

Dental caries in early childhood among Native Hawaiians

MARK H.K. GREER, DMD, MPH*
SUSAN L. TENGAN, RDH, BA**

Introduction

Dental caries is perhaps the most prevalent disease known. As with all other disease processes, its occurrence and severity are influenced by a variety of intrinsic and extrinsic factors. Among these are anthropomorphic, genetic and anatomic variance; dietary and personal hygiene practices; access to and utilization of professional dental disease prevention and intervention services and social and cultural influences. Dental caries tends to be insidious in its progression and, in its advanced stages, can be disfiguring and life-threatening. Oral infections of dental origin and associated early tooth loss in young children can cause defects in developing secondary (permanent) teeth and various degrees of dental and skeletal malocclusion. In addition to its characteristic discomfort, if left untreated, dental caries can adversely affect the development of a child's facial and oral skeletal structure and lead to potentially lethal infections of the head and neck.

For several decades, Hawai'i's public health community has been concerned about the excessively high prevalence of dental caries or tooth decay found among Hawai'i's children.^{1,2,3,6} Among past findings, Caucasian children have consistently demonstrated the lowest rates of dental disease in Hawai'i and Native Hawaiian children have been found to have among the highest rates.

During the 1988 and 1989 school years, 69,037 oral health screening examinations were recorded among public school students in Hawai'i, in grades K through 6. This data was collected according to the exacting standards of the National Institute of Dental Research (NIDR) of the U.S. Department of Health and Human Services, thus is directly comparable to

the findings of similar data sets collected around the nation. The screening examinations were done and recorded by calibrated licensed public health dental hygienists working under the Dental Hygiene Branch of the Hawai'i State Department of Health. The large database collected has given us the opportunity to conduct the first comprehensive regional oral health analysis of school-age children in our State. For the purposes of our study, Native Hawaiians are defined as both pure and part Hawaiians, regardless of blood quantum. East-West Mixed are children of mixed western and Asian ethnicity, Asian Mixed are children of mixed Asian ethnicity, Portuguese are identified as an ethnic group separate from Caucasians, and Other Pacific include children of Pacific basin ancestry other than Native Hawaiian, but not including Filipinos, Asians or Japanese.

Findings

In assessing the dental health of Hawai'i's children, we found fairly wide variance among regional and ethnic cohorts. Among overall findings, children in Hawai'i as a whole suffer from prevalence rates of caries in the primary dentition (dft) which far exceed that of their mainland counterparts. The rates of caries in the secondary dentition (DMFT) on the other hand, were found to be more comparable with mainland findings.

Figures 1 and 2 reflect a comparison of findings with the 1986-1987 National Survey of Dental Caries in U.S. Children⁴ for the U.S. as a whole and for the seven regions identified within the study.

Table 1 reflects findings associated with the prevalence of Baby Bottle Tooth Decay,⁵ which is unfortunately a common finding among pre-schoolers in Hawai'i. Baby Bottle Tooth Decay (BBTD) is an insidious form of early childhood dental caries which is initiated soon after a child's first teeth erupt at 6 to 9 months of age. This form of rampant tooth decay is associated with abuse of the nursing bottle, however, the risk of BBTD is also greatly influenced by other factors, including lack of adequate and appropriate oral hygiene and disease prevention measures and low access and/or utilization of early detection and intervention measures.

Figure 3 reflects findings associated with Unmet Treatment Needs, i.e. the proportion of children active dental caries in either the primary or secondary dentition, requiring restorative dental treatment.

*Chief, Dental Health Division, Hawai'i State Department of Health, 1700 Lanakila Avenue, Room 203, Honolulu, Hawai'i 96817. Tel: (808) 832-5700 Fax: (808) 832-5722. **Chief, Dental Hygiene Branch, Hawai'i State Department of Health.

Table 1. Proportion of 5 year old children affected by baby bottle tooth decay [a]

	N =	Proportion with BBTD (%)
U.S. (approximate mean) [b]		5.00
State of Hawai'i (1989)	8593	15.78
Males	4409	15.81
Females	4184	15.75
Hawai'i Head Start [c]	444	28.8
O'ahu	6528	14.52
Hawai'i	1135	18.33
Maui	474	20.46
Moloka'i	101	32.67
Lana'i	30	23.33
Kaua'i	325	19.38
Ni'ihau	0	NA
Ethnic Group		
Caucasian	1811	4.14
Black	361	4.43
Japanese	810	8.39
Hispanic	265	10.57
East-West Mixed [d]	860	11.28
Asian Mixed [d]	259	15.06
Chinese	203	15.76
Portuguese	213	17.37
Native Hawaiian [e]	1953	20.79
Korean	95	22.10
Other Pacificans [f]	408	24.51
Filipino	1280	32.19
Southeast Asian	75	33.33

[a] Based upon a Statewide Oral Health Assessment Survey of Public School Children in Hawai'i by the Dental Health Hawai'i State Department of Health Dental Health Division, Mark H.K. Greer, D.M.D., M.P.H., Principal Investigator.

BBTD = 3 or more decayed anterior maxillary deciduous teeth.

[b] The U.S. approximate mean is based upon an estimate made by Louis Ripa, D.D.S., M.S., "Nursing Caries: A Comprehensive Review", *Pediatric Dentistry*, 88 Dec; 10(4): 268-82.

[c] R. Louie, D.D.S., M.P.H. et al; 1987 Data; *JPHD*, Vol. 50, No. 5, Fall 1990.

[d] Mixed = children of mixed ethnicity, not including those who are Part-Hawaiian. East-West Mixed = Caucasian - Japanese or Black - Filipino, etc. Asian Mixed = Chinese - Japanese, Japanese - Filipino, etc.

[e] Native Hawaiian = Pure and Part - Hawaiians, regardless of blood quantum.

[f] Other Pacificans = those other than Native Hawaiians, including Micronesians, Samoans, Tongans, Tahitians and Marshallese.

Table 2 reflects findings for Native Hawai'ian children for various oral health indicators, by contrast with the 1986-1987 U.S. and all Hawai'i children (including Native Hawai'ians). The indicators relating to the Proportion of 6 through 8 Year Old Children with One or More Carious Teeth and Proportion of 6 through 8 Year Old Children with Untreated Dental Caries, were established through the effort to identify the nation's Oral Health Objectives for the Year 2000⁷.

Tables 3 and 4 and Figure 4 reflect findings relating to dft and Unmet Treatment Needs.

Discussion

Throughout the various oral health indicators which were analyzed, Native Hawai'ian children stand out as the "local" population with the worst dental health indicators in Hawai'i. While their rates of caries prevalence, BBTD and Unmet Treatment Needs are exceeded by Southeast Asians, Filipinos and 'Other Pacificans', Native Hawai'ians stand out among Hawai'i's "non-immigrant" population. The sample of 'Other Pacificans' included 65 children of Micronesian ancestry, 2,289 Samoans, 407 Tongans and 433 of others of Pacific lineage. While within the study design, children were not identified according to migrant status. Southeast Asians, Filipinos and Other Pacificans ranked higher than others in the proportion of their population which are first generation immigrants.

Native Hawai'ian children were found to suffer from a disproportionately high rate of dental caries in early childhood. This is evident from findings presented here relating to dft and BBTD rates. The data also reflects that, although the rate of Native Hawai'ian children with untreated dental caries is high by comparison with other "non-immigrant populations" in Hawai'i, considering the high rate of disease prevalence, Native Hawai'ians do have access to and utilize professional dental care services. Considering the high prevalence rates, we found a rate of Unmet Treatment Needs which was lower than expected.

Figure 1. Mean DFT among children ages 5-9: Hawai'i vs. Continental US (n=48,988)

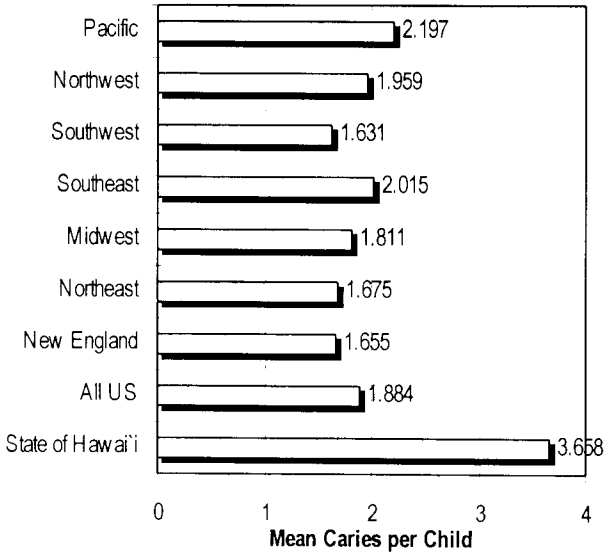


Figure 2. Mean DMFT among children ages 5-12: Hawai'i vs. continental US (n=69,037)

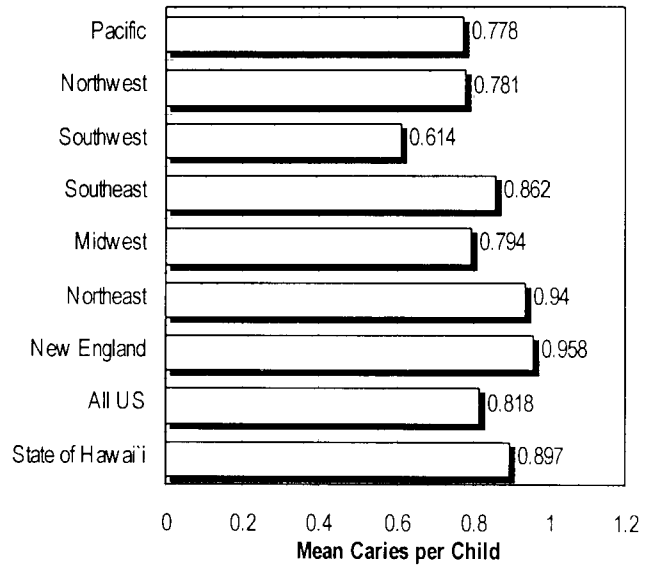


Figure 3. Mean DFT in Hawai'i by ethnic group for ages 5 - 9 Years (n=48,988)

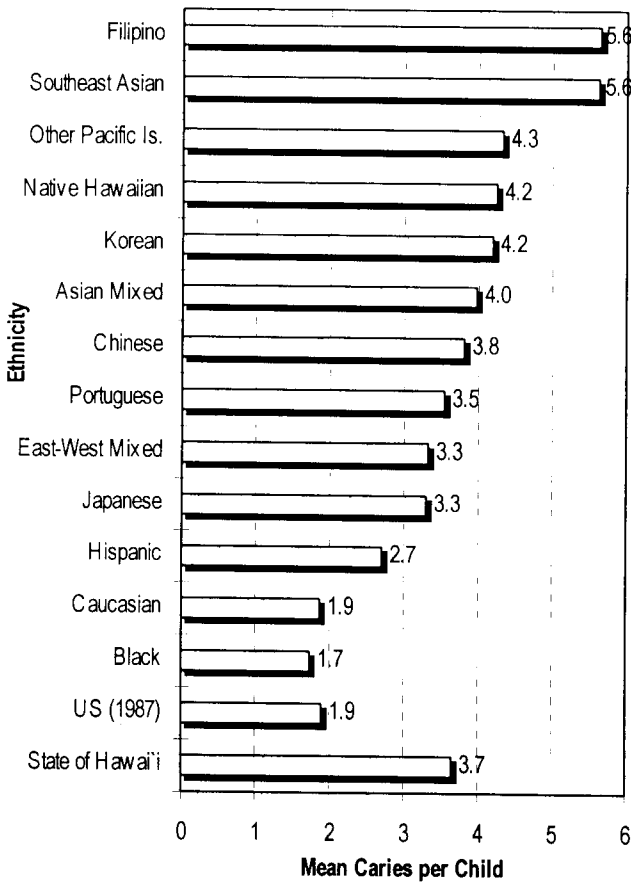


Figure 4. Distribution of children ages 5-12 with unmet treatment needs (n=69,037)

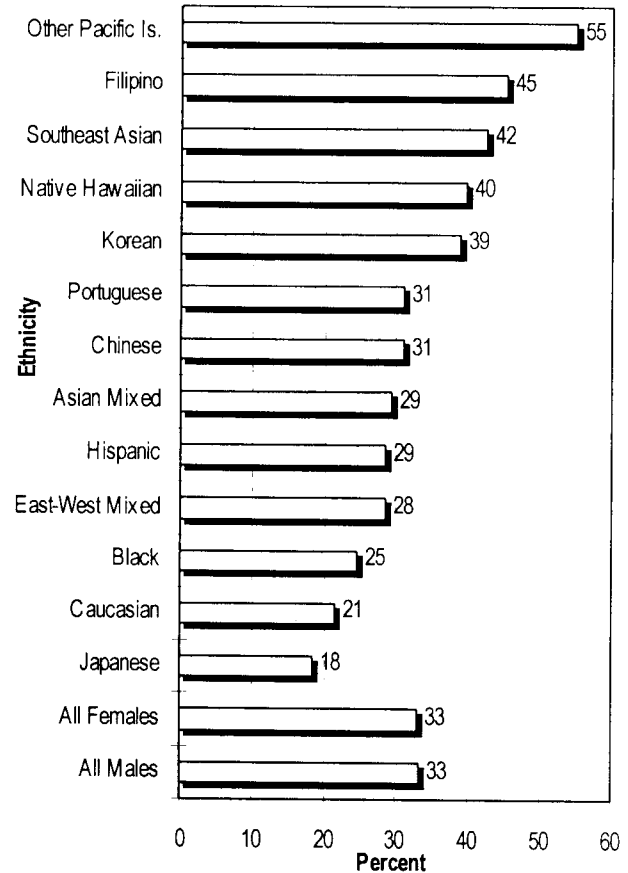


Figure 1. Mean DFT among children ages 5-9: Hawai'i vs. Continental US (n=48,988)

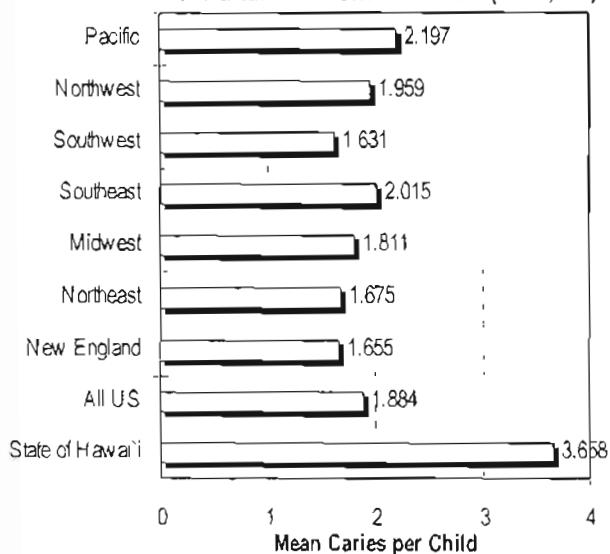


Figure 2. Mean DMFT among children ages 5-12: Hawai'i vs. continental US (n=69,037)

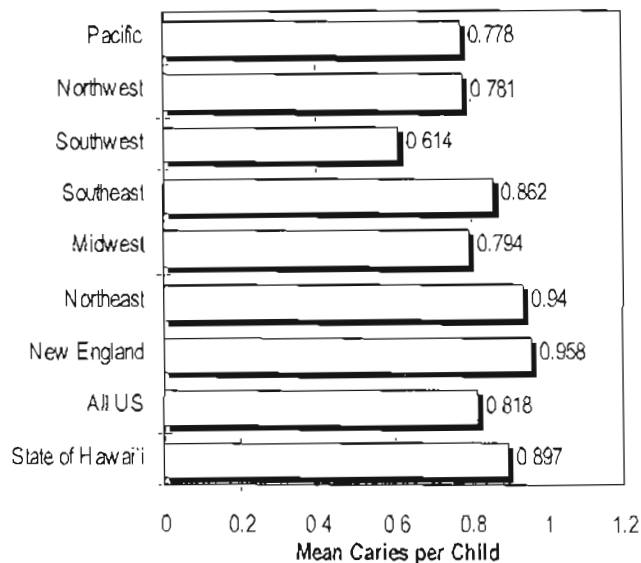


Figure 3. Mean DFT in Hawai'i by ethnic group for ages 5 - 9 Years (n=48,988)

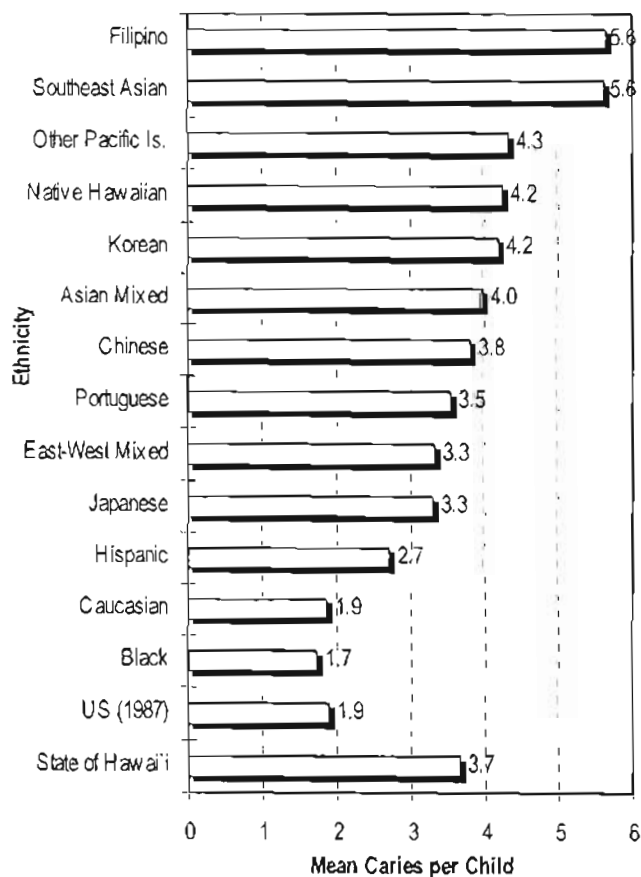


Figure 4. Distribution of children ages 5-12 with unmet treatment needs (n=69,037)

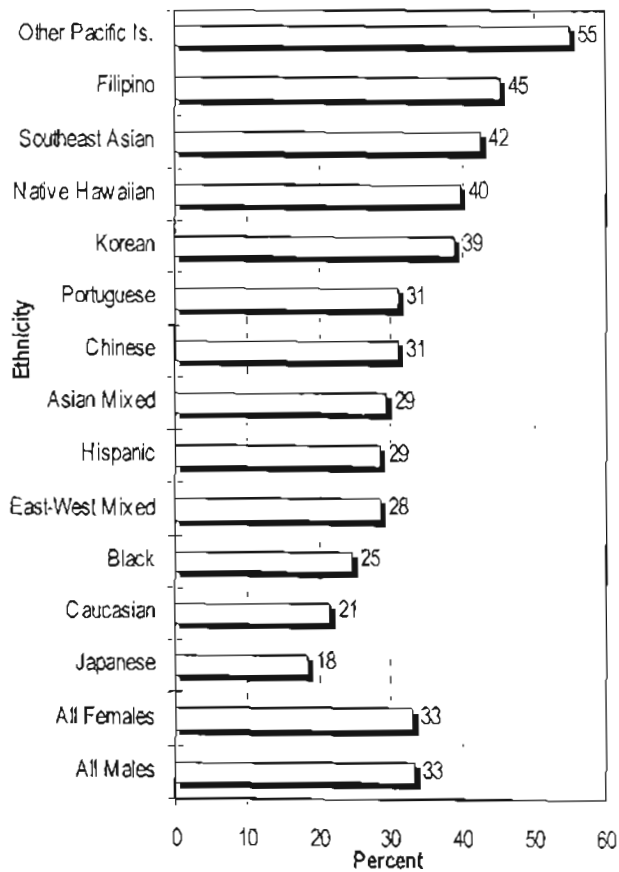


Table 3. DFT: Mean number of decayed or filled primary teeth per child [a]

Age in Years	U.S. mean [b] (1987)	Hawai'i [c] (1989)	Native Hawaiians [d] (1987)	Other Pacificans [e] in Hawai'i (1989)
5	1.716	3.753	4.824	5.434
6	1.773	3.898	4.655	5.441
7	1.999	3.988	4.613	4.745
8	2.018	3.641	4.178	3.741
9	1.891	2.993	3.143	2.383
Age Group				
5 to 9	1.884	3.658	4.240	4.327

[a] *dft* = dental caries prevalence among primary teeth = mean number of decayed or filled primary teeth per child.

[b] Based upon, *The National Survey of Dental Caries in U.S. School Children: 1986-1987, National and Regional Findings*, U.S. Department of Health and Human Services, National Institutes of Health.

[c] All Hawai'i = all children sampled, Native Hawaiian and non-Hawaiian. Data here reflects findings from a total sample which included 8,593 5 year olds (including 1,953 Native Hawaiians); 30,582 children ages 6 thru 8 (including 7,522 Native Hawaiians); 48,988 children ages 5 thru 9 (including 12,112 Native Hawaiians) and 9,951 8 year olds (including 2,654 Native Hawaiians).

[d] Native Hawaiians only, including part and pure Hawaiians, regardless of blood quantum.

[e] Other Pacificans includes children other than Native Hawaiians, including Micronesians, Samoans, Tongans, Tahitians and Marshallese.

Of significance in Hawai'i, in contrast with the mainland U.S., is the populations limited access to fluoridated public water supplies⁸. While children in Hawai'i consistently exhibit among the highest rates of dental caries in the nation, when compared with the other states and the District of Columbia, Hawai'i has the lowest proportion of its civilian population receiving the benefits of optimally fluoridated drinking water. While Hawai'i's military base water systems have been fluoridated since the mid-1950s, Hawai'i's non-military water systems remain unfluoridated. Furthermore, the levels of naturally occurring fluoride in Hawai'i's water is too low to produce the reduction in dental caries prevalence of greater than 60% experienced in many communities worldwide.

Before firm conclusions can be drawn regarding the reasons behind the high rates of early child caries in Hawai'i and the reasons for the disproportionately high rates among Native Hawaiians and Hawai'i's 'immigrants', it is unfair to speculate. More research needs to be conducted relating to the influences of socio-economic and educational background, family structure, diet and dietary practices and cultural values, beliefs and mores.

References

1. Kau, M.C.W., Robinson, J.R. Dental Caries among Hawai'i's Children, *Journal of the American Dental Association*, 1961; 63: 653-665.
2. Kau, M.C.W. and Edger, K.J. Dental Findings: High Caries Rate (School Health Services Evaluation Study), *Hawai'i Medical Journal*, 1962; 22: 107-109.
3. Hankin, J.H., Chung, C.S. and Kau, M.C.W. Genetic and Epidemiologic Studies of Oral Characteristics in Hawai'i's School Children: Dietary Patterns and Caries Prevalence, *Journal of Dental Research*, 1973; 52: 1079-1086.
4. *Oral Health of United States Children, The National Survey of Dental Caries in U.S. Children: 1986-1987*, U.S. Department of Health and Human Services, National Institute of Dental Research (NIH Publication No. 89-2247).
5. *Healthy People 2000*, U.S. Department of Health and Human Services, National Health Promotion and Disease Prevention Objectives (DHHS Publication No. (PHS) 91-50212), 349-364.
6. Louie, R., Brunelle, J.A., Maggiore, E.D. et al. Caries Prevalence in Head Start Children, 1986-87, *Journal of Public Health Dentistry*, 1990; 50: 299-305.
7. Louis R. Nursing Caries: A Comprehensive Review, *Pediatric Dentistry*, 1988; 10: 268-82.
8. Greer, M.H.K., Levy, Steven M. and Kuthy, R.A. Dietary Fluoride Supplements for Hawai'i's Children - The Role of the Dentist, *Hawaii Dental Journal*, 1989; 20: 9-17. □

Table 4. Proportion of children with unmet treatment needs [a]

Age (years)	Hawai'i [b] (1989)	Native Hawaiians [c] in Hawai'i (1989)	Other Pacificans in Hawai'i [d] (1989)
5	35.81	45.31	61.76
6	35.19	42.92	60.63
7	37.08	45.02	63.50
8	36.18	44.69	57.14
9	33.84	39.59	50.11
10	29.52	33.97	50.89
11	24.39	27.92	42.13
12	25.57	25.12	48.70
Age Group			
5 - 12	33.11	39.53	55.08

[a] *Unmet Treatment Needs* = proportion of children with active dental caries requiring treatment. [b] All Hawai'i = all children sampled, Native Hawaiian and non-Hawaiian. Data here reflects findings from a total sample which included 8,593 5 year olds (including 1,953 Native Hawaiians); 30,582 children ages 6 thru 8 (including 7,522 Native Hawaiians); 48,988 children ages 5 thru 9 (including 12,112 Native Hawaiians) and 9,951 8 year olds (including 2,654 Native Hawaiians). [c] Native Hawaiians only, including part and pure Hawaiians, regardless of blood quantum. [d] Other Pacificans includes children other than Native Hawaiians, including Micronesians, Samoans, Tongans, Tahitians and Marshallese.