

Dental Age Estimation from Human Remains at the Cambodian Mass Gravesite of Krang Ta Chan: Scientific Evidence of Child Victims

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INTRODUCTION

Krang Ta Chan (ក្រាំងតាចាន់) (KTC) is located in Takeo Province and is one of nearly 20,000 mass gravesites from the genocidal Khmer Rouge period in Cambodia (1975-1979). Eight graves were excavated at KTC after the fall of the Khmer Rouge and the remains of more than 10,000 victims were exhumed. As presented previously (Fleischman 2020), a Cambodian team analyzed and preserved the KTC remains in 2016. Per their analysis, 5,233 bones were present with a minimum of 1,904 individuals represented based on the number of crania.



PURPOSE

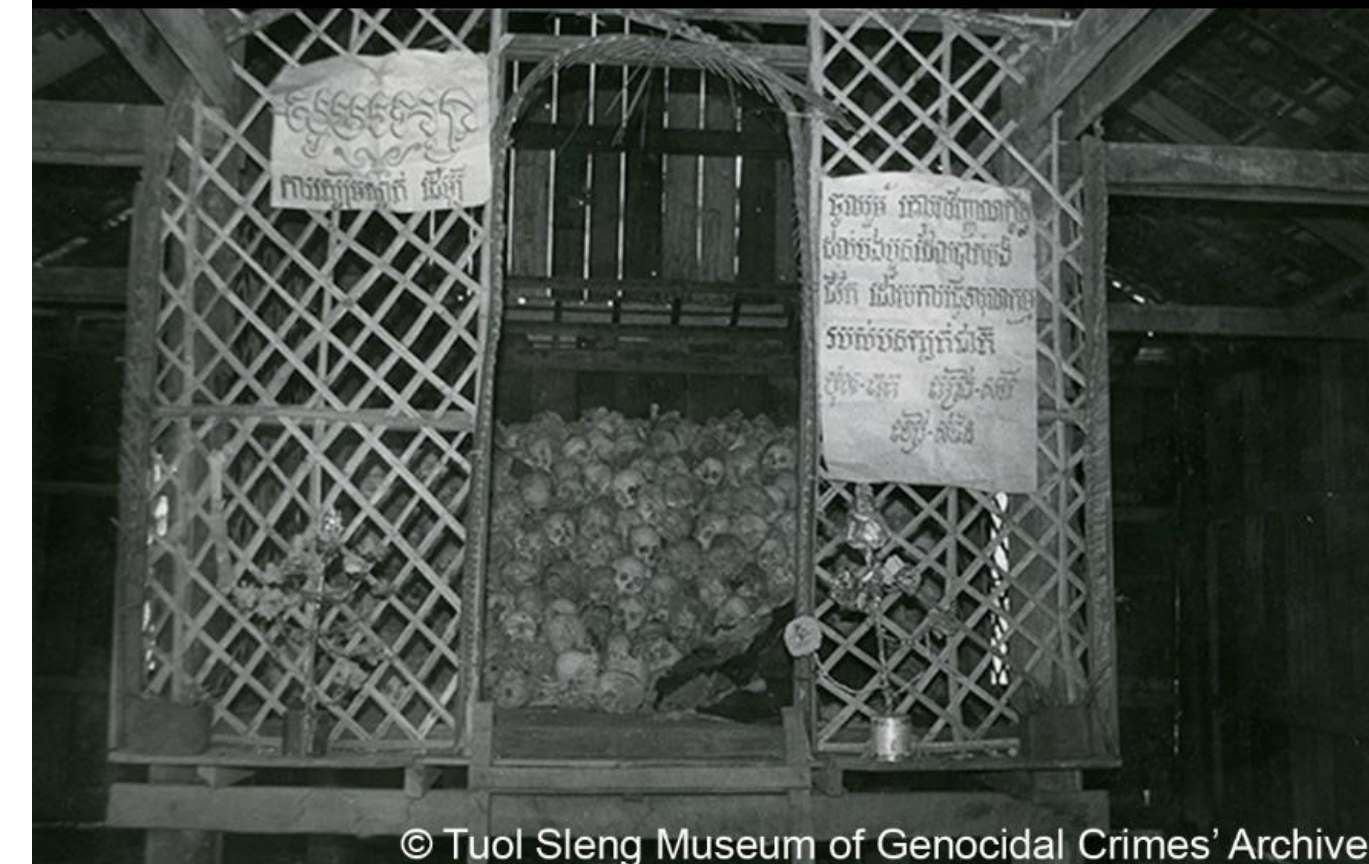
The purpose of this study was to scientifically establish that some of the victims at KTC were juveniles. To our knowledge, the dental radiographs used for this study are the only radiographs of remains from Khmer Rouge victims.



Krang Ta Chan ក្រាំងតាចាន់ 1980s



Krang Ta Chan ក្រាំងតាចាន់ 2015



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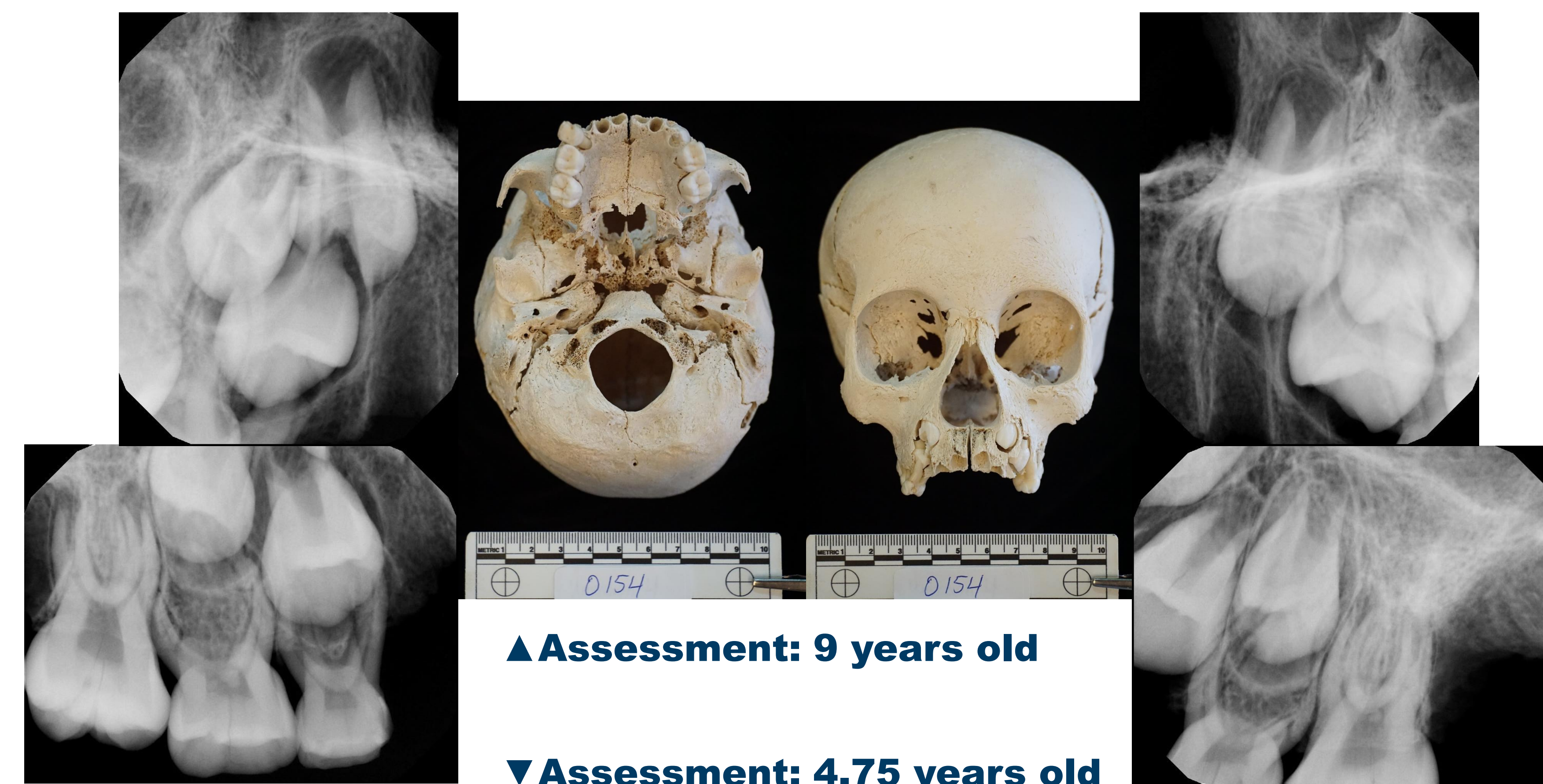
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METHODS

Two Forensic Odontologists, both American Board of Forensic Odontology certified, assessed the available radiographs and photographs of 34 individuals. The following methods and/or dental charts were used: AlQahtani et al. (2010), Mincer et al. (1993), Schour and Massler (1941), Ubelaker (1989), and UT-Age (2018). Point age estimates from both Odontologists were averaged. Based upon the point age estimates and the standard deviations for the various methods, six age intervals were created for the purposes of this study: 3-5 years old, 6-9, 10-13, 14-17, 18+, and indeterminate.

MATERIALS

Thirty four (n = 34) individuals were selected based on gross observation of deciduous maxillary dentition and/or incomplete eruption of the third molars. No mandibles were available for analysis. The available maxillary teeth were radiographed and photographed by the first author. Digital radiographs were obtained using the Aribex NOMAD Dental Handheld X-Ray system, Dexis Platinum digital x-ray sensor, and Dexis software suite (version 9.4.3).



Radiography using the NOMAD



Assessment: 6.25 years old

RESULTS

The point ages were assessed to be between 4.75 and 18.5 years old (Figure 1). An age assessment was not able to be completed for five individuals due to insufficient radiographs. When grouped by interval, 45% of individuals able to be assessed for age were between 6 and 9 years old, followed by the 14 to 17 year old interval (24%) (Figure 2). For the individuals able to be assessed, 24 (83%) were less than 18 years old, and are therefore considered to be children and adolescents.

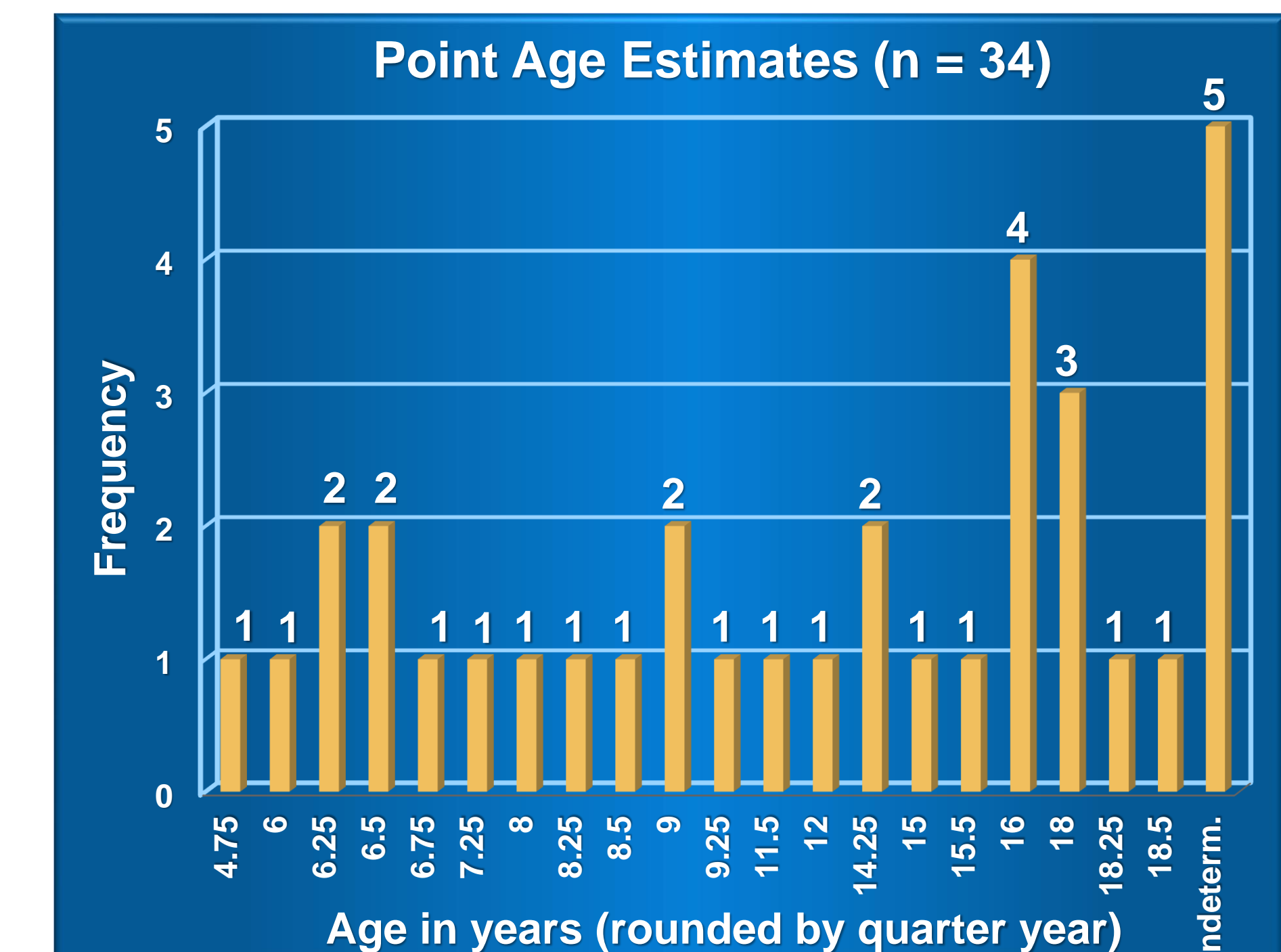


Figure 1: Point age estimates by quarter year

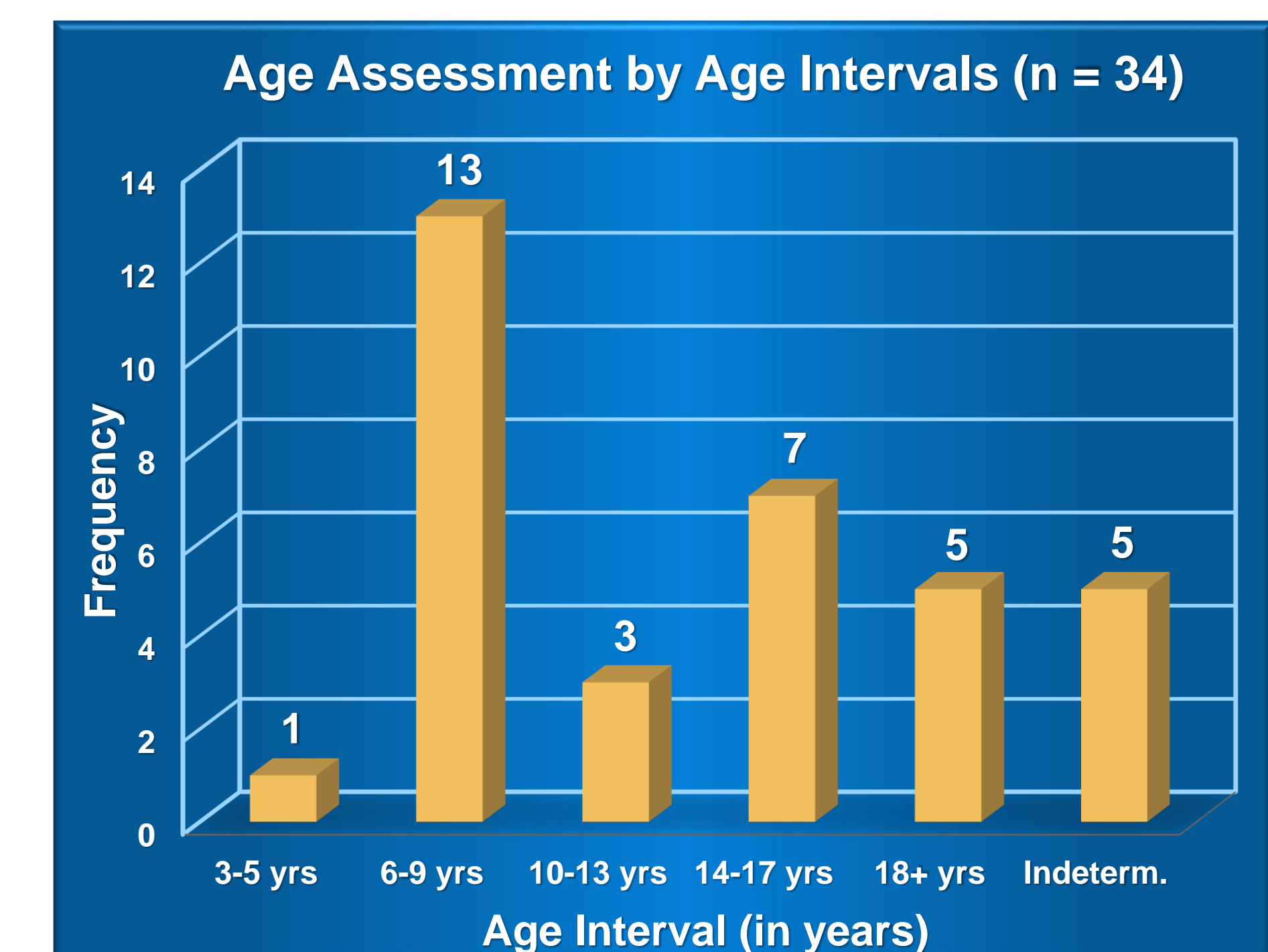


Figure 2: Age assessment by interval

CONCLUSION

While eye witness accounts and historical narratives indicate that no one was accorded special treatment under the Khmer Rouge regime, this study demonstrates that children and adolescents were exhumed from the mass graves at KTC. This study is the first (to our knowledge) to use dental radiography to scientifically assess the age-at-death of Khmer Rouge victims.

LIMITATIONS

The sex of the individuals is unknown which can reduce method accuracy. The methods have varying standard deviations and means which necessitated the age intervals. Many individuals had missing teeth and/or only a few teeth available.

ACKNOWLEDGEMENTS

- HHRRC and AAFS
- Mr. Vooun Vuthy and Cambodian team
- Ms. Ros Sophearavy
- NOMAD Humanitarian Program (for loan of the NOMAD for 10 months)
- KaVo Kerr Group (for Dexis donation)
- Krang Ta Chan staff and the local community
- All of the decedents and survivors