


Knowledge and Attitudes of Pacific Islander Doctors and Medical Students to Childhood Hearing Loss and Hearing Services: Results of a Structured Questionnaire Survey in SAMOA

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Abstract

The Pacific Islands have among the highest global rates of childhood hearing loss in the world. Given the scarcity of ENT Specialists and audiologists in the region, the role of the wider health professional community in addressing preventable childhood hearing loss is crucial. A 10-item 5-point Likert scale questionnaire was administered to medical officers and medical students in Samoa. The statements aimed to investigate knowledge and attitudes to childhood hearing loss and hearing services. Overall, 95.8% of participants selected “Disagree/Strongly Disagree” in response to the statement “Hearing loss is not that important because it does not kill.” There was good knowledge regarding early detection and intervention services for infant hearing assessments (73.6%) and amplification suitability for babies (69.4%-72.2%). Highest knowledge of causes of childhood sensorineural hearing loss was measured for neonatal meningitis/seizures (55.6%), followed by intra-uterine infections (52.8%), and aminoglycosides (52.8%). Knowledge was lowest for jaundice (33.3%) and birth asphyxia (38.9%).

Keywords

Pacific Islands, physician knowledge, physician attitudes, childhood hearing loss, childhood hearing services

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Introduction

The Pacific Islands have among the highest global rates of ear disease and hearing loss.¹⁻⁴ The major causes of hearing disorders in children are otitis media (OM) and other infectious diseases that are avoidable through routine childhood immunizations (ie, measles/meningitis).⁵⁻⁷ The Sustainable Development Goal (SDG) Agenda (2016-2030) offers a platform to address childhood hearing loss through clinical and public health strategies as advocated by the World Health Organization.⁸⁻¹⁰ This should reduce the adverse effects of hearing loss on childhood development, and promote optimal progression toward achieving SDG 3 (Good Health and Well-Being), SDG 4 (Quality Education), and SDG 10 (Reduced Inequalities). Although a greater number of ENT Specialists, audiologists, and audiometrists is desirable for the Pacific Islands,^{11,12} the engagement of the

wider community of health professionals is essential to improve early identification and intervention for children with ear disease and hearing loss. The recent measles epidemic in Samoa illustrated the role of public health in the prevention and management of ear disease and permanent hearing loss among children.⁶

The successful implementation of childhood ear and hearing health measures will depend on the support of parents, the medical community, and all professionals

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involved in the life, welfare and development of children. Previous work from the Solomon Islands indicates that otitis media continues to be prevalent among children,^{13,14} and that parents are very supportive of community-based ENT and Audiology services for children.¹⁵ There are no other studies from the Pacific Islands investigating the perceptions of key stakeholders to childhood hearing loss and hearing services.

The support of medical officers is vital to the successful implementation of ear and hearing health services for children, and aligns with the World Health Organization concepts of task-shifting and task-sharing. Early identification and intervention for children with ear disease and hearing loss is crucial for optimal health and well-being outcomes. OM begins during the first few months of life among Pacific Islander infants, and may progress to life-threatening complications if medical management is delayed or unavailable.^{5,16,17} Delays in attendance at the Ear, Nose & Throat (ENT) Clinic or Audiology Department may be due to lack of timely referral by general health practitioners.^{18,19} In addition to the health risks associated with delays in ear disease management, unidentified hearing loss will adversely impact on speech, language and cognitive development. An appreciation of medical officer knowledge and support of ENT/Audiology services is, therefore, required for best clinical care. The desire to address OM in the Pacific Islands has certainly been documented among key stakeholders.²⁰

A review of the literature found a number of studies from Low and Middle Income Countries (LMICs) that surveyed health professionals and medical students regarding their knowledge and attitudes to infant and childhood hearing loss. Overall, there is evidence for high professional support for ENT/Audiology services.²¹⁻²⁵ A study from Nigeria found that 96.3% of medical students and 96.9% of practising physicians disagreed or strongly disagreed with statement that “hearing loss is not that important because it does not kill.”²³ A systematic review found that a common theme throughout studies of this kind were that parental concern regarding a child’s hearing was the most important factor influencing medical referral for investigation of hearing status.²¹

Samoa is a Polynesian nation of the Pacific Islands where ENT/Audiology services are limited but evolving (Figure 1). The ENT Department of the Tupua Tamasese Meaole (TTM) Hospital in Samoa is currently developing their ENT and audiology services to include public health and community outreach programs.^{26,27} The second author is a General/ENT Surgeon, who re-established the ENT Department of Samoa in 2017. He is an active member of the Samoan Medical Association and has been affiliated with the National University of

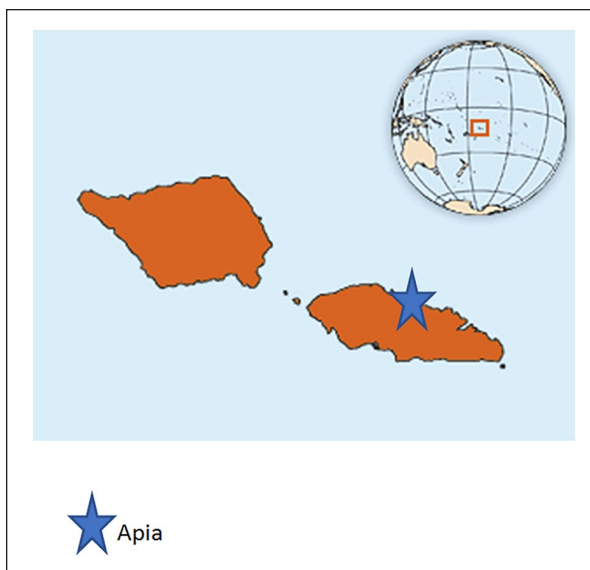


Figure 1. Map of Samoa.

Samoa (NUS) School of Medicine for the past 6 years as a guest lecturer. The relationship between the ENT Department, the Samoan Medical Association, and the NUS School of Medicine presented an excellent opportunity to investigate the knowledge and attitudes of doctors and medical students toward ear and hearing health in Samoa. This would be a step toward the successful implementation of national ENT/Audiology services, as well as reducing the burden of ear and hearing health disease in the country. Given that there is no previous research on this topic from other Pacific Island nations, the results may translational and prove useful to our Pacific Island neighbors.

Methods and Materials

Ethical approval was obtained from the Government of Samoa Ministry of Health (Health Research Committee), the University of Queensland Medical Ethics Research Committee, and the University Research & Ethics Committee of the National University of Samoa. Gatekeeper approval was also obtained from the Samoan Medical Association.

Recruitment of Participants

Medical professionals were recruited during the 2021 Annual Conference of the Samoan Medical Association. The conference attracts almost all doctors of Samoa, and colleagues who are on-call or working were able to “attend” via Zoom. All members of the Samoan Medical Association were eligible for participation (N=113).

Table 1. Age Distribution Among the Study Participants According to Professional and Student Status.

	Up to 25 years	26-35 years	36-45 years	46+ years	Missing data	Total
Medical officers	0	11	8	7	1	27
Pre-clinical students (year 1-3)	22	4	0	0	0	26
Clinical students (year 4-6)	14	3	0	0	2	19
Total	36	18	8	7	3	72

An announcement was made by the research team to the conference delegates, including an invitation to participate in the study. All willing participants were required to sign a group consent form.

Medical students were recruited during pre-arranged class times at the National University of Samoa. All students enrolled in the Bachelor of Medicine (Years 1-6) were eligible for the study (N=56). Again, an announcement was made by the research team to the students with an invitation to participate in the study. Again, all willing participants were required to sign a group consent form.

A total of 72 participants took part in the study. There were 27 medical officers (24% of SMA members), and 45 medical students (80% of NUS enrollment), and they were classified into professional, pre-clinical medical student (Years 1-3), and clinical medical student (Years 4-6) subgroups. The study population consisted of 26 (36.1%) males, 43 (59.7%) females, and data was missing for 3 (4.2%) participants. Age distribution according to professional and student status is summarized below (Table 1).

Study Questionnaire Administration

For both medical professionals and medical students, the study questionnaire was distributed to participants by the research team. Instructions for completing the questionnaire were provided (circle male/female, write age in years, put an "X" in the box corresponding to your response). Upon completion of the deidentified questionnaires, the research team collected the forms and filed them for data entry at the ENT Department office.

The research team adapted the questionnaire used in the original study by Olusanya and Roberts.²³ The Mexican study design was also considered, however, the research team decided that the Nigerian questionnaire was better suited to our context, and only required the modification of "Nigerian children" to "Samoan children." The questionnaire consisted of 10 questions which were rated on a 5-point Likert scale. Each participant completed the questionnaire individually, and responded to each question with "Strongly Agree," "Agree," "Not sure," "Disagree," or "Strongly Disagree."^{23,25}

These study procedures are an amendment of the published study protocol.²⁸ The original intention was to perform the study with medical and nursing students only, however, the opportunity presented itself to include medical professionals. The results for the nursing students will be reported in a separate study.

Data Handling and Analysis

All data handling and analysis was done by the authors affiliated with the University of Queensland (AK, CD). The first author (AK) filed the completed questionnaires at the time of data collection, and then entered results into an SPSS Statistical Software Package spreadsheet created for the study upon returning to her office at the TTM Hospital ENT Department. Each response was assigned a numerical code: Strongly Agree=1, Agree=2, Not sure=3, Disagree=4, and Strongly Disagree=5. Data analysis was performed in collaboration with her colleague at the University of Queensland (CD), and included consultation with the departmental biostatistician.

Responses were tallied for each question according to age, gender, and medical subgroup (professional/pre-clinical/clinical). Chi-square tests of significance were performed to investigate for any significant associations between response proportions (Strongly Agree, Agree, Not sure, Disagree, Strongly Disagree) and gender, age, and medical subgroups, respectively.

Again, the statistical methods were revised as appropriate from the published study protocol.²⁸

Results

The results of the present study are summarized in Table 2.

Attitude to Childhood Hearing Loss

Overall, there was an overwhelmingly positive attitude to addressing hearing loss, with 95.8% of participants selecting the "Disagree" (20.8%) or "Strongly Disagree" (75%) response to the statement "Hearing loss is not that important because it does not kill." A positive attitude to

Table 2. Overall Summary of Results n (%).

Question	Strongly Agree	Agree	Combined Strongly Agree/ Agree	Neutral/ Don't know	Disagree	Strongly Disagree	Combined Strongly Disagree/ Disagree	Missing
Q1 HL is not a serious problem in Samoan children.	6 (8.3)	7 (9.7)	13 (18.1)	18 (25)	22 (30.6)	16 (22.2)	38 (52.8)	3 (4.2)
Q2a Craniofacial anomalies (eg, Down's syndrome) do not cause HL	3 (4.2)	17 (23.6)	20 (27.8)	15 (20.8)	30 (41.7)	5 (6.9)	35 (48.6)	2 (2.8)
Q2b Intrauterine infections (eg, CMV, Rubella) do not cause HL	8 (11.1)	12 (16.7)	20 (27.8)	14 (19.4)	27 (37.5)	11 (15.3)	38 (52.8)	0 (0)
Q2c Low birthweight (less than 2.5kg) does not cause HL	3 (4.2)	15 (20.8)	18 (25)	19 (26.4)	29 (40.3)	6 (8.3)	35 (48.6)	0 (0)
Q2d Neonatal jaundice does not cause HL	5 (6.9)	10 (13.9)	15 (20.8)	30 (41.7)	22 (30.6)	2 (2.8)	24 (33.3)	3 (4.2)
Q2e Neonatal meningitis/ seizures does not cause HL	5 (6.9)	15 (20.8)	20 (27.8)	9 (12.5)	27 (37.5)	13 (18.1)	40 (55.6)	3 (4.2)
Q2f Birth asphyxia does not cause HL	3 (4.2)	14 (19.4)	17 (23.6)	2 (2.8)	19 (26.4)	9 (12.5)	28 (38.9)	2 (2.8)
Q3 Aminoglycosides like gentamycin will not harm a baby's hearing	4 (5.6)	6 (8.3)	10 (13.9)	21 (29.2)	21 (29.2)	17 (23.6)	38 (52.8)	3 (4.2)
Q4 A mother's exposure to loud noise in pregnancy will not affect a baby's hearing	7 (9.7)	20 (27.8)	27 (37.5)	27 (37.5)	16 (22.2)	2 (2.8)	18 (25)	0 (0)
Q5 Babies with hearing loss cannot be accurately detected at birth	6 (8.3)	22 (30.6)	28 (38.9)	20 (27.8)	21 (29.2)	3 (4.2)	24 (33.3)	0 (0)
Q6 Babies with hearing loss cannot be helped until they are older	4 (5.6)	8 (11.1)	12 (16.7)	10 (13.9)	38 (52.8)	12 (16.7)	50 (69.4)	0 (0)
Q7 Hearing aids are unsuitable for babies	1 (1.4)	10 (13.9)	11 (15.3)	9 (12.5)	41 (56.9)	11 (15.3)	52 (72.2)	0 (0)
Q8 Parental suspicion of hearing loss should not influence a clinical opinion	6 (8.3)	10 (13.9)	16 (22.2)	4 (5.6)	30 (41.7)	22 (30.6)	52 (72.2)	0 (0)
Q9 Babies can wait until they are older before testing for hearing loss	1 (1.4)	9 (12.5)	10 (13.9)	8 (11.1)	32 (44.4)	21 (29.2)	53 (73.6)	1 (1.4)
Q10 Hearing loss is not that important because it does not kill	0 (0)	2 (2.8)	2 (2.8)	1 (1.4)	15 (20.8)	54 (75)	69 (95.8)	0 (0)

Abbreviation: HL, hearing loss.

addressing hearing loss was also revealed by the finding that 72.2% of participants selected a “disagree” or strongly disagree’ response to the statement that “Parental suspicion of hearing loss should not influence

a clinical opinion.” There were no significant difference in response proportions between the age, gender, or professional/clinical student/pre-clinical student subgroups for either of these statements.

Awareness of Childhood Hearing Loss as a Public Health Issue in Samoa

Overall, there were 52.8% of respondents who selected “disagree” (30.6%) or “strongly disagree” (22.2%) to the statement that “Hearing loss is not a serious problem in Samoan children.” Again, there were no significant difference in response proportions between the age, gender, or professional/clinical student/pre-clinical student subgroups for this statement.

Knowledge of Causes of Sensorineural Hearing Loss

Overall, knowledge was average for causes of childhood sensorineural hearing loss. Knowledge was highest for neonatal meningitis/seizures (55.6%), intra-uterine infections (52.8%), and aminoglycosides (52.8%) as causes of childhood sensorineural hearing loss. Pearson Chi-Square tests of significance showed a significant in response proportions between the age variable and knowledge regarding intra-uterine infections as a cause of childhood hearing loss ($\chi^2=14.489$, $df=1$, $P=.025$). Further chi-square tests of comparison revealed that there was a difference in response proportions between participants in the youngest Age 1 category, and those in the older Age 2 ($\chi^2=5.33$, $df=1$, $P=.02$) and Age 3 ($\chi^2=6.1997$, $df=1$, $P=.0127$) categories, with higher knowledge in the older age groups regarding Intrauterine infections as a cause of hearing loss in babies.

Similarly, Pearson Chi-Square tests of significance showed a significant difference in response proportions between the age variable and knowledge regarding aminoglycoside therapy as a cause of childhood hearing loss ($\chi^2=15.168$, $df=1$, $P=.019$), and further analysis found that there was a difference in response proportions in the youngest Age 1 category, and those in the older Age 2 ($\chi^2=7.68$, $df=1$, $P=.005$) and Age 3 ($\chi^2=7.12$, $df=1$, $P=.007$) categories, again with higher knowledge in the older age groups regarding aminoglycosides as potentially harmful to a baby’s hearing. Furthermore, a significant association was measured between knowledge of aminoglycosides and the professional/clinical student/pre-clinical student subgroups ($\chi^2=24.189$, $df=1$, $P=.000$), and further chi-square tests of significance found a significant difference in response proportions between the knowledge of pre-clinical students and that of both professionals ($\chi^2=15.7$, $df=1$, $P=.000$) and clinical students ($\chi^2=9.86$, $df=1$, $P=.001$), with higher knowledge among the clinical students and professionals regarding aminoglycosides as a possible cause of permanent hearing loss.

Overall, knowledge was lowest for maternal exposure to noise during pregnancy (25%), jaundice (33.3%) and birth asphyxia (38.9%) as possible causes of childhood sensorineural hearing loss. A significant difference in response proportions was measured between knowledge of birth asphyxia and the professional/clinical student/pre-clinical student subgroups ($\chi^2=19.888$, $df=1$, $P=.001$), and further analysis found a significant difference in response proportions between knowledge of pre-clinical students and medical professionals regarding birth asphyxia as a possible cause of hearing loss among babies ($\chi^2=4.89$, $df=1$, $P=.026$), with higher knowledge among the medical professionals.

There was also a significant difference in response proportions between professionals/clinical students/pre-clinical students to the statement regarding low-birthweight as a possible cause of hearing loss ($\chi^2=13.889$, $df=1$, $P=.008$). Further analysis found a significant difference in response proportions between pre-clinical students and both medical professionals ($\chi^2=5.6382$, $df=1$, $P=.017$) and clinical students ($\chi^2=5.9083$, $df=1$, $P=.015$) regarding low birthweight as a possible cause of hearing loss, with higher knowledge among the clinical students and medical professionals.

Knowledge Regarding Hearing Services for Childhood Hearing Loss

Overall, there was good knowledge regarding early detection and intervention for babies with congenital or early-onset sensorineural hearing loss. Participants responded “disagree” or “strongly disagree” to the statements that “babies can wait until they are older before testing for hearing loss” (73.6%), “hearing aids unsuitable for babies” (72.2%), and “babies with hearing loss can’t be helped until they are older” (69.4%).

Knowledge was lowest for the statement “babies with hearing loss cannot be accurately detected at birth” (33.3%). There was a significant difference in response proportions to this statement and the age variable ($\chi^2=13.297$, $df=1$, $P=.039$), and further chi-square tests of significance found a difference in response proportions between the youngest Age 1 category and the older Age 3 ($\chi^2=6.11$, $df=1$, $P=.01$) and Age 4 ($\chi^2=7.87$, $df=1$, $P=.005$) categories regarding accurate detection of hearing loss at birth, with higher knowledge among the older age group. There was also a significant difference in response proportions to this statement and the professional/clinical student/pre-clinical student subgroups ($\chi^2=20.261$, $df=1$, $P=.000$), and further chi-square tests of significance found a difference in response proportions between the knowledge of professionals regarding accurate detection of hearing

loss at birth and that of both pre-clinical ($\chi^2=10.85$, $df=1$, $P=.000$) and clinical students ($\chi^2=6.62$, $df=1$, $P=.01$), with higher knowledge among the medical professionals.

Discussion

Overall, there were overwhelmingly positive attitudes to addressing childhood hearing loss among the health professionals and medical students in Samoa. The results of the present study (95.8%) are similar to those from the previous study in Nigeria where high importance was expressed by both medical students (96.3%) and physicians (96.9%) on addressing childhood hearing loss, despite it not being a fatal condition.²³ Although only 52.8% of participants were aware of childhood hearing loss in Samoa as a major public health issue, the positive attitudes suggest that current efforts by the Samoan ENT/Audiology Department should be met with some goodwill by our health professional colleagues as we seek to strengthen ear and hearing health outcomes at the public and primary healthcare levels.^{5,7,10,29} The Sustainable Development Agenda offers an excellent platform to harness the goodwill demonstrated in the present study for children with hearing loss.

The knowledge of causes of sensorineural hearing loss among newborns and infants varied from 25% for maternal exposure to noise during pregnancy to 55.6% for neonatal meningitis. This contrasts with the Nigerian study where best knowledge of causes for permanent hearing loss among newborns was for intra-uterine infections for both medical students (86.6%) and physicians (91.9%).²³ The paper from Mexico had a different study design and asked new medical residents ($N=2727$) to list all possible risk-factors for permanent hearing loss among newborns and infants: knowledge was highest for intra-uterine infections (mentioned by 1769 participants), followed by ototoxic drugs (mentioned by 746 participants).²⁵ In our Samoan study, the younger pre-clinical medical students further showed statistically significant lower knowledge than the older clinical students and medical professionals of aminoglycosides, birth asphyxia and low-birthweight as possible causes of permanent hearing loss. The current university curriculum on ENT disorders may be reviewed to strengthen teaching on causes of childhood hearing loss. Given that overall knowledge was average regarding causes of childhood sensorineural hearing loss, the risk-factors for early-onset sensorineural hearing loss could be a focal topic for the ENT/Audiology Department to present to colleagues during the weekly Samoan Medical Association Continuing Medical Education sessions. The ENT/Audiology Department

had an opportunity to contribute to the updated National Baby Health Book which is issued to all caregivers at the birth of a new child, and the new edition will include a modified version of the Joint Committee on Infant Hearing risk-factor questionnaire for childhood hearing loss for completion by primary health professionals during routine baby health checks.³⁰ This public health initiative should provide a catalyst for improving the knowledge of current and future health professionals on this topic.

At this time in Samoa, there is no Newborn and Infant Hearing Screening (NIHS) program, and pediatric auditory rehabilitation is limited to short-term visits by overseas audiologists. Despite this context, there was good knowledge for early intervention (69.4%) and the option of hearing aids (72.2%) for babies with hearing loss. Our finding regarding hearing aid fitting for babies was higher than either study from Mexico (40.1%) or Nigeria (57.3% students, 50.3% physicians).^{23,25} In contrast, only 33.3% of Samoan participants were aware that hearing loss may be accurately detected at birth, and this may be a reflection of the fact that NIHS is not yet part of the national ear and hearing health agenda. In the absence of NIHS in Samoa, a positive finding was that 72.2% of Samoan participants responded that parental suspicion of hearing loss should influence clinical opinion, which should lead to timely referrals to the ENT/Audiology Department for assessments. Our finding is similar to the results from the Nigerian study (68.2% medical students, 75.8% physicians).²³

Limitations of the Present Study

The study population size is smaller than that of the previous Nigerian and Mexican studies, however, it includes a high proportion of the current and future medical health professionals in Samoa. Although medical professionals who were not able to attend the national conference in person were offered the opportunity to participate, no questionnaires were submitted to the research team from these eligible participants.

The present study was modeled on the original study performed in Nigeria to enable comparison of results. Our study population has a high level of English literacy despite this being the second language of most participants, however, it is possible that the use of “double negative” statements may have caused some confusion. Should the study be repeated at a future time to evaluate for any changes in knowledge and attitudes to childhood hearing loss and hearing services in Samoa, the option of providing the statements in both English and Samoan will be considered.

Our sample size reflects the fact that the medical community and medical student body in Samoa is comparatively small. This fosters close relationships between professional members and students, and may have influenced the goodwill and positive responses in the present study.

Conclusions

An overwhelmingly positive attitude was found among current and future health professionals to addressing childhood hearing loss in Samoa. There was good knowledge regarding early detection and intervention, despite these services not being available as yet in Samoa. The present study identified knowledge of possible causes of childhood sensorineural hearing loss as focal topics for continuing professional development activities and university course curriculum.

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Author Contributions

AK: chief investigator, study design, data collection, data analysis, preparation of manuscript. SP: co-investigator, data collection, review draft manuscript. CD: co-investigator, data analysis, review draft manuscript. BP: data collection, review draft manuscript. FALS: data collection, review draft manuscript.

Declaration of Conflicting Interests

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