INTRODUCTION
The burden of disabling hearing impairment is thought to be greatest in the Asia Pacific, South Asia and sub-Saharan Africa[^1]. Of the 466 million people thought to have disabling hearing impairment in 2019, approximately 34 million were children[^2].

It is estimated that by 2050, one in every 10 people will have disabling hearing loss[^2]. Olusanya et al.[^3] in 2000 reported a prevalence of 13.9% among school entrants in South-West Nigeria. This finding was also similar to a study done by Lasisi et al.[^1] among children in a tertiary hospital in Ibadan which also reported a prevalence of 14%. Both studies revealed that respondents with hearing impairment had educationally significant hearing loss at presentation.

Deafness and hearing impairment do have profound effects on individuals, especially when commencing pre-lingually; and result in delayed development of speech, language and cognitive skills in children. Being hearing impaired does not only affect a child's academic performance, but can also influence his or her overall development and ability to succeed[^5,6]. At any age, disabling hearing impairment has a profound impact on interpersonal communication, psychosocial well-being, quality of life and economic independence and is also a high risk factor for visual problems[^7,8].

The high rate of ocular pathology in deaf individuals is related to the fact that the retina and cochlear have the same embryonic origin during the sixth and seventh weeks of intrauterine development[^9]. Some of the hereditary diseases causing both hearing and visual impairment include Usher's syndrome; which is a recognisable hereditary cause of profound deafness in children[^10] and congenital rubella syndrome[^11]. However, preventable diseases like measles and meningitis are also known causes of both deafness and visual impairment in West Africa[^12] probably due to...
to the poor state of health facilities and inadequate health personnel.

Unfortunately, the combination of hearing and visual impairment worsens the overall burden of the sensory impairment. Usually, when one sense organ is impaired, the other sense organs are recruited to compensate for the disability. Thus, hearing-impaired individuals generally compensate by making greater use of their vision than their normal hearing peers. Therefore, even a mild refractive error may reduce the visual cues available to the deaf-mute person.13,14

The utilization of eye care services among deaf and hearing impaired persons is imperative to the promotion of their ocular health as well as the early detection and treatment of ocular diseases in them. Previous studies on the utilization of care services among the hearing-impaired have reported varying rates. Onakpoya et al.15 found a utilisation rate of 29.5%, while Omolase et al.16 reported a higher utilisation rate of 72.5%; although the later study observed that students who had previously utilised eye care were prompted by ocular complaints.20

Information on the factors associated with utilisation and reasons for non-utilisation of eye care services by hearing-impaired persons would aid the development of polices for adequate planning and provision of comprehensive healthcare services for them. Therefore, the aim of this study was to determine the utilisation of eye care services and its associated factors among students attending schools for the hearing impaired in Oyo state Nigeria.

MATERIALS AND METHODS
This was a descriptive cross-sectional study conducted within schools providing formal education to the hearing-impaired individuals in Oyo State South-West Nigeria between February and March 2016. There are health care facilities in different parts of the state that offer eye-care services. These facilities spanning the 3 levels of health care include 3 tertiary hospitals, 4 missionary eye hospitals, general hospitals and primary healthcare centres.

A total of six schools are established for hearing-impaired individuals in Oyo state, and four of them were selected by simple random sampling technique (balloting). Proportional allocation was used to determine the number of students to be recruited in each of the selected schools. Within the schools, the students were selected from the class registers using systematic random sampling with probability proportion to size. After adjusting for non-response rate of 10%, a minimum sample size of 335 students was calculated.

Ethical approval was obtained from the Ethical Committee of the Oyo State Ministry of Health. Permission was also obtained from the State Ministry of Education and the principals of the various schools included in the study. In addition, written informed consent was obtained from the parents or guardian of each student. Each student was required to provide verbal consent before enrolment into the study. The study abided by the tenets of the declaration of Helsinki for studies on human subjects.

Information on socio-demographic characteristics of the students including history of previous ocular diseases as well as current or previous visual complaints, ocular and family history and eye care utilization was collected from all participants using an interviewer administered semi-structured questionnaire. Communication with the students was achieved with the assistance of their teachers using sign language.

Data collected was entered and analysed using the IBM SPSS software version 22. Summary statistics are presented using mean, standard deviation, frequency and tables. Tests of association between categorical socio-demographic variables and utilisation of eye care facilities were done using the Chi-square test. Multiple logistic regression was used to test which variables contributed to utilisation of eye care facilities. All hypotheses were tested at 5% level of significance.

RESULTS
A total of 335 students attending schools for the hearing impaired participated in the survey. They had a mean age of 17 ± 2.9 years with a range of 11-39 years, and 195 (58.2%) of them were males (Male to female ratio - 1.4:1). One hundred and forty-eight (44%) of them were aged 18 years and above. Other socio-demographic characteristics are shown in Table 1.

Ocular abnormalities identified in this study included refractive errors (56.1%), allergic conjunctivitis (2.4%), retinitis pigmentosa (0.9%), Wardenburg syndrome (0.6%) and corneal scar (0.3%). The details of the ocular abnormalities in the study population have been documented in a previous report17.

A total of 195 (58.2%) respondents had eye problems at the time of the study, while 191 (57%) reported that they had eye problems previously with 149 (44.5%) noticing a change in their vision (Table 2). Also, 75 (22.4%) respondents had visual symptoms that were causing difficulty with their routine daily activities. One hundred and forty-three (76.9%) of the respondents...
that did not have eye problems in the past or at the
time of the study said they felt a need for routine eye
check-up.

A total of 147 (43.9%) respondents had visited an
eye-care facility in the past, while the remaining students
who had never utilised eye-care services gave various
reasons (Table 3).

Ninety-four (43.9%) of the respondents who lived
with both parents had utilized eye care facilities
compared with 36 (58.1%) of those who lived with a
caregiver and 19 (32.2%) of those who lived with their
mothers alone (p=0.016). Among those who had eye
problems at the time of the study, 124 (63.6%) had
utilised eye care facilities; compared with 25 (17.9%)
among those who did not have eye problems
(p=<0.001). Also, among those who had eye problems
in the past, 137 (71.75%) had utilised eye care facilities;
compared with 3 (2.2%) among those who did not
have eye problems (p=<0.001). The associations
between the utilization of eye care facilities and socio-
demographic characteristics of the respondents are
shown in Table 4.

Table 1: Other socio-demographic characteristics of the respondents

| Variables                      | Frequency | Percentage (%) |
|--------------------------------|-----------|----------------|
| Who do you live with           |           |                |
| Both parents                   | 214       | 63.9           |
| Caregiver                      | 62        | 18.5           |
| Mother alone                   | 59        | 17.6           |
| Total                          | 335       | 100.0          |
| **Education- both parents**    |           |                |
| Secondary school               | 95        | 44.0           |
| Tertiary education             | 76        | 36.0           |
| Primary school                 | 24        | 11.2           |
| No formal education            | 14        | 6.5            |
| Others                         | 5         | 2.3            |
| Total                          | 214       | 100.0          |
| **Education-mother alone**     |           |                |
| Secondary school               | 31        | 52.5           |
| Tertiary education             | 17        | 28.8           |
| Primary                       | 7         | 11.9           |
| No formal education            | 4         | 6.8            |
| Total                          | 59        | 100.0          |
| **Education-caregiver**        |           |                |
| Secondary                      | 48        | 77.4           |
| Tertiary                       | 14        | 22.6           |
| Total                          | 62        | 100.0          |
| **Occupation-both parents**    |           |                |
| Civil servant                  | 83        | 38.8           |
| Trading                        | 60        | 28.0           |
| Farming                        | 35        | 16.4           |
| Others                         | 22        | 10.3           |
| Driver                         | 14        | 6.5            |
| Total                          | 214       | 100.0          |
| **Occupation-mother alone**    |           |                |
| Trading                        | 34        | 57.6           |
| Civil servant                  | 11        | 18.6           |
| Others                         | 10        | 17.0           |
| Farming                        | 4         | 6.8            |
| Total                          | 59        | 100.0          |
| **Occupation care giver**      |           |                |
| House matron*                  | 57        | 92.0           |
| Trading                        | 5         | 8.0            |
| Total                          | 62        | 100            |

*For students staying in the boarding house
Table 2: Ocular problems by respondents

| Variable         | What was the problem-past | What is the problem-present |
|------------------|---------------------------|----------------------------|
|                  | Number | Percentage (%) | Number | Percentage (%) |
| Vision problem   | 80     | 39.8           | 89     | 44             |
| Watering eyes    | 60     | 29.8           | 50     | 24.8           |
| Pain in the eyes | 49     | 24.4           | 60     | 29.7           |
| Eye injuries     | 7      | 3.5            | 0      | 0.0            |
| Others           | 5      | 2.5            | 3      | 1.5            |
| Total            | 201    | 100.0          | 202    | 100.0          |

Table 3: Reasons for non-utilisation of eye care services by respondents

| Variables                                         | Number | Percentage (%) |
|---------------------------------------------------|--------|----------------|
| If you have eye problem in the past/present, why did you not seek eye care |         |                |
| No money                                          | 32     | 17.0           |
| Nobody to follow me (No escort)                   | 93     | 49.5           |
| Did not think the problem was important enough     | 44     | 23.4           |
| Did not know where to go                          | 6      | 3.2            |
| Fear                                              | 2      | 1.1            |
| Was advised that orthodox medicine would not help | 1      | 0.5            |
| Far distance to an eye care center                | 1      | 0.5            |
| Total                                             | 188    | 100.0          |

Table 4: Association between utilization of eye care facilities and socio demographic characteristics of the respondents

| Variables | Did not utilize eye-care | Utilized eye-care | Total | X² (p<0.05) | p-value |
|-----------|--------------------------|-------------------|-------|-------------|---------|
|           | N           | %             | N     | %          | N       | %          |
| Age of respondents |<18 years 138 58.0 | 100 42.0 | 238 100.0 | 0.605 | 0.437 |
|           | At least 18 years 50 51.5 | 47 48.5 | 97 100.0 | 1.953 | 0.162 |
| Sex       | Male 102 52.3 | 93 47.7 | 195 100.0 | 8.261 | 0.016* |
|           | Female 84 60.0 | 56 40.0 | 140 100.0 | 1.953 | 0.162 |
| Who you live with | Both parents 120 56.1 | 94 43.9 | 214 100.0 | 8.261 | 0.016* |
|           | Mother alone 40 67.8 | 19 32.2 | 59 100.0 | 1.953 | 0.162 |
|           | Caregiver 26 41.9 | 36 58.1 | 62 100.0 | 1.953 | 0.162 |
| Education - Father | No formal 6 42.9 | 5 57.1 | 14 100.0 | 8.106 | 0.088 |
|           | Primary 8 33.3 | 16 66.7 | 24 100.0 | 1.953 | 0.162 |
|           | Secondary 58 58.0 | 42 42.0 | 100 100.0 | 1.953 | 0.162 |
|           | Tertiary 47 61.0 | 30 39.0 | 77 100.0 | 1.953 | 0.162 |
|           | Others 4 80.0 | 1 20.0 | 5 100.0 | 1.953 | 0.162 |
| Education - Mother | No formal 2 50.0 | 2 50.0 | 4 100.0 | 0.758 | 0.859 |
|           | Primary 5 62.5 | 3 37.5 | 8 100.0 | 1.953 | 0.162 |
|           | Secondary 19 70.4 | 4 29.6 | 23 100.0 | 1.953 | 0.162 |
|           | Tertiary 11 68.8 | 5 31.2 | 16 100.0 | 1.953 | 0.162 |
|           | Others 37 67.3 | 18 32.7 | 55 100.0 | 1.953 | 0.162 |
| Education - caregiver | Secondary 19 39.6 | 29 60.4 | 48 100.0 | 1.374 | 0.241 |
|           | Tertiary 7 58.3 | 5 41.7 | 12 100.0 | 1.374 | 0.241 |
| Have you had eye problem in the past | Yes 54 28.3 | 137 71.7 | 191 100.0 | 162.634 | <0.001* |
|           | No 131 97.8 | 3 2.2 | 134 100.0 | 1.953 | 0.162 |
|           | Not sure 1 10.0 | 9 90.0 | 10 100.0 | 1.953 | 0.162 |
| Do you have eye problem presently | Yes 71 36.4 | 124 63.6 | 195 100.0 | 69.018 | <0.001* |
|           | No 115 82.1 | 25 17.9 | 140 100.0 | 1.953 | 0.162 |
Those who lived with both parents were 2 times less likely to use eye care services compared with those who lived with their caregiver (95% confidence interval CI, 0.510 (0.211-1.231; p=0.156). Those living with their mothers were also 3.6 times less likely to use eye care services compared with those who lived with caregivers (95% CI, 0.279 (0.96-0.813; p=0.019). Male respondents were 1.6 times more likely to utilise eye care services compared with the female respondents (95% CI, 0.849-2.952; p= 0.149). After adjusting for other factors using logistic regression, ‘who the respondents live with’ and ‘history of eye problems’ were significantly associated with the utilization of eye care services. The predictors of utilization of eye care services are presented in Table 5.

**DISCUSSION**

Despite their predisposition to developing visual impairment as well as their need for optimum vision and routine eye check, the rate of utilisation of the available eye care services in the studied population was found to be low (43.9%). This correlates with reports from a similar study carried out by Onakpoya et al. who reported a low utilisation rate of 29.5%. However, Omolase et al. reported that 72.5% of students had utilised eye care services possibly due to greater awareness among their study population.

With the effect of visual impairment being directly linked with disabilities caused by incapacitating systemic conditions. The main reasons given for non-utilisation of eye care services (no escort, lack of funds, etc.) are a cause for concern in today’s world. Therefore, this emphasises the greater need for the provision of comprehensive eye care services for persons with these disabilities and encouraging regular eye check among them. All these can be established in relation to the universal health coverage scheme where no one should suffer financial hardship for assessing healthcare.

Factors that were found in this study to be significantly associated with eye care utilisation include history of eye problems and who they stay with. Students with ocular problems were found to have utilised eye care services more than those without any ocular problem. The direct association between having ocular complaints and utilisation of eye-care services by hearing-impaired students was also described by Omolase and Onakpoya in their studies. This reiterates the poor health seeking behaviour of the population, while also revealing that parents/caregivers of the students wait till the development of ocular complaints before attempting to utilise eye-care services. This attitude may predispose the hearing impaired to irreversible visual impairment or blindness. Also, students staying with caregivers were also found to have utilised eye-care services more than those who stay with their parents. This may be due to the neglect the children suffer from family members due to their disability, poor socio-economic status, inadequate health facilities and/or lack of awareness.

Low utilisation of eye care services among the hearing impaired may lead to an increase in the burden of ocular diseases and blindness with a consequential worsening of their ocular health status, interpersonal communication and overall quality of life. Therefore, there is a significant need for regular comprehensive ophthalmic assessment of every hearing-impaired child at the point of admission into schools as well as incorporating eye care services into the existing maternal and child services in order to incorporate those that are not in school. In achieving all these, no one should suffer financial hardship while assessing these health services.
CONCLUSION
This study has demonstrated that the rate of utilisation of eye care services among the studied population is low. Reasons that were given for not utilising eye care services included lack of an escort, eye problem being considered unimportant and financial constraints. It is essential for eye care providers, government at all levels, and other stakeholders to join efforts towards designing and implementing policies for sustainable eye care programmes which ensure access for all people while providing universal health coverage. Such efforts would optimise the uptake of eye health services by hearing-impaired individuals as well as their quality of life, while also adhering to the tenets of the International Disability Rights law.

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