

Evaluating associations between age at first birth, parity, and bone mineral density in premenopausal individuals



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Introduction

- Reproduction can have adverse effects on the skeleton (Yüce et al., 2015)
- Adolescent developmental period is essential to the accrual of total bone mineral density (BMD), which helps prevent skeletal degradation later in life (Xue et al., 2020)
- Study aims to evaluate potential associations between age at first birth (AFB), parity, and BMD in premenopausal indiv.
 - Particularly in individuals whose AFB was prior to peak BMD accrual

Methods

- Data were procured from publicly-available NHANES data repository
- Age of peak BMD accrual was estimated at 27 yrs (Rodrick et al., 2024)
- Multivariate linear regressions were performed (R) to understand potential relationships between the variables of interest
- Two-way ANOVA was performed to determine best fit (R)
- For full analysis, see below

References and Materials

- Yüce, T., Kalafat, E., & Koc, A. (2015). Adolescent pregnancy; a determinant of bone mineral density in peri-menopausal women?. *Maturitas*, 82(2), 203–207.
- Xue, Shanshan, Oumer Kemal, Meihan Lu, Lisa M. Lix, William D. Leslie, and Shuman Yang. "Age at Attainment of Peak Bone Mineral Density and Its Associated Factors: The National Health and Nutrition Examination Survey 2005–2014." *Bone* 131 (February 2020): 115163.
- Rodrick, E., & Kindler, J. M. (2024). Bone mass accrual in children. *Current opinion in endocrinology, diabetes, and obesity*, 31(1), 53–59.
- Looker, A. C., et al., "Updated Data on Proximal Femur Bone Mineral Levels of US Adults." *Osteoporosis International* 8, no. 5 (August 1, 1998): 468–90.

Results

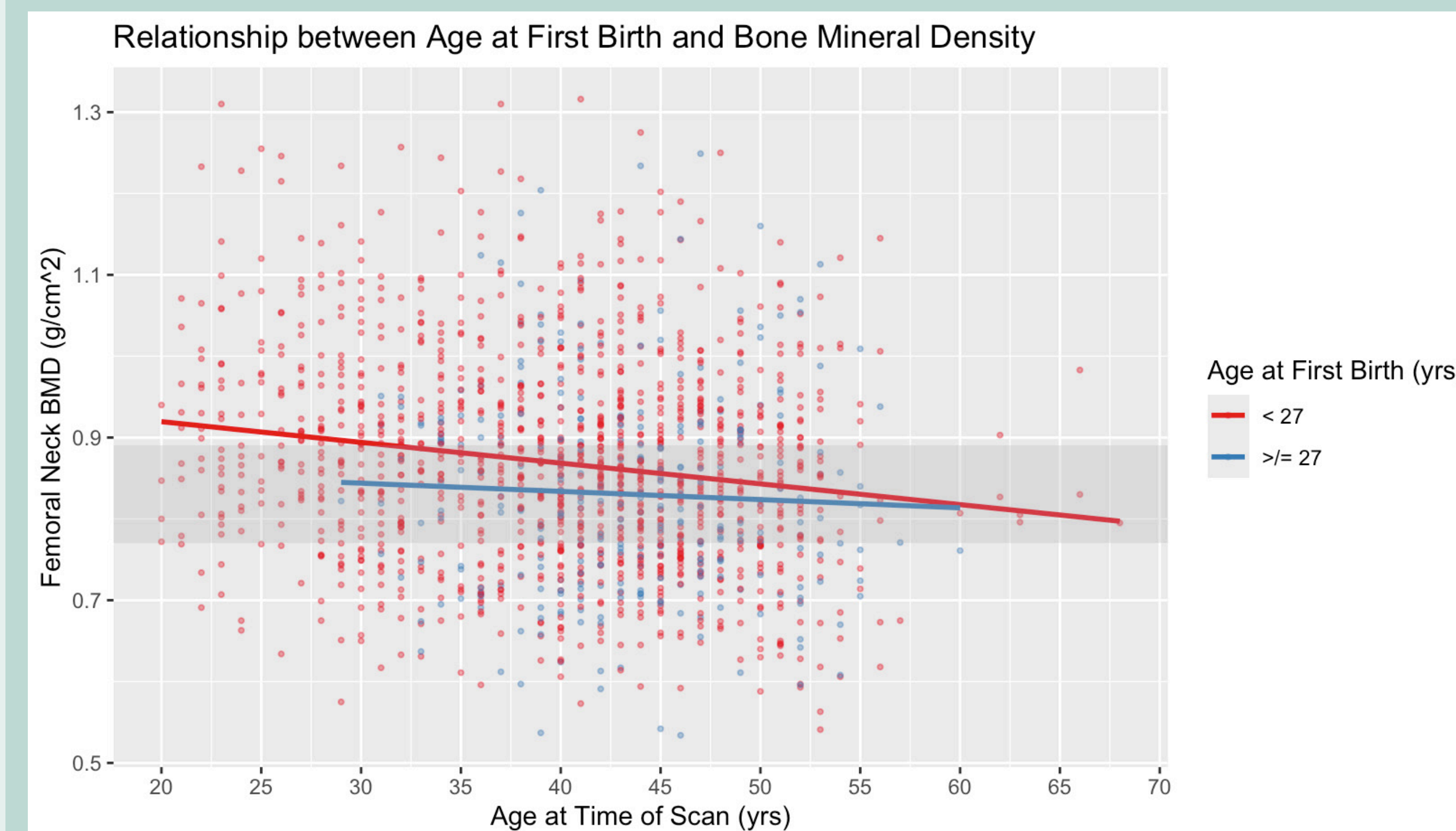


Fig. 1. Relationship between Participant Age at First Birth and Femoral Neck Bone Mineral Density

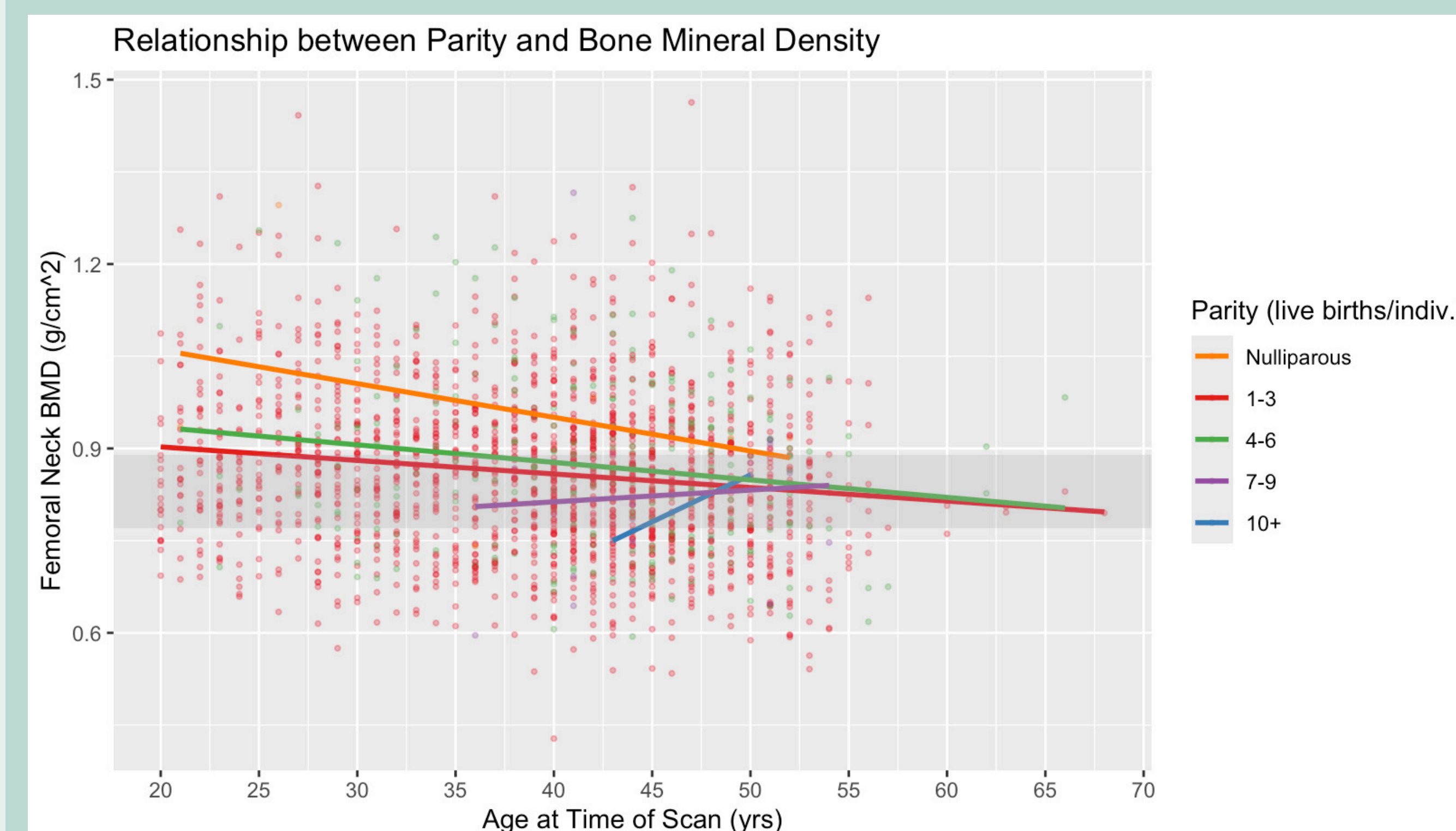


Fig. 2. Relationship between Parity (binned) and Femoral Neck Bone Mineral Density

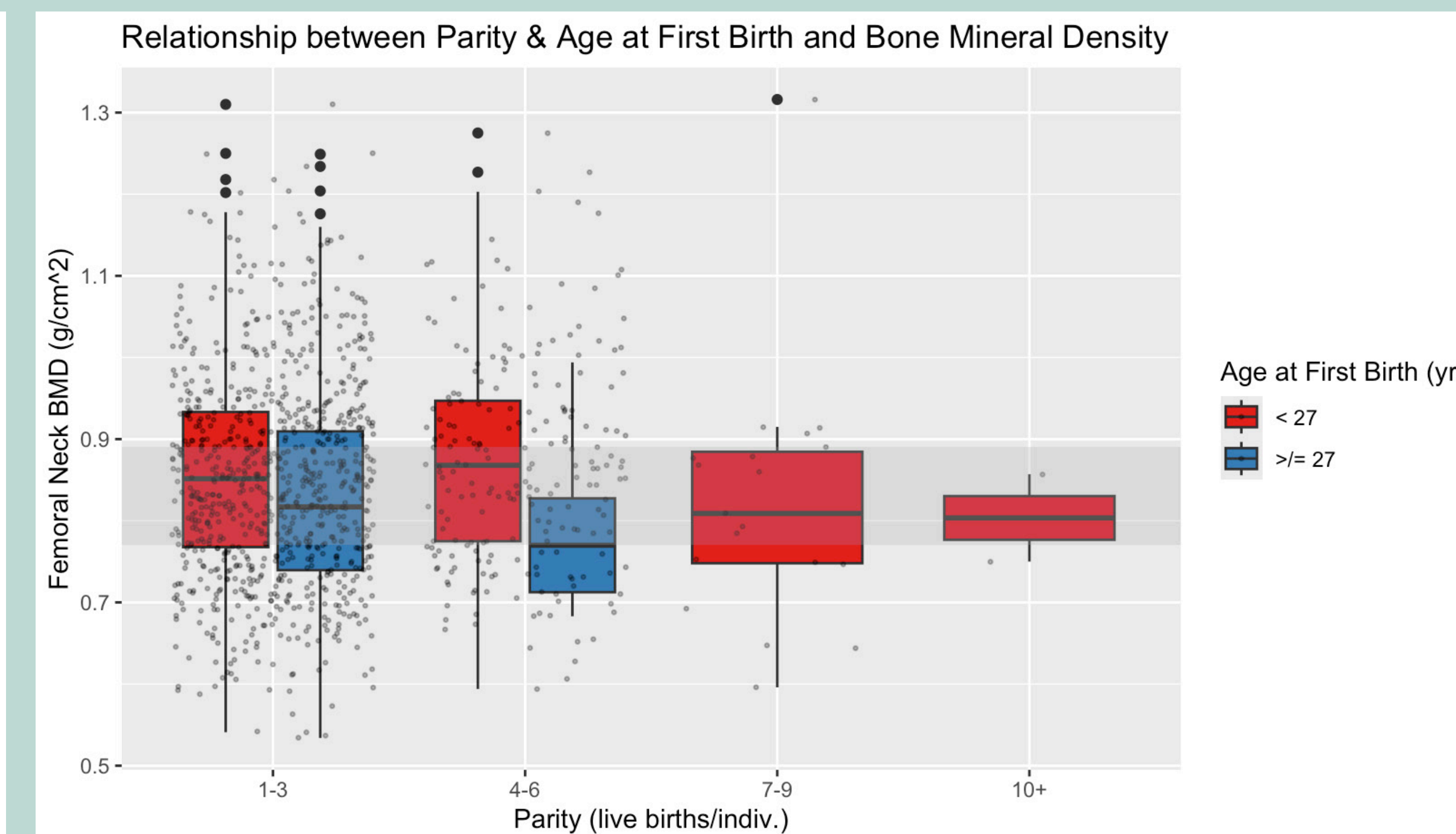


Fig. 3. Relationship between Parity & Participant Age at First Birth and Femoral Neck Bone Mineral Density

- Fig. 1. and fig. 2. are controlled for the participant's age at the time of DEXA scan, where all eligible premenopausal participants are represented
- Fig. 3. is constrained to participants ages 35–55 at time of scan, where only eligible premenopausal participants within that range are visually represented
- Grey rectangles in all figures represent the population average femoral neck BMD of individuals aged 20 and over (Looker et al., 1998)

Discussion

- Analyses show **no statistically significant relationships between BMD and AFB and/or parity**
- Evidence suggests a **quicker decrease in BMD prior to menopause in participants whose AFB was < 27 yrs** when compared to those whose AFB was ≥ 27 yrs; although, **not statistically significant**
- Analyses also suggest an **inverse relationship between parity and BMD for nulliparous indiv.** and those with **1–6 offspring**, but a **direct relationship between parity and BMD for those with 7+ offspring**; **neither relationship is statistically significant**
- Limitations include controlling for the indiv. effects (e.g., age at time of data collection)
 - BMD is known to decrease with age after peak BMD; may have been a confounding factor when looking at reproduction-associated BMD decreases

Future Directions

- Study is a **broad-strokes analysis of potential associations between young motherhood and premenopausal skeletal degradation**
- Future studies may consider analyzing longitudinal data to reduce indiv. effects when modeling, as well as controlling for factors like socioeconomic status, ancestry, BMI, and others

Acknowledgments and Contact

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For more, see below:
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For complete list of references, please scan

