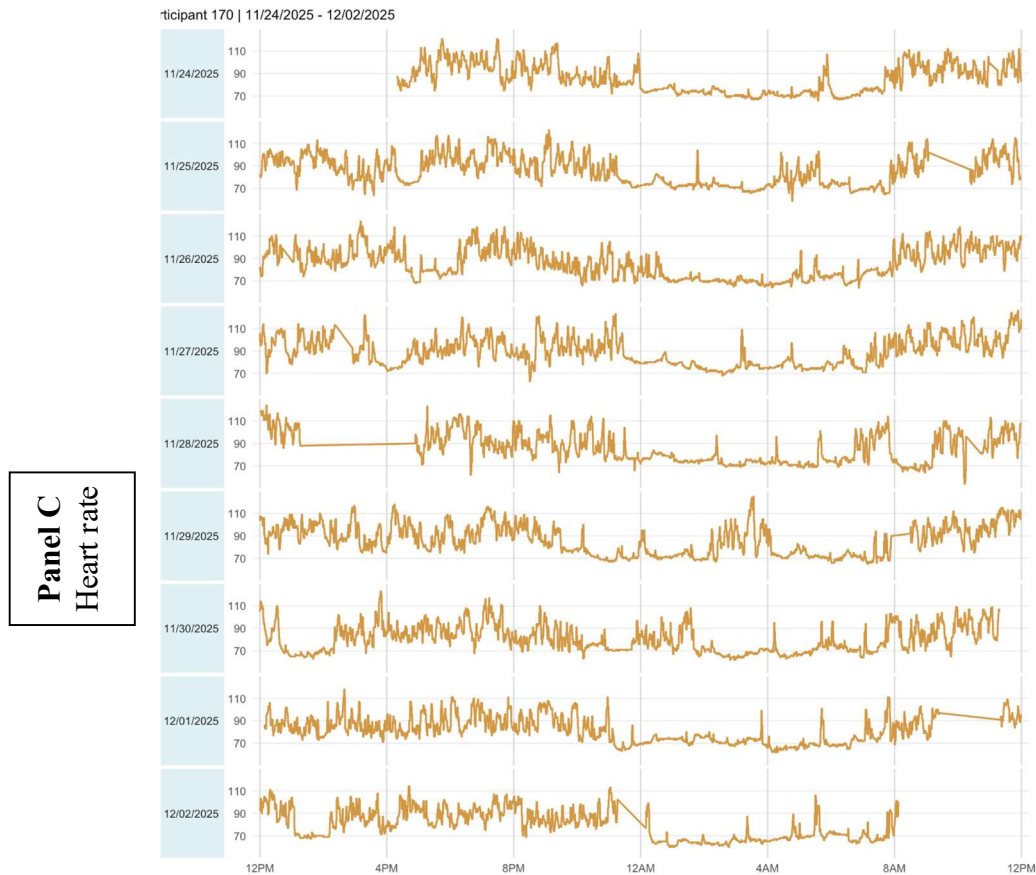


Figure 3. Continuous physiological and behavioral data collected using wearable devices. Example data from one participant over multiple days illustrating the multidimensional information captured by the Garmin Vivosmart wearable device. **Panel A** shows step counts across the 24-hour day, reflecting daily physical activity patterns. **Panel B** presents the sleep stage hypnogram, indicating transitions between wake, light sleep, deep sleep, and REM sleep during the nighttime sleep period. **Panel C** shows heart rate across the same recording period. Together, these measures provide high-resolution information on sleep, activity, and physiological rhythms that can be used to examine relationships between maternal sleep, physical activity, and health in this cohort.