

IN SEARCH FOR THE OPTIMAL SLEEP: IS ADOLESCENT SLEEP SUFFICIENT IN NON-INDUSTRIAL SETTINGS?

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1. THE SOCIAL JETLAG HYPOTHESIS

- Since the late 1970s, **sleep researchers have warned against short sleep quotas** among adolescents (i.e., less than 9 hours per night¹) and its negative short- and long-term effects on their mental and physical health^{2,3}.
- The Social Jetlag Hypothesis (SJH) argues that **adolescents living in “traditional” non-industrial environments will more closely fulfil their “biological/natural” sleep requirements**^{4,5}.
- Additionally, the SJH claims that the adolescent “biological/natural” sleep **quotas and circadian cycles can be ascertained from non-school days**, when sleep patterns are minimally shaped by social commitments^{6,7}.
- Yet, **relevant evidence** of adolescent sleep patterns in traditional settings across the week is **scant**^{4,8–13}.

Aims



- We **reexamined the SJH** among adolescents living in **one post-industrial site**, Mexico City, and **two traditional societies** of Totonac and Maya agriculturalists with limited access to electronic and/or electrical devices [Figure 1].

2. MATERIALS AND METHODS

- Between February-November, 2019, we assembled sleep data from 145 participants (ages 11-16y, mean 13.7 ± 1.21). Recruitment was school-based [Figure 2].
- Participants wore the actigraphy watches for 10 continuous days (Motionlogger Micro Watch units, Ambulatory Monitoring Inc., US). We obtained a total of 1405 sleep observations, of which 44% corresponded to free (i.e., non-school) nights.

Study site	n
Mexico City	50
Huehuetla, Puebla	51
Bolonchen, Campeche	44

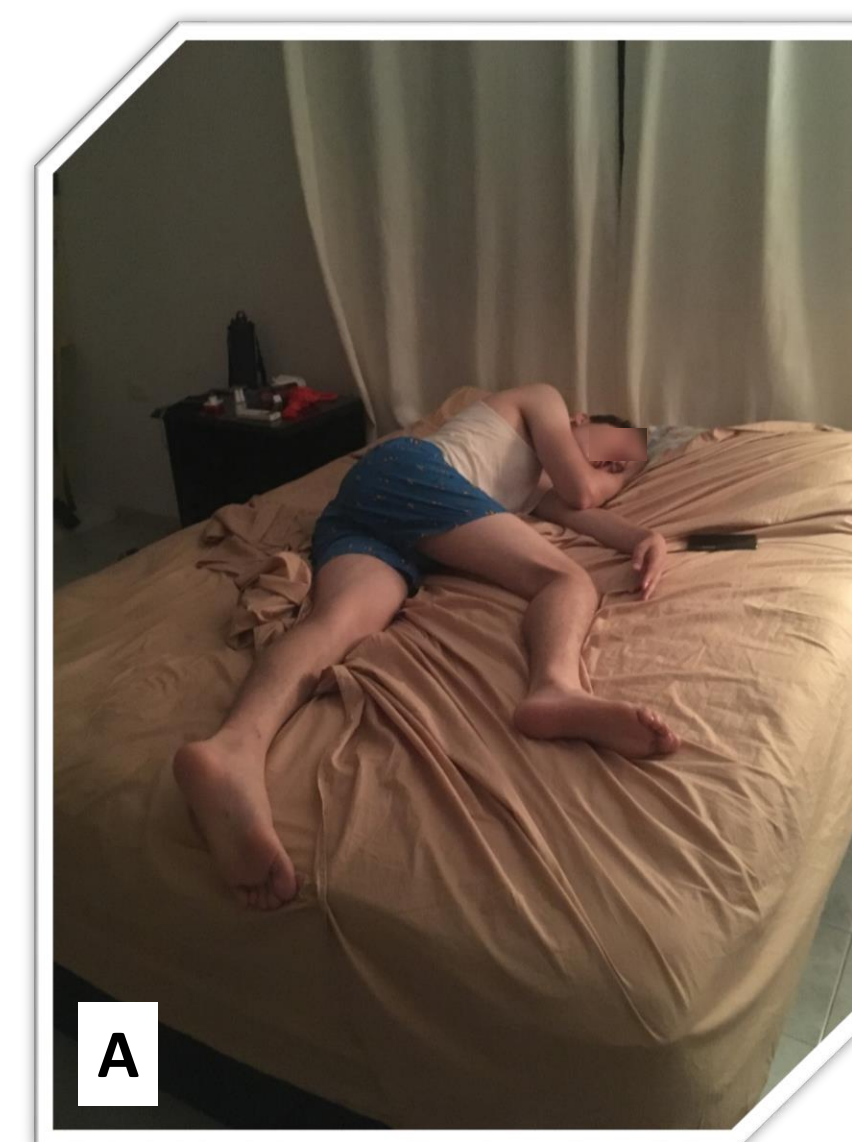
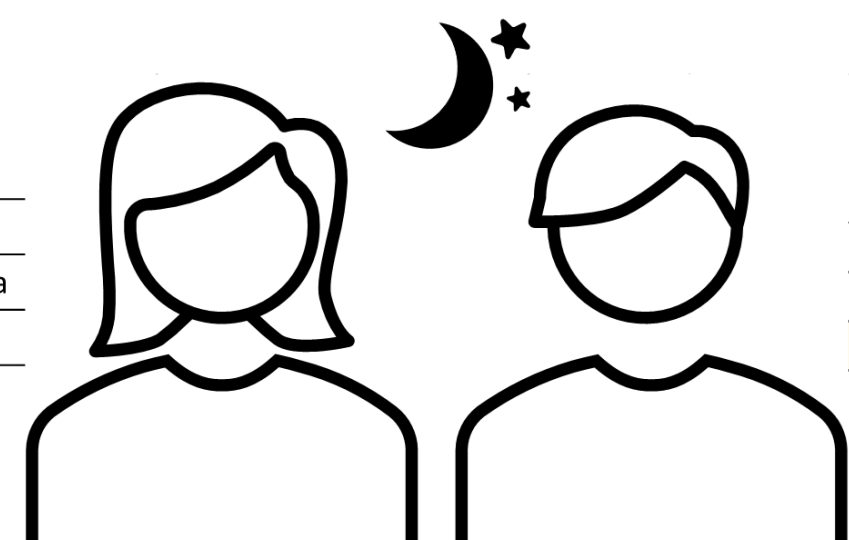


Fig 1. Different sleeping surfaces: A) Mattress in Mexico City, B) Maya hammock in Campeche, C) Totonac wooden board in Puebla

3. LOOK AT SOME DATA

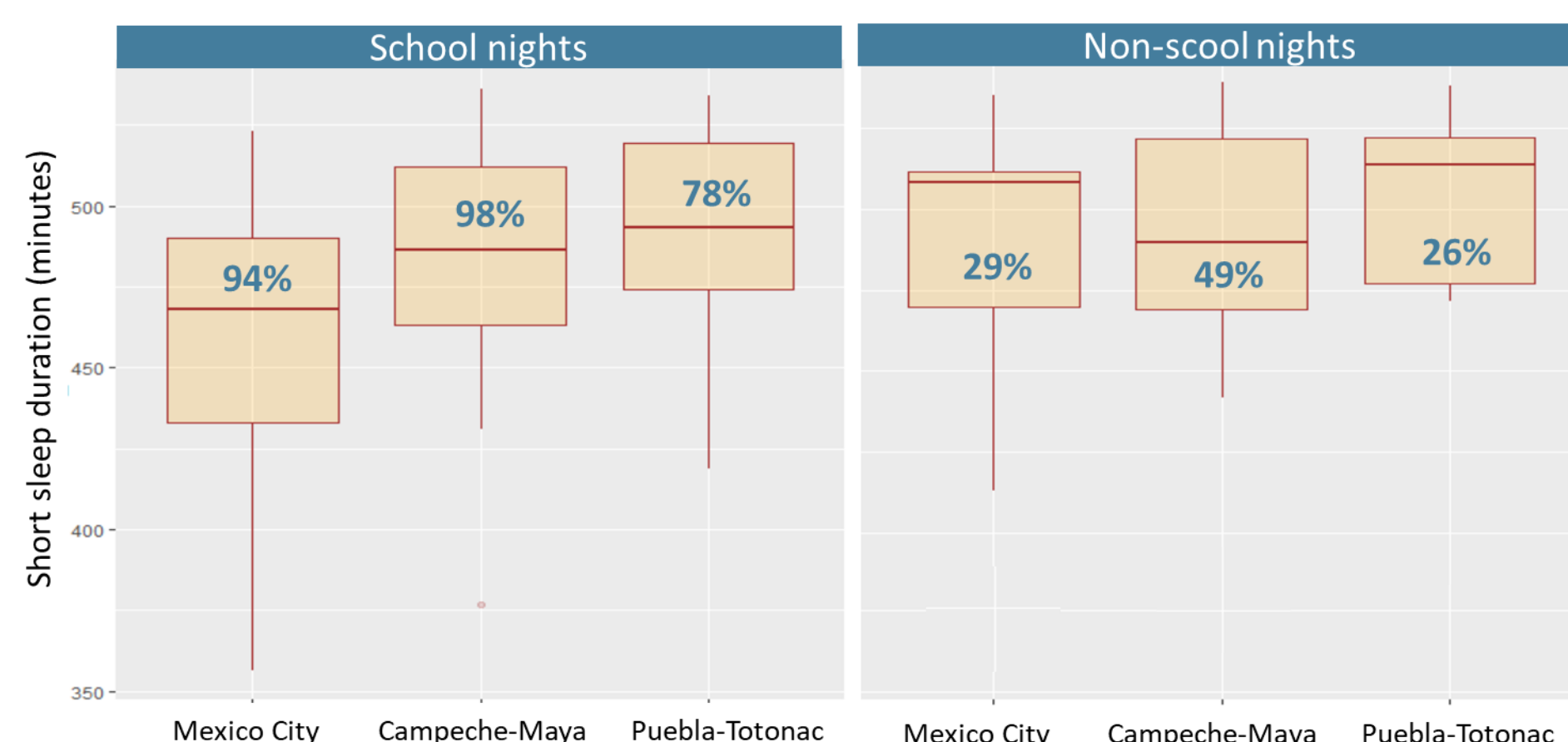
- Urban participants from Mexico City and Maya teenagers from Campeche had the shortest sleep duration.

523.8 ± 87	Mexico City
520.2 ± 65	Campeche-Maya
540.2 ± 82	Puebla-Totonac



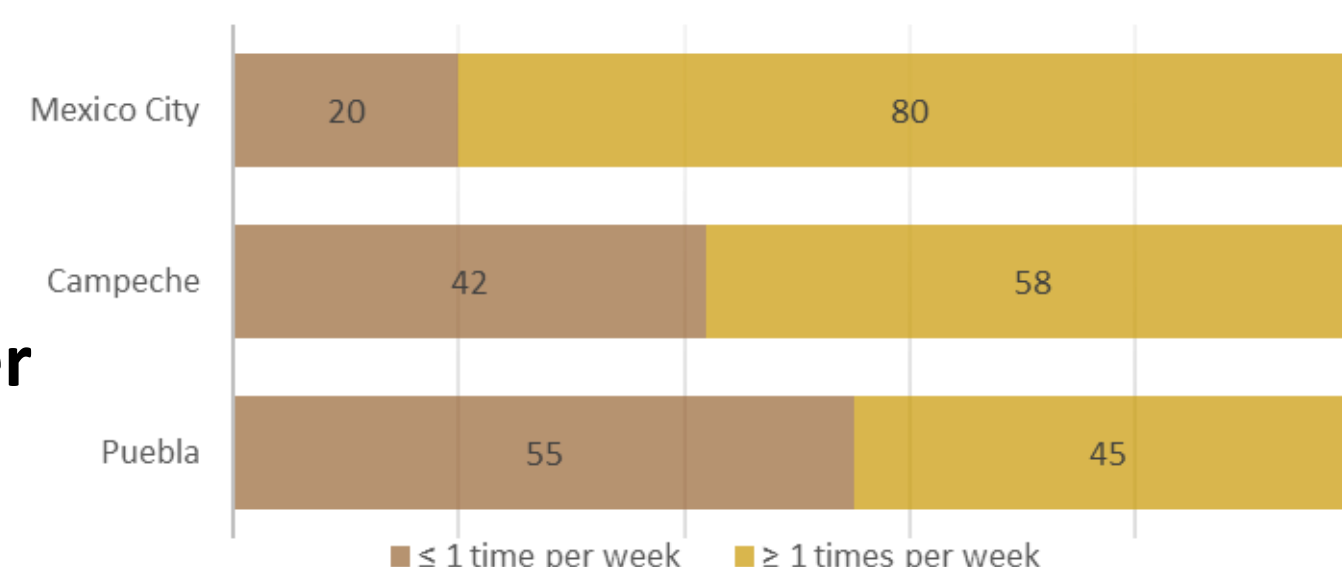
Overall sleep duration (minutes)

501.5 ± 94	Mexico City
495.5 ± 77	Campeche-Maya
542.5 ± 88	Puebla-Totonac



- We found **short sleep quotas during school and non-school days** in our three sites.
- Remarkably, the **prevalence** of short sleep quotas **was particularly high in Campeche**, the most “traditional” setting in our study.

- However, the percentage of participants reporting **recurrent daytime sleepiness** during school days **was considerably lower among Maya** than urban adolescents.



5. WHAT IS NEXT?

- Future research will evaluate sleep efficiency (i.e., the ratio of total sleep time to total time in bed) as a complementary approach to check sleep sufficiency in our sample¹⁶.
- In this regard, we speculate that the observed variation in self-rated drowsiness may reflect differences in the participants’ sleep efficiency.
- We advocate further research to delve into the relationship between sleep and health outcomes in natural settings and better understand sleep's role in our evolutionary history.



REFERENCES



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4. WHAT DOES THIS MEAN?

- Differences in the prevalence and durations of short sleep were linked to distinct school workloads, access to screen-based devices, sunset times, earlier school schedules, longer commuting times and the adolescents' likeliness to sleep in during free days.
- Altogether, our results undermine the premises of the SJH since they suggest that, given certain socio-cultural and ecological factors, **adolescents living in natural, traditional societies also express short sleep quotas**.
- These findings bring into question current presumptions about sufficient sleep and how adolescents slept before the modern era.
- Contrary to what SJH proposes, **reduced adolescent sleep durations might have been a constant in our species’ evolutionary history** where individuals weighed the costs of reduced sleep against the benefits to them or their group of economic, social, reproductive or rearing waking-life activities^{14,15}.



Acknowledgements

This research was funded by:



We thank our participants and collaborators from:

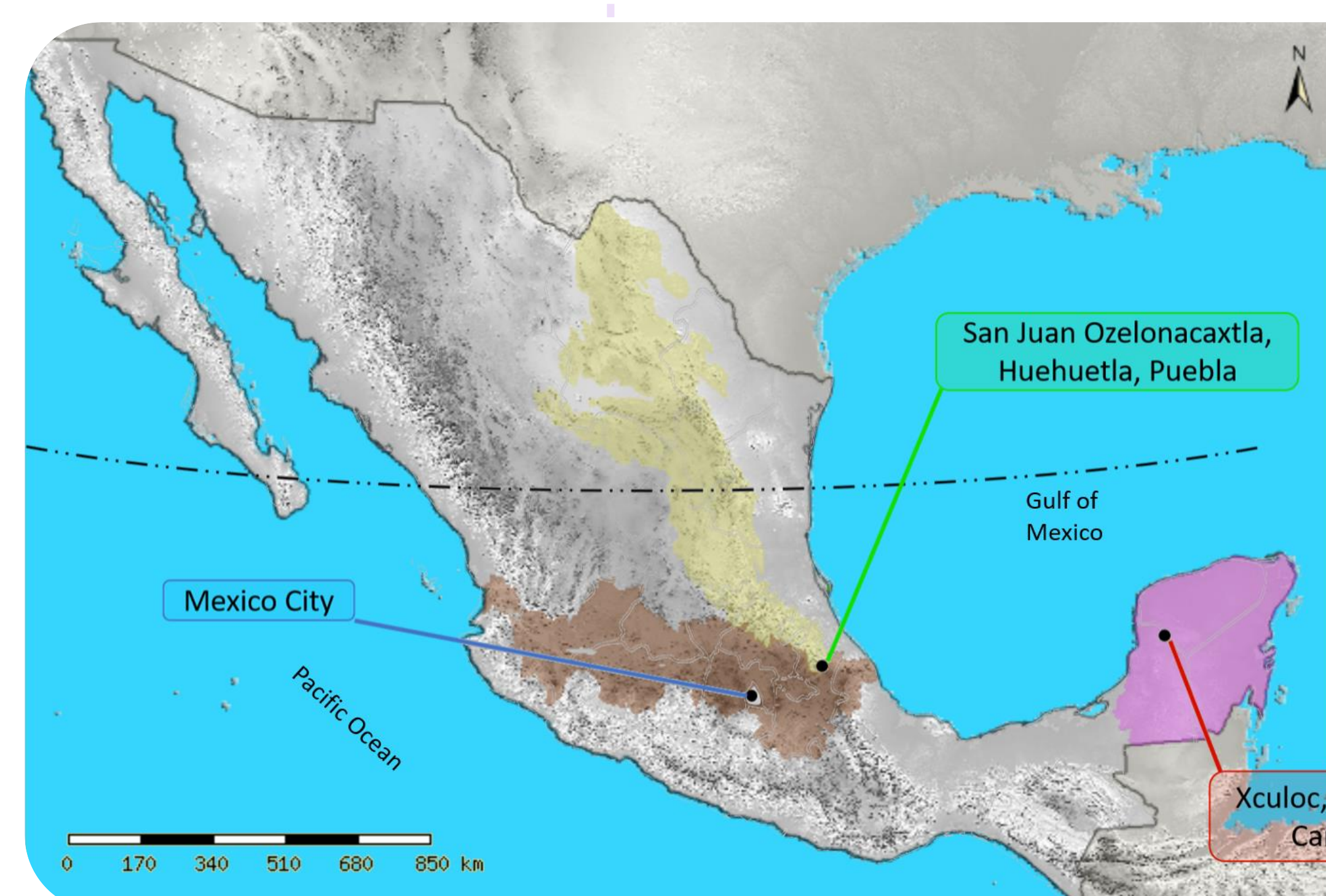


Fig 2. Study locations