Original Research

Maternal knowledge and attitudes to childhood hearing loss and hearing services in the Pacific Islands: A cross-sectional survey protocol for urban and rural/remote Samoa

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ABSTRACT

Introduction: The successful implementation of ear and hearing health services for children depends on the support and engagement of primary caregivers. The World Health Organization (WHO) recommends childhood hearing screening programs for all member states to enable early detection and intervention for children with hearing loss. Ear and hearing specialists are limited in the Pacific Islands, a region with one of the highest global rates of ear disease and hearing loss. Given that a significant proportion of childhood hearing loss is preventable through public health measures, collaboration with health promotion activities is recommended to improve primary caregiver knowledge of avoidable ear and hearing disorders among infants and young children. Previous work has examined the knowledge and attitudes of parents in an urban Pacific Island setting, and this study will investigate for differences between urban and rural/remote Pacific Island populations.

Study design: Cross-sectional survey.

Methods: Questionnaire administered to mothers attending immunization clinics with their infants in urban (Apia) and rural/remote (Savai'i) Samoa. A 25-item questionnaire was formally translated from the original English into Samoan by an accredited translator in collaboration with an Ear, Nose and Throat registered nurse. It will be administered in a semi-structured interview style by a Health Promotion Officer in Samoan. The participating mothers are required to respond with ‘yes,’ ‘no,’ or ‘unsure.’ The questions assess knowledge of biomedical etiology of hearing impairment (9 questions), beliefs regarding non-biomedical etiology of hearing impairment (2 questions), knowledge of otitis media and its risk factors (5 questions), knowledge of hearing loss identification and intervention (4 questions), and attitudes towards hearing services for children (6 questions).

Results: Not applicable. Data to be collected.

Conclusion: We publish these protocols to facilitate similar studies in other Low- and Middle-Income Countries, and especially among our Pacific Island neighbours.

1. Introduction

The successful implementation of ear and hearing health services for children depends on the support and engagement of primary caregivers [1]. The World Health Organization (WHO) recommends childhood hearing screening programs for all member states, and reports that 90% of children living with disabling hearing loss are living in Low and Middle-Income Countries (LMICs) [2]. To ensure that emerging clinical programs and public health promotion activities are contextually relevant and culturally appropriate, an assessment of caregiver knowledge and attitudes to ear and hearing health is essential for the development of these services in LMICs.

The Pacific Islands have among the highest global rates of ear disease and hearing loss [3–6]. Although specialized ear and hearing health services are limited in the region [7,8], there is currently goodwill from key stakeholders to reduce the burden of preventable hearing loss, especially among children [9]. Collaborations between ear/hearing health professionals, health promotion officers, and public health services should make a positive contribution to reducing avoidable ear disease and hearing loss in the Pacific Islands.

A review of the literature found that caregiver support for childhood hearing health services in LMICs is overwhelmingly positive [10]. A
96% of parents supported infant hearing screening, and 99.3% supported school-based ear and hearing health examinations [11]. Similar findings are reported from studies in Nigeria [12], South Africa [13], India [14,15], and China [16]. Based on previous studies from LMICs [17,18], the Solomon Islander study also investigated knowledge of ear disease and its risk-factors, and found that 94% of parents were aware of otitis media as a causal factor for childhood hearing loss [11]. Only one study from Malaysia compared urban and remote populations, and found that although there was higher knowledge among urban mothers, there was no significant difference in positive attitudes to childhood hearing services [19].

The above studies also revealed that non-biomedical belief systems continue to feature in caregiver perceptions of hearing disability. The previously referenced study from the Solomon Islands reported that 56% of parents agreed that a curse may cause childhood hearing loss [11]. This has implications for any audiological management plan for a child identified with a permanent hearing loss. Anthropology studies found that multiple health belief models co-exist for health-seeking needs in the Pacific Islands, and it is possible for biomedically-based audiology services to work in collaboration with non-biomedical health service providers [20–22].

Samoa is a Polynesian nation of the Pacific Islands (Fig. 1). The Ear, Nose & Throat (ENT) Clinic of the Tupua Tamasese Meaole (TTM) Hospital in Samoa was established in 2018 under the leadership of General/ENT Surgeon (author SP), and is the only ENT Clinic in the country. Public health, development and research audiologist (author AK) joined the ENT Clinic team in 2019. This presented a unique opportunity to develop strategies aimed at reducing ear disease and hearing loss in Samoa. Given existing initiatives by health promotion officers for improving childhood health, a collaboration with the Health Promotion Division was developed to address preventable hearing loss in children.

The aim of the present study is to assess the knowledge and attitudes of mothers in urban and rural/remote Samoa regarding childhood hearing loss and hearing services. The results will guide the development of health promotion activities aimed at reducing preventable ear disease and hearing loss among children. The results will also provide baseline data for comparison with subsequent surveys, and enable the assessment of the effectiveness of health education and health promotion activities.

We hypothesize the following:

- Maternal knowledge in Samoa regarding causes of permanent hearing loss will be over 80%
- Maternal knowledge in Samoa regarding risk-factors for ear disease will be over 80%
- Maternal belief in Samoa regarding non-biomedical causes of hearing loss will be 50%
- Positive maternal attitudes in Samoa to ear and hearing health services will be above 80%
- No significant difference in maternal knowledge and attitudes to childhood hearing loss and hearing services will be found between urban and rural/remote Samoa
- No significant difference in urban maternal knowledge and attitudes to childhood hearing loss and hearing services will be found between Samoa and the Solomon Islands

2. Methods/design

2.1. Planning and preparation

2.1.1. Ethical approval

This study was approved by the Government of Samoa Ministry of Health Ethical Research Committee and the University of Queensland Medical Ethics Research Committee (Approval No. 2020000255).

The first author (AK) was Chief Investigator on the previously cited study in the Solomon Islands [11], which included a Procedures and Protocols Manual as online supplementary material with the research publication. Permission was granted by the Editor-in-Chief of the International Journal of Pediatric Otorhinolaryngology to publish this amended parts of the manual as a study protocol to facilitate similar studies in other LMICs, and especially among our Pacific Island neighbours.

2.1.2. Aim

The aim of the present study is to assess the current knowledge and attitudes of mothers in urban and rural/remote Samoa regarding childhood hearing loss and hearing services. The results will guide the development of health promotion activities aimed at reducing preventable ear disease and hearing loss among children. The results will also provide baseline data for comparison with subsequent surveys, and enable the assessment of the effectiveness of health education and health promotion activities.

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2.1.3. Personnel

The study will be led by the research audiologist (first author AK) and the head of ENT Clinic (SP). Two Health Promotion Officers will perform the data collection. Data analysis will be performed in collaboration with the Hearing Research Unit for Children at the University of Queensland (Australia) and includes consultation with a biostatistician (CD).

2.1.4. Design

The study will use a cross-sectional survey and convenience sampling design. This method was used in previous studies of this kind, and is a cost-effective method appropriate for this population [11–13].
Table 1
Maternal knowledge and attitudes to childhood hearing loss and hearing services study questionnaire.

| Question                                                                 | Yes | No | Unsure |
|--------------------------------------------------------------------------|-----|----|--------|
| 1. Babies can be born with HL*                                           |     |    |        |
| 2. High fever can cause HL                                               |     |    |        |
| 3. Measles can cause HL                                                  |     |    |        |
| 4. Maternal rubella can cause HL                                         |     |    |        |
| 5. Drugs/medication can cause HL                                         |     |    |        |
| 6. Jaundice can cause HL                                                 |     |    |        |
| 7. Delayed crying at birth can cause HL                                  |     |    |        |
| 8. Family history can cause HL                                           |     |    |        |
| 9. Noise exposure can cause HL                                           |     |    |        |
| 10. Evil spirits can cause HL                                            |     |    |        |
| 11. Cures can cause HL                                                   |     |    |        |
| 12. Ear discharge and OM** can cause HL                                  |     |    |        |
| 13. Recurrent flu can cause OM                                           |     |    |        |
| 14. Breast-feeding for first 6 months can reduce/prevent OM             |     |    |        |
| 15. Smoke (tobacco/woodfire) can predispose to OM                       |     |    |        |
| 16. Routine childhood immunisations can reduce OM                       |     |    |        |
| 17. HL can be identified soon after birth                                |     |    |        |
| 18. Speech/language problems can be a sign of HL                         |     |    |        |
| 19. Treatment for HL is available                                       |     |    |        |
| 20. Children with HL can attend school                                   |     |    |        |
| 21. I would like my baby tested soon after birth                         |     |    |        |
| 22. I would accept OAE hearing screening test for my baby                |     |    |        |
| 23. I would like my child tested at school                               |     |    |        |
| 24. I would let my child use hearing aids                                |     |    |        |
| 25. I would accept ear surgery for my child                              |     |    |        |
| 26. I would like more information                                        |     |    |        |

*HL—Hearing Loss; **OM—Otitis Media.

2.1.5. Setting
The study will be set at the routine immunization clinics of the TTM Hospital (urban, Apia) and the Malietoa Tanumafili II (MT II) Hospital (rural/remote, Savai’i).

2.1.6. Participants
The study population will consist of a representative sample of mothers attending routine immunization clinics at the TTM Hospital and the MT II Hospital with their infants. These clinics were chosen because they are the largest in the country and should, therefore, enable the best comparison between urban and rural/remote Samoan populations. All mothers over 18 years of age attending the clinics on the days of data collection will be eligible for the study.

The sample size will be 200 mothers: 100 mothers from Apia, and 100 mothers from Savai’i. The Health Promotion Officers will each interview 100 mothers: 50 mothers in Apia, and 50 mothers in Savai’i.

2.1.7. Assessment tool: questionnaire
The study questionnaire will be a Samoan translation of the questionnaire used in the Solomon Islander study [11]. The questionnaire was translated from the original English (Table 1) into Samoan by an accredited translator, and in collaboration with the ENT Clinic staff. The translation was reviewed by the Government of Samoa Health Research Ethics Committee and approved.

2.1.8. Training of health promotion officers in the administration of the questionnaire
The study questionnaire will be administered in a semi-structured interview style to the participants by the Health Promotion Officers in Samoa. Training in the administration of the questionnaire will be conducted by the team leader to ensure robust methodology.

2.1.9. Equipment and consumables
All requirements, as listed below, will be contained within a simple plastic folder for utilization by the research team:

- Information Sheet for Participants (English) – Maternal Knowledge and Attitudes to Childhood Hearing Loss and Hearing Services in Samoa
- Information Sheet for Participants (Samoan) – Maternal Knowledge and Attitudes to Childhood Hearing Loss and Hearing Services in Samoa
- Participant Consent Form (English) - Parental Knowledge and Attitudes to Childhood Hearing Loss and Hearing Services in Samoa
- Participant Consent Form (Samoan)- Parental Knowledge and Attitudes to Childhood Hearing Loss and Hearing Services in Samoa
- Questionnaire (English) - Parental Knowledge and Attitudes to Childhood Hearing Loss and Hearing Services in Samoa
- Questionnaire (Samoan) - Parental Knowledge and Attitudes to Childhood Hearing Loss and Hearing Services in Samoa
- Laminated Copy of Pictures of Children with Hearing Aids & Infants Undergoing Oto-Acoustic Emissions Screening
- Staff member business cards with contact details
- Pens

N.B. To reduce the cost of consumables, the Samoan version of the consent and questionnaire forms will be printed back-to-back on the same sheet of paper for use in the study (One English version of forms present for the benefit of team leader only). To further reduce the cost of consumables, a laminated copy of the Samoan version of the information sheet and 5 non-laminated copies only will be in the study folder (information sheets to be kept by individuals only if requested).

2.1.10. Quality control
The following measures will be implemented to ensure maximum quality control for the study:

- Health Promotion Officers will undergo training in the administration of the questionnaire to ensure consistency and reliability,
- Regular review with the team leader during the study period to enable any clarification of issues if/as they arise,
- Two Health Promotion Officers are involved in the administration of the questionnaire to prevent/minimize tester bias,
- Questionnaire form requires the identification and signature of the staff member administering the questionnaire,
- Team leader reviews all questionnaires, and gives feedback to Health Promotion Officers as required (e.g., Incomplete section(s) of questionnaire), and
- Team leader to give regular feedback to Health Promotion Officers on their performance (positive feedback, as well as suggestions for improvement), and provide refresher training as necessary.

2.2. Conducting the study
The recommended work flow on the days of data collection is summarized in Fig. 2.

2.2.1. Recruitment of participants
On the day(s) of data collection, an announcement will be made by one of the Health Promotion Officers to mothers attending the immunization clinic. The announcement will be made at the start of the day, and then at regular intervals throughout the day. The announcement will introduce the members of the research team, and then describe the aims of the project and the participant requirements. Attending mothers will then be invited to participate in the study.

Mothers willing to participate in the study will be shown to a private area that has been allocated for the project. They will be given more detailed information on the study (i.e., Information Sheet), and asked to sign the consent form (Name/Signature/Date) if they are still willing to participate.
2.2.2. Administration of questionnaire

2.2.2.1. Demographic information. The Health Promotion Officers will complete the demographic information on the questionnaire form as follows:

- Location of Assessment (Apia/Savai’i)
- Staff member initials
- Participant Age (in years)
- Circle level of school attainment as appropriate (none/primary school/secondary school/tertiary school)

2.2.2.2. Questionnaire. The questionnaire will be administered in a semi-structured interview style. The Health Promotion Officer will ask the questions in the order in which they appear on the questionnaire (i.e., Begin with Question 1, end with Question 26). The Health Promotion Officer may clarify the questions as required in the event of language or cultural barriers (e.g., “yellow skin” instead of “jaundice”).

The Health Promotion Officer will begin by explaining to the participant that they will be asked a series of questions relating to ear and hearing problems in infants and children. The participants will then be instructed to answer these questions with “yes,” “no,” or “not sure.” The Health Promotion Officer will record the participant’s response to each question on the questionnaire form.

2.3. Data handling and analysis

All data handling and analysis will be done by the team leader.

- All completed questionnaires will be given to the team leader by the Health Promotion Officers,
- The team leader will review all questionnaires to ensure all items are completed. Where information is missing, the team leader will consult the relevant staff member and, if appropriate, contact the participant,
- The team leader will assign a code-identifier to each participant. This will be entered on the top right-hand corner of the Consent forms, and
- The team leader will enter all data into the SPSS Statistical Package Software in a file titled “Maternal Knowledge and Attitudes to...”

Fig. 2. Maternal knowledge and attitudes to childhood hearing loss and hearing services in Samoa study work flow chart.
Table 2
Maternal knowledge and attitudes to childhood hearing loss and hearing services in Samoa: Coding strategy for data entry and analysis.

| Item             | Description                                      | Code |
|------------------|--------------------------------------------------|------|
| Participant ID   | Numeric code in order of participation           | 1, 2, etc. |
| Location         | Apia                                             | 1    |
|                  | Savai’i                                          | 2    |
| School attainment| None                                             | 1    |
|                  | Primary School                                   | 2    |
|                  | Secondary School                                 | 3    |
|                  | Tertiary School                                  | 4    |
| Yes/No/Unsure    | Yes                                              | 1    |
|                  | No                                               | 2    |
|                  | Unsure                                           | 3    |
| Interviewer ID   | Health Promotion Officer 1                        | 1    |
|                  | Health Promotion Officer 2                        | 2    |

Childhood Hearing Loss and Hearing Services in urban and rural/remote Samoa.” The coding strategy for data entry and analysis is provided in Table 2.

The team leader will descriptively analyze the data to provide the following information:

2.3.1. Demographic information
A descriptive analysis will be performed for the total number of participants, and number/proportion of mothers according to location and education attainment. The analysis will include age range (mean and standard deviation) for the total number of participants, as well as for each subgroup. If exact age of participants cannot be determined, the age of participants may be described in decade subgroups (i.e., 20–29 years, 30–39 years). Results will be presented in tabulated form using a cross-analysis (i.e., age subgroup x location).

2.3.2. Analysis of variables
For each item of the questionnaire, the number of participants answering “Yes,” “No,” or “Unsure” will be tallied. Chi-Squared Linear-By-Linear Association tests will be performed to investigate for any significant associations between response proportions (Yes/No/Unsure) and age groups, locations, and education levels, respectively. The same procedure will be applied to investigate for any significant associations between response proportions between urban mothers in Samoa and the Solomon Islands. The results will be presented in tabulated form, and any significant findings highlighted.

3. Results
Not applicable. Data to be collected.

4. Discussion
Not applicable. Data to be collected.

5. Conclusion
The results of this study will be prepared as a research paper for submission to a peer-reviewed journal. Similar studies have been published in the International Journal of Audiology and the International Journal of Pediatric Otorhinolaryngology. The published paper will be also be delivered to the Government of Samoa Ministry of Health, and include an action plan for health education and health promotion activities based on the results. The Health Promotion Officers will prepare a short media release about the study and the results. This will be done in collaboration with the Government of Samoa Ministry of Health to ensure information is appropriate and receives maximum population coverage. The aim of the media release is to initiate community awareness of ear and hearing health care, and to promote the launching of Ear and Hearing Health Promotion Activities.

We include the English versions of the Participant Information Sheet and Participant Consent Form as additional files with this publication to further facilitate similar studies of this kind, especially among our Pacific Island neighbours.

Declaration of competing interest
The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Thank you to the Editor-in-Chief of the International Journal of Pediatric Otorhinolaryngology (IJPO) for granting permission to publish amended parts of the manual previously published in IJPO for the original study in the Solomon Islands by author AK. Publication of the present study protocol should facilitate similar studies in other LMICs, especially among our Pacific Island neighbours.

List of abbreviations
- ENT Clinic: Ear, Nose & Throat Clinic
- LMICs: Low- and Middle-Income Countries
- TTM Hospital: Tupua Tamasese Meaole Hospital
- WHO: World Health Organization

Ethics approval and consent to participate
This study was approved by the Government of Samoa Ministry of Health Ethical Research Committee and the University of Queensland Medical Ethics Research Committee (Approval No. 2020000255). All participants will sign a consent form prior to data collection.

Consent for publication
Not applicable.

Availability of data and materials
All data generated or analyzed during this study will be included in the published article.

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Authors’ contributions
AK wrote the initial draft manuscript, and all authors provided feedback. AK performed revisions to the manuscript as appropriate, and all authors read and approved the final manuscript.

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