PREVALENCE AND RISK FACTORS OF VOICE DISORDERS AMONG PRIMARY SCHOOL TEACHERS AND NON TEACHING STAFF IN NAIROBI

DR ALEX MALAMBO

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M.Med Otorhinolaryngology- Head and Neck Surgery Registrar

University of Nairobi

A Dissertation Submitted in Partial Fulfillment of the Requirements for the Award of the Degree of Master of Medicine in Otorhinolaryngology-Head & Neck Surgery (M. Med ORL-HNS) of the University of Nairobi.

DECLARATION

This is my original work. It has not been presented for a degree award at any other university

Signed…….. Date…….

Dr Alex Malambo, Bs.Ch.B, M.B.Ch.B (University of Zambia)

Postgraduate Student M.Med Otorhinolaryngology, Head and Neck Surgery

Registration Number H58/83088/2015

University of Nairobi

SUPERVISORS' APPROVAL

This dissertation has been submitted for examination with our approval as supervisors:

DR CATHERINE IRUNGU, MBChB, MMed (ENT)

CONSULTANT ENT, HEAD AND NECK SURGEON,

LECTURER DEPARTMENT OF SURGERY

UNIVERSITY OF NAIROBI

Signed……. Date…….

DR KABEU J. KAMAU. MBChB, MMed (ENT)

CONSULTANT ENT, HEAD AND NECK SURGEON DEPARTMENT OF ENT

KENTATTA NATIONAL HOSPITAL

Signed…… Date……

DEDICATION

I dedicate this study to my family especially my Wife Annie Hachiboola Malambo, my children Grace, Alex and Joshua. My appreciation goes to my wife for the spiritual and emotional encouragement and sacrifice for allowing me to be away from home while she took care of the family.

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APPROVAL BY THE DEPARTMENT

This dissertation has been presented at a dissertation seminar of the thematic unit of Otorhinolaryngology-Head & Neck Surgery, Department of Surgery and is hereby approved for submission.

Dr. Joyce Aswani

Thematic Unit of Otorhinolaryngology-Head and Neck Surgery

School of Medicine

University of Nairobi

Sign…….

Date…….

DECLARATION OF ORIGINALITY FORM

Name of Student: Dr. Alex Malambo

Registration Number: H58/83088/2015

College: Health Sciences

Faculty/School/Institution: School of Medicine

Department: Surgery

Course Name: Otorhinolaryngology, Head and Neck Surgery

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ABBREVIATIONS

ASHA	American Speech Language Hearing Association
ENT	Ear Nose and Throat
KNH	Kenyatta National Hospital
NACOSTI	National Commission for science, technology and innovation
SPSS	Statistical Package for Social Sciences
UoN	University of Nairobi
VHI	Voice Handicap Index

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ABSTRACT

Background: Teachers are part of a special group of voice users described as professional voice users. The profession requires the frequent use of the voice at an elevated volume for long hours. This makes teachers more prone to development of voice disorders or dysphonia. Voice disorders will lead to reduction in quality of life, decreased work performance, absent days from work and restrictions in social interactions and activities. Identification and treatment will reduce these negative outcomes.

Objective: To determine the prevalence of voice disorders and associated risk factors in primary school teachers and non-teaching staff in Nairobi.

Study Design: comparative cross sectional study

Study Setting: The study was carried out in 17 randomly selected public primary schools across Nairobi and the study population consisted of primary school teachers in active teaching and the non-teaching staff as a comparison.

Methodology: A total of 200 primary school teachers and 200 non-teaching staff were selected from the 17 primary schools. Multi stage random sampling using a ruffle to select the 17 primary schools and 12 teaching staff, 12 non-teaching staff from each school was done. The assessment tools used were a voice risk factor and voice handicap index. A voice disorder was defined as a voice that does not perform, work or sound as it usually does resulting in interference with work or communication.

Results: The prevalence of voice disorders was significantly higher in teachers as compared to the non-teaching staff, (24.5% Vs 3.5%), P<0.001, OR=8.9(95%CI:3.9-20). Voice disorders were more prevalent among female teachers. Upper respiratory tract infections (OR=2.58, 95%CI1.32-5.00) were a significant risk factor among teaching staff while allergies (OR=2.63, 95%CI1.44-4.77), stress (OR=2.66, 95%CL1.16-6.09) and chronic use of medications (OR=2.81, 95%CI1.00-4.74) were significant risk factors among non-teaching staff. Teachers had significant higher VHI scores as compared to non-teaching staff.

Conclusion/Recommendations: voice disorders among primary school teachers in Nairobi is high compared to non-teaching staff leading to significant levels of handicap. There is a greater need to educate and train these professional voice users on voice hygiene and care of their voice.

1.0. CHAPTER ONE: INTRODUCTION

1.1 Back ground

Teachers are part of a special group of voice users described as professional voice users. This is because they depend on their voice for employment or to earn a living (1). The profession requires the frequent use of the voice with an elevated volume for long hours. These factors therefore make teachers more prone to development of voice disorders, voice problems, or dysphonia compared to non-professional voice users(1, 2). The mechanism of development of voice disorders has been attributed to phonotrauma (3-5).

The frequent use of the voice with an elevated volume or tone for long hours can be compounded by factors such as, having large numbers of students in a class, increased number of classes to teach especially in public schools. Studies done show teachers have a higher propensity to develop voice problems compared to other professionals ranging from 11%-81%(1, 4, 5). Voice disorders will ultimately lead to negative outcomes in one's life such as reduced work performance, decrease in quality of life, absenteeism from work and restrictions in social interactions and activities (6, 7).

Phonotrauma due to prolonged voice use is the major risk factor to development of voice disorders. Apart from this, there are other risk factors which include; female gender, noise within the class or around causing the teacher to raise their voice, systemic illness, hormonal disturbances, gastro intestinal reflux, recurrent upper respiratory tract illness, stress, anxiety and psychological influence. Others include alcohol consumption, smoking and drinking caffeinated drinks(8).

1.2 Statement of the problem

Voice disorders in teachers can significantly have a negative impact on their performance, communication capacity and social aspect(8). These negative outcomes will lead to increased absenteeism from work, job losses and consequently financial burden ensues(3). Voice disorders prevalence among teachers is on the rise in developing countries. This may be due to an interplay of many factors which include; increased pupil to teacher ratio, large sizes of classes without the use of amplifying devices such as a microphone. With many schools located in densely populated and noisy environs, the surrounding noise demands the teacher to raise their voice to be heard.

Currently, in Kenya the discrepancy between pupil to teacher ratio is 41.5 in public school with a class size of 36 pupils, compared to 15.8 and class size of 16 pupils in private schools.(9). Other factors nonspecific to teachers as professional voice users are, high intake of caffeinated beverages like tea and coffee, alcohol and smoking which synergizes with the above. This therefore can result in higher voice disorders prevalence in this group compared to the general population. Like many other developing countries, Kenyan teachers do not receive any training or instructions on proper voice use or vocal hygiene programmes as part of their formal training which is a large omission in the training and therefore, ultimately prevention and treatment of voice disorder in a professional voice.

1.3 Significance of the study

Knowledge about the prevalence of voice disorders and its impact on these school teachers' quality of life and ultimately their performance at their work is of vital importance. This study will serve as a guide in formulating a deliberate policy concerned with providing training for proper voice use and voice hygiene as part of the curricula for teachers.

1.4 What are Voice disorders?

The voice without doubt is among the main important means of communication. There are two main ways of communication: verbal and nonverbal. The voice is the main means of verbal communication. It is the means through which humans do convey messages to their surroundings including their ideas, emotions and personality (10).

Voice disorders are conditions that alter the normal quality, pitch, loudness and duration of the voice thereby affecting speech production(11, 12). In other terms, a voice disorder describes an inappropriate voice for one's age, gender, geographical location and cultural background. An individual will be said to have a voice disorder if they complain about having an unusual voice that does not satisfy their daily personal expectations(11, 13). These Voice disorders can manifest in many ways as symptoms such as throat dryness, globus sensation , low pitched voice, voice weakness, throat pain, hoarseness of voice or vocal fatigue(14).

The voice can be altered by emotional status and the general health of an individual and therefore in the assessment of an individual with a voice disorder or problem, the entire body and psyche

should be considered. Any alterations to the interaction of the structures involved in production of voice will lead to a voice disorder(15).

Disorders of voice can be classified into three main types according to etiology namely organic voice disorders, functional voice disorders and psychogenic voice disorders (16). Organic disorders of voice occur due to a physical insult to the voice producing apparatus and voice misuse or abuse is among the common insults. They fall into two groups namely structural and neuromuscular organic voice disorders with examples of structural organic voice disorders being; vocal cord nodules, polyps, cysts, granulomas and malignancy(16). Neuromuscular voice disorders result due to an insult to the nervous system or pathway involved with voice production. The ultimate effect is paralysis or paresis of the muscles responsible with voice production. Examples include lesions to the recurrent laryngeal nerves, the vagus nerve itself or neurological disorders like Parkinson's disease and myasthenia gravis.

Functional voice disorders also known as muscle tension dysphonia are caused by poorly functioning muscles. The physical structure is normal but there is muscle tension because of improper use or straining of the voice causing muscle tension. The types describe the pattern of muscle tension. Examples include; hyperabduction, hyperadduction, anterior posterior constriction and pharyngeal constriction.

The last type of voice disorder is the psychogenic type in which the voice disorder is due to psychological status of the patient. There is neither structural reason nor muscle tension to the voice disorder. It is rare compared to the other two groups of voice disorders. Examples include conversion dysphonia and puberphonia.

Functional voice disorder is the main type of voice disorder found among professional voice users. Apart from teachers, other professionals classified as professional voice users include telephone operators, clergy, lawyers, public speakers, actors and singers. This special group of voice users develop functional voice disorders due to high demand on the voice causing phonotrauma and thus are most at risk.(17-19)

1.5 Anatomy of the larynx

The body itself is a vocal instrument and the larynx is the most sensitive part in production of sound. Laryngeal function efficiency is effected by groups of muscles of which some are intrinsic and others extrinsic to the larynx itself. These muscles function by adjusting the position and shape

of the larynx and the resonator. Ultimately the position and length of the vocal cords, the vibrators of the larynx is adjusted(15).

Hirano described the laminar nature of the human vocal fold in his "COVER-BODY" theory of vocal fold vibration of which the vocal cord is made up epithelium superficially, lamina propria intermedially and a muscle (vocalis) deeper to the above two(20). The lamina propria has three layers namely superficial (reinke's space), intermediate and deeper (vocal ligament) layer close to the vocalis(15). The deeper layer of lamina propria and the vocalis form the bulk of the vocal cord. According the "cover body" theory, the epithelium and the superficial layer of lamina propria form the COVER. While the intermediate and deeper layer form the transitional zone. The BODY is formed by the Vocalis muscles. The contrasting masses and physical properties of the vocal cord Cover and Body causes them to move at different rates as air passes between the vocal cords(15).

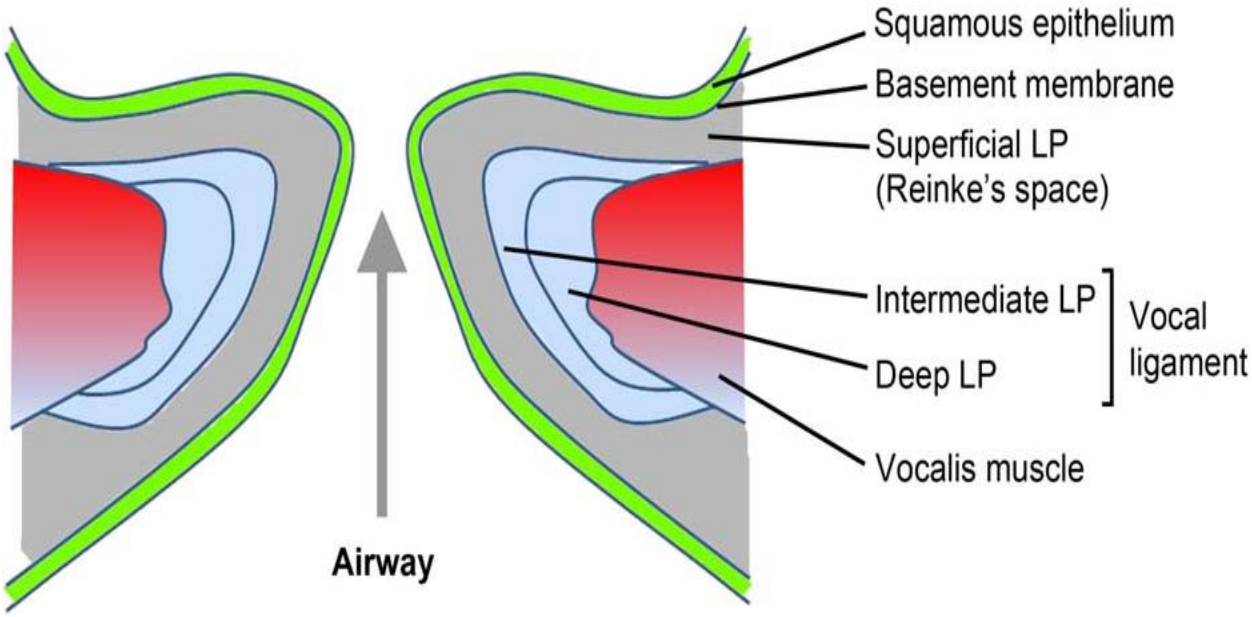

Fig. 1 Schematic diagram illustrating vocal cord microarchitecture.(21)

1.6 Voice production

The voice is produced by interactions among the respiratory, laryngeal and the resonance apparatus. The respiratory system comprises of the lungs, rib cage and its muscles of respiration while the laryngeal apparatus are mainly the larynx or voice box itself. The resonance system comprises of the pharynx, nasal cavity and its sinuses, oral cavity, teeth and lips.

Voice production or phonation all starts with a stream of air expired from the lungs during recoil of lung tissue and relaxation of the rib cage and its muscles of respiration. This stream of air is

forced against the nearly closed vocal cords. This results in decreased pressure and increased velocity of air at the glottis. The relative vacuum created forces the Covers of the two adjacent vocal cords to collapse on each other and hence closure occurs. However more air is being pushed through from the chest. This results in opening of the glottis from inferior to superior in that sequence. An alternating converging and diverging configuration occurs. This movement or vibrations will produce a sound buzz like in tone and presented to the resonator for modulation into audible speech or song. (15)

Voice misuse is described as phonation that is excessive in length or is produced in overly loud manner. This results in phonotrauma which is trauma or stress to the vocal cord specifically at basement membrane superficial lamina propria area(22). Functional voice disorder thus develops. Prolonged over use following phonotrauma will mostly lead to an organic voice disorder in which structural evidence such as a vocal nodule results.

1.7 Assessment of Voice disorders

Voice disorders are generally assessed via two methods; self reported voice problems by test subjects which is subjective and secondly clinical assessment mainly through using instruments this being more objective. However, each method has its own inherent deficits.

Self-reported voice problem is an evaluation done by an individual via **Patient scales**. These are self-administered validated questionnaires that assess patient's perception of their voice.

1.7.1 Patient Scales

Voice disorders can have different levels of limitation on individuals because we all have different expectations of our voices. Therefore, for a full evaluation of voice disorder, the patient's input on their voice perception plays an important role. This forms the beginning of evaluation as the patient has agreed about having or noticed changes from the usual.

Patient scales are questionnaires completed by the patients themselves. They measure the patient's satisfaction, quality of life, general health handicap due to change in their voice from the expected. The use of these self-reported questionnaire provides a practical and realistic estimate of the disease prevalence(23). These validated questionnaires vary in length, construction and what they assess. Two commonly used scales are the Voice Handicap Index (VHI) and voice related quality of life(15).

1.7.2 Voice Handicap Index (VHI)

Developed and validated by Jacobson B.H et al in 1997, the VHI is currently the gold standard subjective tool of evaluating voice disorders. It assesses the emotional, physical and functional handicap of the patient resulting from voice problems. It was originally written in English but has been translated in many languages. It consists of 30 statements that a patient rates on a 5-point scale. The total possible highest score is 120 and lowest 0. A score of 0-30 is mild, 31-60 moderate and 61-120 severe voice handicap(24).

1.7.3Voice risk factor questionnaire

It is a standardized questionnaire developed to evaluate voice disorders and study factors impacting voice quality. It consists of four voice quality impacting risk factor scales: 1. Voice using habits scales, 2. Environment factor scales, 3. Medical factor scale 4. Psychosocial factor scale as well as prevalence of voice disorders scale and demographic data. To determine the prevalence of voice disorders, the question "Does your voice not work or perform or sound as it should normally do so that it interferes with work" is used. A four-point scale answer from never, sometimes, often and always is provided.

The questionnaire has been developed from previous studies with modifications according to geographical locations (25-28). It was validated by Trinite B and Sokolovs J and has been used widely(29).

1.7.4 Clinical Assessment

The second method of evaluation of the voice is clinical, which is a more objective method. This evaluation is multifactorial in that the respiratory, laryngeal, resonance systems and the general wellbeing of the patient is evaluated. No one evaluation is definitive on its own rather a summation of all the vocal functions measures or evaluations.

These vocal function tests help the clinician know the status of the larynx (vocal cords), the severity and type of the voice disorder and plan management and treatment goals. Many methods of evaluation have been developed over the past years and the relevance of some of these to the patients' complaint is not often clear. The more commonly used measures in clinical practice can be broadly grouped in to the following (30);

Perceptual evaluation- This is an objective evaluation by the examiner. It includes auditory perception in which rating scales are used, visual perception in which inspection is done on the patient and tactile perception in which palpation is done.

Acoustic analysis- Acoustic analysis is objective evaluation of acoustic wave forms from the patient.

Electrolaryngography/electroglottography- This evaluation indirectly measures vocal cord vibrations.

Aerodynamic measures-This evaluation indirectly measures the forces that initiate and maintain vocal cord vibration

Videostroboscopy- This is a video assisted evaluation of the vibrations of the vocal cords

1.8 Treatment of voice disorders

A treatment plan for a voice disorder is made following the evaluation by a laryngologist and a speech therapist. Treatment options will depend on the patient's symptoms, vocal requirements and clinical findings. These options may include medical treatment, voice therapy and surgical treatment.

Voice therapy forms an important treatment option for many voice disorders. This is particularly true especially in functional voice disorders in which vocal misuse or abuse is the cause. Laryngologists recommend voice therapy as first line treatment for this type of voice disorder. Voice therapy includes patient education in which they are taught how the voice works, how it can be injured and how to take care of it. Vocal hygiene programme is then initiated in which the patient is taught about adequate oral rehydration coupled with adequate voice rest. In addition to this, special vocal exercises and respiratory exercises are taught.

Medical treatment will depend on the type of voice disorder the patient has. Drugs are given to treat the voice disorder. For example, anti-reflux drugs are given in voice disorders due to laryngeal reflux disease and botulinum toxin is given in spasmodic dysphonia.

Lastly but not the least, Surgery is another option. This includes phonomicrosurgery on vocal cords to remove lesions or surgery on the laryngeal framework itself to improve vocal fold closure and hence improve vocal cord vibration.

2.0 CHAPTER TWO: LITERATURE REVIEW

Several studies have been done to find out the prevalence of voice disorders and associated risk factors(31) more especially in the developed countries compared to the developing countries. Few documented studies have been done in Africa and none in Kenya.

Studies have shown prevalence rates ranging between 11-81%. (4, 5, 7, 32, 33)A Meta-analysis done by Cutiva et al attributes the wide range difference to differences in study populations and different assessment tools used. (34)

A cross sectional study done in Nigeria by Akinbode et al (35) on primary school teachers comparing teaching staff and non-teaching staff showed a prevalence rate of 42% and 18% respectively. A self-administered questionnaire was used and voice disorder defined as presence of at least one of the four following symptoms; hoarseness, repetitive throat clearing, tired voice or straining to speak. The associated risk factors in developing voice disorders found to be statistically significant were regular caffeinated drink intake, recurrent upper respiratory tract infections and raising voice when teaching.

Bolbol S et al (36) in Egypt conducted a comparative cross-sectional study on school teachers from elementary to high school and non-teaching professionals. The study investigated the VHI score differences between the two groups, teachers' knowledge on vocal care and effect of treatment and lastly investigated for the vocal cord lesions using video laryngostroboscopy in those found with a voice disorder according to their criteria. Unlike Akinbode, Bolbol used the original VHI self-administered questionnaire with a score of >30 as a reference for voice disorder and found prevalence of 19.9% in teachers compared to 10% in non-teachers. The use of raised voice when teaching, increased number of classes and increased number of years in teaching profession were found to be associated with development of voice disorders while Smoking and caffeinated drinks were statistically insignificant.

Devadas et al(31) conducted a study in the primary school teachers of Mysore District of Karnataka state in India to determine prevalence rates and potential risk factors associated with voice disorders. He found a prevalence of 17.4%. Similar to Akinbode operation definition of voice disorder, a teacher was considered to have a voice disorder if at all at any time their voice could not sound, perform as it normally does so that their ability to communicate was disturbed. Similar

to Bolbol study, use of raised voice due to background noise where found to be other risk factors. Others include thyroid problems, acid reflux symptoms and upper respiratory tract illnesses. Smoking, alcohol intake and caffeinated drinks were not found risk factors.

In Mangalore district Karnataka state India, Arati et al(37) did a cross sectional study to determine associated risk factors in development of voice disorders and its effect on the quality of life of school teachers. He found out that 81% had a voice disorder at least once in their profession. The association of upper respiratory tract infections and gastro reflux symptoms was found statistically significant similar to Devadas et al. A voice risk factor self-administered questionnaire was used with prevalence determined by an "often" frequency of occurrence of symptoms. A four-point scale from never, sometimes, often and always was used.

In a study by Charn et al(23) in Singapore to evaluate voice problems prevalence amongst teachers and risk factors associated, unlike many other studies he divided prevalence into three; point prevalence 13.1%, past year prevalence 25.4% and career prevalence 32.1%. This was by patient stating to have difficulties with their voice at the time of contact, two to three episodes in 12 months and two or more episodes yearly in their teaching career respectively. Allergic rhinitis and reflux symptoms were found to be risk factor to development of voice disorders.

In 2008 in Taipei city Taiwan, Sheng et al(25) conducted a study studies to investigate risk factors associated with voice disorders in teachers with voice problems compared to teachers without voice problems, and also to assess voice disorders effect on daily life. The study found a prevalence of 50.4% among teachers. The use of a loud voice when teaching was found to be the main risk resulting in voice disorders in the voice disorder group of teachers. A self-administered questionnaire was used.

A cross sectional study done by Lee et al(38) in Hong Kong China primary school teachers found a prevalence rate of 69.9%. Like Devada et al, voice disorder was considered as any time the voice does not work, perform or sound as it usually does interfering with communication. Associated risk factors found included alcohol consumption, laryngitis and asthma.(31)

Baiba et al(39) did a similar study to Sheng et al in Liepaja city in Latvia in which the goal was to evaluate voice disorders prevalence and their risk factors in a Latvian teacher population. The prevalence was found to be at 82% and the risk factors included upper respiratory tract infections.

The study had a voice disorder group and non-voice disorder group based on a ‘yes’ response from the voice disorder risk self-administered questionnaire. Similar to other studies, a disorder of the voice was considered as a voice not working or sound abnormal at any time(28, 31, 38). VHI lativan translated showed high scores among teachers with voice disorders compared to those with no voice disorders.

In the United States, Roy et al(5) did a cross sectional study in the states of Iowa and Utah to find out the voice disorders prevalence in teachers compared to the general public. There was 11% and 6.2% prevalence respectfully. A voice risk factor questionnaire was administered via telephone unlike in other studies. He also found that longer duration of a teaching career, being female and older age were associated risk factors in developing voice problems.

3.0 CHAPTER THREE: METHODOLOGY OF THE STUDY

3.1 Research Questions

What is the prevalence and risk factors of voice disorders among primary school teachers in Nairobi in comparison to the general population represented by non-teaching staff?

3.2 Aims and Objectives of the study

3.2.1 Broad Objective

To determine the prevalence and risk factors for voice disorders among primary school teachers and non-teaching staff in Nairobi.

3.2.2 Specific Objectives

1. To determine the prevalence of voice disorders in primary school teachers compared to non-teaching staff in Nairobi.
2. To determine the risk factors associated with voice disorders in primary school teachers compared to non-teaching staff in Nairobi.
3. To determine the level of voice handicap due to voice disorders in primary school teachers compared to non-teaching staff.

3.3 Design of the study

This study was a Comparative cross sectional study. The Teaching staff at risk of voice misuse or abuse being professional voice users were compared to the non-professional voice users in this case non-teaching staff.

3.4 Study Area

The study was conducted at randomly selected primary schools across Nairobi.

3.5 Study population

The study population comprised of 200 primary school teachers and 200 non-teaching staff randomly selected across public schools in Nairobi.

3.6 Inclusion Criteria

1. All teachers who were in active teaching and gave consent
2. All non-teaching staff who gave consent

3.7 Exclusion Criteria

All teachers in administrative duties and all those not in active teaching

3.8 Sampling Procedure and Sample size determination

3.8.1 Sample Size determination

Sample size calculation for comparison between two groups(40) ;

n = Desired sample size

$\boldsymbol{Z_{\frac{\alpha}{2}}}$ = value from standard normal distribution corresponding to desired confidence level (Z=1.96 for 95% CI)

$\boldsymbol{Z_{\beta}}$= 0.842 (From Z table) at 80% power

$$\boldsymbol{n = \frac{2\left(Z_{\frac{\alpha}{2}} + Z_{\beta}\right)^2 P(1-P)}{(P_1 - P_2)^2}}$$

$\boldsymbol{P_1}$ $\boldsymbol{and}$ $\boldsymbol{P_2}$ = expected true proportions (estimated at 19.9% for teachers and 10.0% for non-teaching staff, from a study done by Bolbol S. et al (29) on disorders of voice in Egyptian school teachers from elementary to high school.)

$\boldsymbol{P_1 - P_2}$ = Difference in proportion of events in two groups

$\boldsymbol{P}$ = Pooled prevalence = (Prevalence in group $\boldsymbol{P_1}$+ Prevalence in group $\boldsymbol{P_2}$) / 2 = (0.199 + 0.100) /2 = 0.15

$$\boldsymbol{n = \frac{2(1.96 + 0.842)^2 \, x \, 0.15(1-0.15)}{(0.199 - 0.100)^2} = 200}$$

Teaching staff required is 200 and non-teaching 200

Estimated study population from ministry of education science and technology 5,044 teachers in public schools (39)

3.8.2 Sampling Method

There are 205 public primary schools in Nairobi County. A multistage stratified random sampling technique was done to obtain a representative sample from a sampling frame of the 205 primary schools list from the Nairobi City County Education Department. In the first stage, the schools were divided into the 17 zones of Nairobi County(subcounties). In the second stage, 1 school from within each zone was randomly selected. The random selection was done through a ruffle where all the names of schools in each zone was written on a piece of paper and put in a box. A ruffle was done and one school picked. After selection of the schools, the final stage involved choosing 12 teachers and 12 non-teaching staff (i.e. equal proportions from 201 teachers divided by 17 primary schools) from each of the schools randomly. This was done by writing all the names of the teaching staff on piece of paper and put in a box. A ruffle was then done and 12 names picked. The same process of selection was applied when selecting nonteaching staff. For those that did not give consent among the 12, new names were picked via same process to replace them.

3.9 Recruitment and Consent

After the random selection of the 17 schools, the researcher and the research assistant proceeded to each of the selected schools. The principal of the school or the headmaster was approached, and the purpose of the study explained. The documents of approval for the study from the KNH/UON ETHICS AND RESEARCH COMMITTEE, permission from the Department of Surgery through the UON, permission from the National Commission for science, technology and innovation(NACOSTI), Ministry of Education Nairobi county and ministry of education subcounty offices were then presented.

Lists of both teaching staff and non-teaching staff were then requested and random selection done as described in the sampling method. The selected participants were approached and the study and the purpose explained. Both the teaching staff and non-teaching staff participants who met the criteria and had been selected through the random selection process were asked for consent and recruited. Those who did not consent were excluded and new participants selected for both groups

3.10 Data Collection procedure

The principal investigator and a research assistant carried out the study. Two self-administered questionnaires were given to fill in after obtaining consent. For the teaching staff group the voice risk factor (for teachers: Appendix iv) specific for teachers was given first and then followed by

the VHI questionnaire (Appendix vi) in that order with the VHI only to participants who respond to presence of a voice problem. The non-teaching staff were also given the voice risk factor questionnaire (for non-teaching staff: Appendix v) to fill followed by the VHI questionnaire like wise. The voice risk factor for non-teaching staff excludes sections specific with teaching information .ie section D and F. For the purpose of the study, voice disorder was defined as any time the voice does not work or perform or sound as it should normally do so that it interferes with work or communication (5). A "yes" to the question was used to calculate prevalence.

3.11 Quality Assurance

The principal investigator and one research assistant provided the questionnaires to participants and ensuring researcher availability during completion of questionnaire and checked for completeness and accuracy. Participants were assured of anonymity.

3.12 Data Management and Analysis

Data was entered and analysed by use of Statistical Package for Social Sciences ver. 21 (IBM, Inc., Austin, TX) software. Continuous data was summarised and presented as means with standard deviations, as well as medians and interquartile ranges where applicable, while the categorical data was analysed by use of frequencies and proportions. Univariate and Bivariate analysis was done using Pearson Chi-square to compare the teachers with and without voice problems and also the non-teaching staff, while multivariate analysis was done using multiple logistic regression to evaluate the association between the reported voice problems and the risk factors. Odds Ratio as well as 95% confidence interval were calculated. A P value of <0.05 was considered significant. The Voice handicap index was correlated with the two study arms by use of one way analysis or variance (ANOVA).

3.13 Ethical Considerations

The study was carried out after approval by the KNH/UON ETHICS AND RESEARCH COMMITTEE, Department of Surgery through the UON, National Commission for science, technology and innovation(NACOSTI), Ministry of Education Nairobi county and ministry of education subcounty offices. Recruitment was done after consent. The participants received full disclosure of the nature of the study and were informed that participation was voluntary and they had the right to accept, refuse or withdraw from participation without any penalty. They were also informed of the possible benefits of the study being referral for treatment for those found with a

voice problem. Participants' privacy was maintained by ensuring that they are not exposed to the public when filling in the questionnaire. No single cost was incurred by the patient. The researcher ensured the anonymity of participants by concealing their identity and kept the research data confidential and all the questionnaires locked in a file cabinet and secured. The raw data was coded and backed up for further study. These results will be published in scientific journals and presented in medical conferences, regular print and electronic media where necessary for the benefit of the lay public. The study population were given their results and those found to have voice problems were referred to Kenyatta national hospital ENT department for further evaluation and treatment or nearest hospitals at the participant's convenience. There were no conflicts of interest or otherwise in this study by the principal investigator, supervisors and the hospital.

4.0 CHAPTER FOUR: RESULTS

4.1.0 Socio-demographic Characteristics of the Participants

This section presents the socio-demographic characteristics of the participants. The variables include sex and age.

4.1.1 Distribution of Participants by Gender

A total of 400 participants were drawn for the study with 200 teachers and 200 non- teaching staff. Males constituted a larger proportion of the study 211(52.8%) compared to females 191(47.2%) as shown in the figure 2 below.

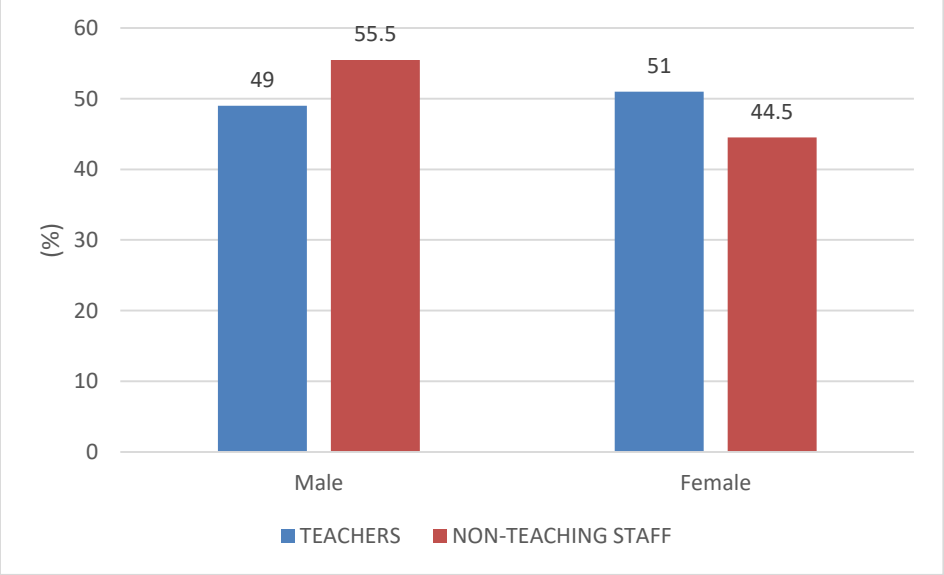

Figure 2. Figure shows Gender distribution for both Teaching staff and non-teaching staff.

4.1.2 Distribution of the Participants by Age

The age range for the teachers spanned from 23 to 58 years with a mean age of 37.9 and standard deviation of 8.6. While the age range for the non-teachers was from 21 to 63 years, a mean age of 33.4 years and a standard deviation of 8.2.

The study participants were further grouped into the following age brackets; 20-30 years, 31-40 years, 41-50 years, 51-60 years and above 61 years as shown in **figure 3 below.** The 31-40 years age bracket had the highest study participants for both the teaching staff and the non-teaching staff

at 37.5% and 43.5% respectively. The above 60 category had no study participants unlike for the teachers' group.

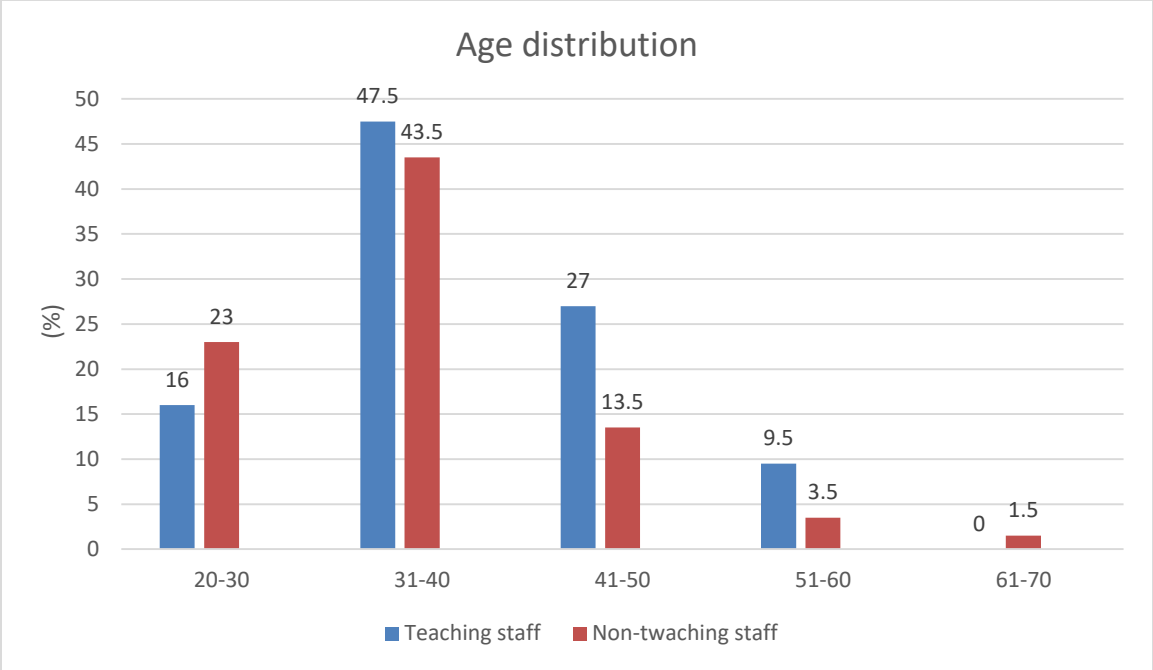

Figure 3. Age category distribution for teaching staff and non-teaching staff

4.2.0 Prevalence of the Voice disorders

Using the operational definition as described in the methodology, 49 of the 200 teachers gave a "yes" response compared to 7 of the 200 non-teaching staff giving a prevalence rate of 24.5% and 3.5% respectively. Voice disorders were significantly higher among teachers compared to Non-teaching staff with a P-value **<0.001** as **Table 1** shows.

Table 1. Prevalence of voice disorders in teachers and non-teachers

Category	Prevalence	P-value, OR, CI
Teachers	49(24.5%)	**P<0.001, OR=8.9(95%CI:3.9-20%)**
Non- teachers	7(3.5%)	

The majority of the teaching staff 32 of the 49 (65.3%) responded that "sometimes" their voice could not work or perform or sound as it should normally do such that it interfered with work or

communication. For the non-teaching staff, all gave a "sometimes" response. Figure 4 below shows the results.

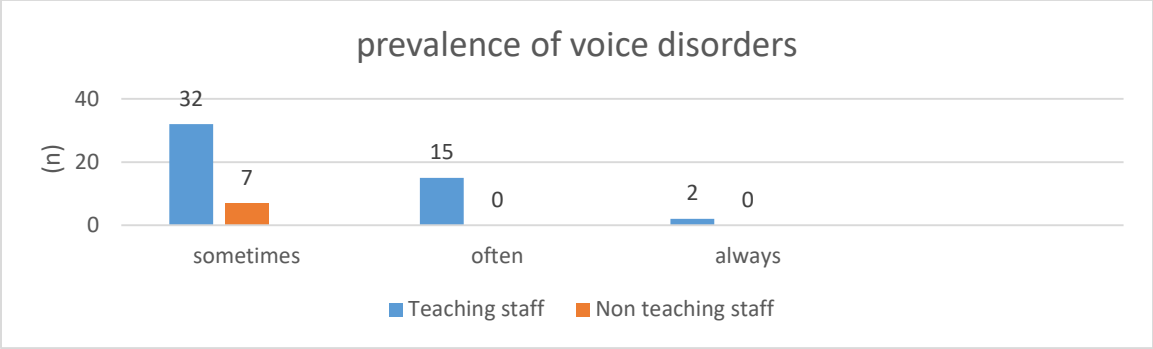

Figure 4 shows how often the voice is interfered with for those who responded with a "yes"

4.3.0 Association of Voice Disorders and Gender

There was no significant difference in the prevalence of voice disorders between sexes for Teaching staff and Non-teaching staff combined 28(14.7%) for females and 28(13.3%) for males, χ^2=0.13, P=0.77, OR=1.09(95%CI:0.67-1.77). However, specific to the teachers, voice disorders were more prevalent among female teachers than male teachers, 26(25.5.0%) vs 23(23.5%). This relationship was however not statistically significant, P=0.75, χ^2=0.11, OR=1.09 (95% CI:0.67-1.77). The non-teaching staff unlike the teaching staff had a predominance of males with voice disorders at n=5(4.5%) compared to females at n=2(2.2%). P =0.47, χ^2=0.75, OR=2.05(95% CI 0.39-10.84).

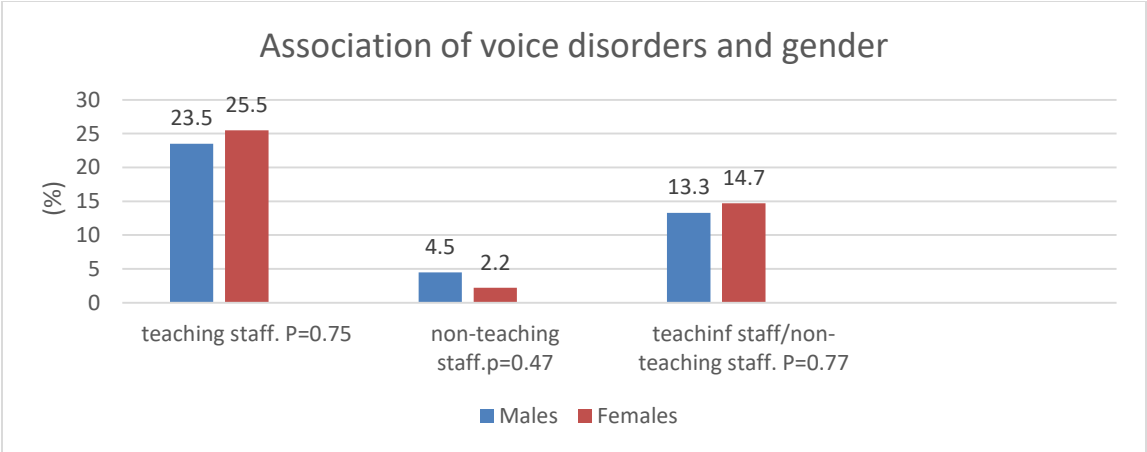

Figure 5. shows gender distribution of both teaching staff and non-teaching staff with voice disorders

4.4.0 Risk Factors associated with Voice Disorders

This section shows the findings on the risk factors associated with the Voice disorders. The first part shows the results of the Living Habits and Health conditions risk factors associated with Voice disorders for both the Teachers and Non-teachers. The latter section gives the teaching characteristics risk factors results purely concerned with the Teachers only.

4.4.1 Living habits and Health Conditions Risk factors associated with Voice Disorders

The association of the presence of a voice disorder and known risk factors was assessed using the chi square test. This was done for both the Teachers **Table 2** and the Non-teachers **Table 3**. Smoking, alcohol, caffeinated and carbonated drinks and use of medications for chronic illness are known living habits risk factors while upper respiratory tract infections (URTI), allergies, Gastroesophageal reflux disease, hormonal disturbance illnesses and stress are health condition risk factors.

Table 2. Risk factors for voice disorders among teachers

Risk factor		**Prevalence of Risk factor n(%)**	χ^2	**P-value**	**OR**	**95%CI**
Smoking	Yes	1(50%)	0.71	0.43	3.12	0.19-50.9
	No	48(24.2%)				
Alcohol	Yes	5(27.8)	0.12	0.78	1.21	0.41-3.57
	No	44(24.2)				
Caffeine drinks	Yes	39(28.5)	3.70	0.08	2.11	0.98-4.56
	No	10(15.9)				
Medication use	Yes	7(31.8)	0.72	0.43	1.51	0.58-3.95
	No	42(23.6)				
URTI	Yes	24(36.9)	8.03	**0.005**	2.58	1.32-5.00
	No	25(18.5)				
Nasal Allergies	Yes	17(34.0)	3.25	0.09	1.90	0.94-3.84
	No	32(21.3)				
GERD	Yes	3(37.5)	0.75	0.41	1.89	0.43-8.22
	No	46(24.1)				
HORMONAL	Yes	1(20.0)				
	No	47(24.4)	0.05	1.00	0.77	0.09-7.12
STRESS	Yes	7(30.4)				
	No	42(23.9)	0.47	0.61	1.40	0.54-3.62

Consumption of caffeinated drinks and sodas, upper respiratory tract infections and allergies in that order were reported to have high prevalence according to the responses. However, the only statistically significant risk factor was URTI (P=0.005, OR=2.58, 95%CL 1.32-5.00). Compared with the non-teachers, risk factors that where statistically significant included chronic use of medications (antihistamines, diuretics and angiotensin-converting enzyme inhibitors) with (P=0.02, OR=8.20, 95%CI1.69-39.9), nasal allergies (P=0.004, OR=11.29, 95%CI2.10-60.57) and work/social related stress (P=0.03, OR=10.57, 95%CI 1.74-64.28) as shown in **table 3** below.

Table 3. R**isk factors for voice disorders in Non-teachers**

Risk factor		**Prevalence of risk factor**	χ^2	**P-value**	**OR**	**95%CI**
Smoking	Yes	1(4)	0.02	1.00	1.17	0.14-10.4
	No	6(3.4)				
Alcohol	Yes	1(2.2)	0.31	0.69	0.55	0.06-4.7
	No	3(6.9)				
Caffeine	Yes	7(4.4)	1.87	0.35	-------	----------
	No	0(0.0)				
Medication use	Yes	3(15.8)	9.25	**0.02**	8.20	1.69-39.90
	No	4(2.2)				
URTI	Yes	5(7.0)	4.09	0.06	4.81	0.91-25.5
	No	2(1.6)				
Allergies	Yes	5(12.5)	11.99	**0.004**	11.29	2.10-60.57
	No	2(1.3)				
GERD	Yes	1(16.7)	3.15	0.20	6.23	0.63-61.9
	No	6(3.1)				
HORMONAL	Yes	1(12.5)	1.97	0.25	4.38	0.46-41.46
	No	6(3.2)				
STRESS	Yes	2(22.2)	9.72	**0.03**	10.57	1.74-64.28
	No	5(2.6)				

Tests of independence and logistic regression analyses

Chronic use of medications, upper respiratory tract infections, allergies and stress were found to be statistically significant risk factors to development of voice disorders following the chi-square tests. To determine if each risk factor was independent in development of a voice disorder, the four risk factors found in teaching and non-teaching staff (general population) were analyzed using logistic regression. The results show that none of these variables were **independent risk factors** for the causation of voice disorders in the study population. The adjusted odds ratio (AOR) were all within the 95%CI ranges respectively.

Table 4. Logistic regression for the significant risk factors in teaching staff and non-teaching staff

Risk Factors	**P-value**	**Adjusted odds ratio (AOR)**	**95% C.I. for AOR**	
			Lower	**Upper**
MEDICATION	0.06	0.468	0.209	1.046
URTI	0.14	0.609	0.315	1.177
ALLERGIES	0.07	0.531	0.270	1.045
STRESS	0.18	0.539	0.219	1.327

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4.4.2 Teaching characteristics as risk factors

Teaching characteristics were also assessed as they are also risk factors in developing voice disorders. These included number of years taught, the grade/class taught, how loud the voice is during teaching and lastly if any voice amplifier is used during teaching (**Table 5).**

The number of years taught were categorized into less than 5 years, 6-10 years, 11-20 years and more than 20 years. The 6-10 years teaching category had the highest number of teachers 23of the 49 (46.9%) who presented with a voice disorder. This represented 27.7% of the total number of teachers both with and without a voice disorder in this category. However, the association of years taught and presence of a voice disorder was statistically insignificant (P=0.13).

Grades taught where divided into three categories i.e Class 1-3, class 3-6 and 7-8. The 3-6 grade category had the highest number of teachers presenting with voice problems at 31(63.3%) out of

the total 49. This represented 29% of both teachers with voice disorders and those with non. However, the association between the grade taught and the presence of a voice disorder was statistically insignificant at P=0.3.

The level of loudness is a known risk factor in development of a voice disorder. Teachers were asked to subjectively score the level of voice loudness they usually use in class. It was graded as small, medium or large. Of the total 49 teachers with a voice disorder, 34(69.4%) reported medium level of voice loudness during class. However, it was not statistically significant at P=0.16. No teacher reported the use of voice amplifiers when teaching.

Table 5. **Teaching characteristics as voice disorder risk factor**

Teaching characteristic risk	**Category**	**Prevalence of the characteristic risk**	**P-value**
Years taught	≤5yrs	6(13.6%)	**0.13**
	6-10yrs	23(27.7)	
	11-20yrs	11(22.9)	
	>20yrs	9(37.5)	
Grade taught	1-3	8(18.2)	**0.30**
	3-6	31(29.0)	
	7-9	12(20.0)	
	Small	3(10.3)	
Voice loudness	Medium	34(26.8)	**0.16**
	Large	12(27.3)	
Voice amplifiers in class		0.00	--

4.5 Voice related symptoms amongst Teachers and Non-teachers

The teachers and the Non-teachers who reported to have a voice disorder were asked to report the symptoms that they had experienced as a symptom of a voice disorder. The seven symptoms shown in **Table 6** below were common among the two groups. The commonest symptom amongst teachers was throat discomfort (93.8%). Non-teachers also had throat discomfort as the commonest symptom together with hoarseness of voice at (85.7%). However, none of these symptoms comparing the two groups were statistically significant as shown by the P values.

Table 6. Voice symptoms amongst Teachers and Non-teachers who reported voice disorders

Symptom	**Teachers N=49(%)**	**Non-teaching staff N (%)**	**P-value**
HOV	44(89.8%)	6(85.7%)	1.00
Breathiness	11(22.4)	1(14.3)	1.00
Tired voice	22(44.9)	3(42.9)	1.00
Weak voice	10(20.4)	4(57.1)	0.06
Low speaking voice	13(26.5)	2(28.6)	1.00
Straining	30(61.2)	3(42.9)	0.43
Throat discomfort	46(93.8)	6(85.7)	0.34

4.6.0 Effects of Voice Disorders

The effects of the voice disorders were assessed for both the teachers and non-teachers using the validated Voice Handicap questionnaire. The assessment sort to find out ways how teachers specifically were adjusting to teaching in view of voice problem and if they had sought any professional help.

4.6.1 Voice Handicap index scores in Teachers and Non teachers.

The voice handicap index scores were divided into three categories: VHI (0-30) mild, VHI (31-60) moderate and VHI (61-120) severe handicap. The majority of the teaching staff (58%) had a moderate score unlike the non-teaching staff whose majority (71.4%) had a mild score. No one gave a severe score for the non-teaching staff as shown in Table 9 below. Though the VHI scores were higher among teachers, the difference was statistically insignificant with a P value of 0.14.

Table 7. Voice handicap scores comparing teachers and Non-teachers

VHI category	Teaching staff VHI scores	Non-Teaching staff VHI scores	P value
VHI≤30 (mild)	16(30.8%)	5(71.4%)	
VHI 31-60 (moderate)	30(57.7)	2(28.6)	**0.14**
VHI 61-120 (severe)	6(11.5)	0(0.)	

4.6.2 Ways of Adapting to voice disorders

The teachers indicated the various ways of adjusting to cope with voice disorder while continuing to teach. Of the 49 teachers who had a voice disorder n=26(53.1%) reported to have adjusted in the ways they teach while 46.9% reported not to have adjusted (**Table 8)**. Many of them chose to talk less in class (18%), or change teaching methods (16.3%), reducing teaching hours (8.2%) and others would often get sick-offs (12.2%).

Table 8. Ways of adjusting teaching methods in teachers with voice disorders.

Adjusted teaching method	**N (%)**
Ask for leave	5(10.2%)
Reduce teaching hours	4(8.2%)
Talk less in class	9(18.4%)
Change teaching methods	8(16.3%)
Reduce course content	0(0)
Not adjusted	23(46.9%)

4.6.3. Professional/ Medical help seeking behavior

All respondents who had voice disorders for both teachers and non-teachers were asked if they had sought any professional assistance for their problem. Only n=12(24.4%) teachers sought professional help rather medical help compared to n=1(16%) non- teaching staff.

5.0 CHAPTER FIVE: DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1 DISCUSSION

The present study had the main object of investigating the prevalence and risk factors of voice disorders among primary school teachers in Nairobi county in Kenya. This is against the back ground that occupational dysphonia is an important complaint among professional voice users and a most frequent complaint(41). There is a paucity of data in Kenya concerning the magnitude of this problem especially among the teaching fraternity in this case. The study highlights the findings in these professionals who are an important sector that impacts the outcome of future generations.

The results are a comparison between the teachers and a control group of non-teachers all whom were drawn from the public primary schools across Nairobi county. This was to highlight the differences between the two groups concerning the variables investigated and therefore ultimately show the burden of voice problems among teachers.

The study showed that there were more female teachers (51%) than male teachers (49%). This generally agrees with literature that shows there are more female teachers in primary schools than males(9, 14, 31, 42). The control group had more males than females probably because these forms the support staff of which manual labour is their main duty.

The study showed that the prevalence of voice disorders is quite high among teachers, 49 of the 200 at 24.5% as compared to the non-teaching staff, 7 of the 200 at 3.5%, χ^2=36.2, P<0.001, OR=8.9(95%CI: 3.9-20). In other terms a teacher is 8.5 times likely to develop a voice problem than a non-teaching staff. The prevalence of the voice disorders was measured using an operational definition which has been used by many in similar studies “Any time your voice does not work, perform, or sound as it normally should, so that it interfered with communication and job performance”(26, 28, 31). This high prevalence falls within literature figures which shows that voice disorders prevalence among teachers ranges from 11%-81% compared with non-teachers at 1.0-36.1% (1, 4, 28, 42). This wide range in prevalence rates may be mainly because of differences in the study population, type of methods used, and the definition of the voice disorder (28).

In this study, of the 24.5% teachers with a voice disorder, the females had a higher prevalence of 25.5% compared to the male teachers at 23.5%. Female teachers had an increased risk of developing a voice disorder compared to the male counterparts (OR=1.09) although this was statistically insignificant with a P value of 0.75. The non-teaching staff unlike the teaching staff had males predominant with voice disorders at n=5(4.5%) compared to females at n=2(2.2%). Female teachers having an increased risk to developing voice disorder has also been shown in literature(4, 28). Previous studies have ascribed the reasons to anatomic, physiologic and behavioural factors in that females use their voice at a higher pitch(43, 44). It is postulated that women are more prone to having voice disorders because of structural differences in their laryngeal anatomy in that they have shorter vocal folds and produce voice at a higher fundamental frequency. This therefore means there is less tissue mass to dampen a larger amount of vibratory force. Females will also tend to shout more in class. Pupils usually tend to be more fearful of a male teacher than a female and thus a female teacher will tend to use her voice maximally to control a noise class (36).

The present study was a comparative cross sectional study and thus the known risk factors were analysed to determine if they were associated with the presence of a voice disorder and not to establish a causal relationship. The known risk factors are listed in **Table 4.** Of all these lifestyle habits and health conditions risk factors among teachers, upper respiratory tract infections (URTI) were found to be statistically significant in the association with voice disorders while for non-teaching staff, chronic use of medications, allergies and stress were statistically significant. A teacher with an upper respiratory tract infection was 2.58 times likely to develop a voice problem. This finding has also been echoed by other studies(5, 35, 45). Respiratory tract infection and allergy causes inflammation of the larynx and thus cause the vocal cord “cover” (mucosa and superficial lamina propria) to have reduced mobility. This will ultimately manifest in vocal symptoms like vocal fatigue and hoarseness and thus as a voice disorder(46). In this study, a plausible explanation as to why risk factors were more prevalent among non-teachers than teachers would not be found.

Caffeinated drinks intake among both teaching staff and non-teaching staff was high, however its association with developing a voice disorders was statistically insignificant. Alcohol and smoking, were found to be statistically insignificant in association to presence of a voice disorder similar to

other studies(31, 36). Just like in this study, the reason could be due to low prevalence of smoking and alcohol intake among the teachers(47).

Nasal allergies, chronic use of medications and stress were statistically significant among non-teachers but insignificant among teachers. This is contrary to Usha (31) who found significant association of voice disorders with nasal allergies, and stress due to teaching. Some medications have a negative effect on voice production. There are various mechanisms depending with the medication in use. In this study, diuretics, angiotensin converting enzyme inhibitors and antihistamines were reported. Diuretics and antihistamines have been found to have a drying effect on the laryngeal mucosa thus affecting the vibratory mechanism while angiotensin-converting enzyme inhibitors causes a chronic cough resulting in laryngeal irritations(48).

Hormonal or endocrine problems are associated with voice dosorders in that they lead to fluid accumulation in the vocal cords thus increasing the bulk of it and ultimately affect the quality of voice (45). However, in this study there was no association. This can be attributed to very few respondents having hormonal problems (n=1 each) for both teaching staff and non-teaching staff.

The three teaching characteristics were found not to be statistically significant as risk factors in developing a voice disorder. These included number of years in teaching, the grade taught and the loudness of the voice during class. The study showed that the 6-10 years teaching category had the highest number of teachers with a voice disorder at 46.9% followed by the 11-20 years teaching category at 22.4%. This adds up to 69.3% of all teaching staff with a voice disorder falling under the above two categories. Russel (32) and Sapir (49) also found that duration of teaching experience was not associated with voice problems. Some studies contrary to the above have found an association between duration of teaching and voice disorders. Usha (31) found teaching experience of greater than 20 years was associated with voice problems. This was also echoed by Smith (27) and Roy(28) who indicated that it could arise from vocal fatigue with increasing age. In this present study, the insignificant association would be probably due to few teachers with higher teaching years being less active in teaching than the younger teachers.

The study showed that the most frequent voice related symptom was throat discomfort (92%), hoarseness (89%), straining of voice when speaking (60%) and tired voice (50%). Though a bit higher Bolbol (36) also found high frequency of these symptoms. The first two symptoms were

equally high among non-teachers. These vocal symptoms may begin slowly and sporadically, and may contribute to the development of laryngeal disorders/occupational voice disorders that prevent their normal voice production over a period of time.

The VHI scores were high among teachers compared to the non-teachers though not statistically significant (p=14). The majority of the teaching staff (58%) had a moderate score unlike the non-teaching staff whose majority (71.4%) had a mild score. These results conform to findings of Bolbol et al who also found similar high VHI scores among teachers(36).

Of the teachers that had voice disorders only 53% had adjusted on teaching ways so as to cope with their voice problem during teaching. they opted either to be taking leaves, talk less in class, change teaching ways or reduce the course content they teach.

Of all the 49 teachers with voice disorders few of them 12 (24%) sought medical/professional help for their problem just like there were few 1(14%) non-teaching staff who sought medical help. Having fear of missing work and negative perception maybe reasons as to why help wasn't sought. Roy et al(5) also reported only a small percent (14%) of teachers sought medical or professional assistance for their voice disorder. Similar findings have also been reported by Bolbol et al(36).

5.2 CONCLUSION

The results of this study confirm that prevalence of Voice disorders among primary school teachers in Nairobi is quite high at 24.5% compared to 3.5% in non-teachers. This shows that teaching in itself is a risk to development of a voice disorder. The voice disorders are more in teachers with a teaching experience from 6-20 years and these are more who form the bulk of the workforce. Of these, female teachers are more affected making it a risk to development of the voice disorder. Upper respiratory tract infection is also a risk factor to development of a voice disorder. The study has also shown that these voice disorders have led to high levels of voice handicap in the teachers. In spite of this, few teachers seek medical intervention for their voice problem.

5.4 RECOMMENDATIONS

Vocal hygiene awareness programmes and strategies aimed to promote optimal voice production should be considered as part of the teacher's curriculum during their basic training. Further studies can be done with use of video laryngoscopy and stroboscopy to assess the exact vocal cord or laryngeal pathology.

Arising from the above results, other studies can be done to determine the actual causal relationship of the risk factors and the voice disorders.

REFERENCES

1. Van Houtte E, Claeys S, Wuyts F et al. The impact of voice disorders among teachers: vocal complaints, treatment-seeking behavior, knowledge of vocal care, and voice-related absenteeism. J Voice. 2011;25(5):570-575.

2. Nerrière E, Vercambre M-N, Gilbert F et al. Voice disorders and mental health in teachers: a cross-sectional nationwide study. BMC Public Health. 2009;9:370-374.

3. Kooijman PGC, Thomas G, Graamans K et al. Psychosocial Impact of the Teacher's Voice Throughout the Career. Journal of Voice. 2007;21(3):316-324.

4. Sala E, Laine A, Simberg S et al. The Prevalence of Voice Disorders Among Day Care Center Teachers Compared with Nurses: A Questionnaire and Clinical Study. Journal of Voice. 2001;15(3):413-423.

5. Roy N, Merrill RM, Thibeault S et al. Prevalence of Voice Disorders in Teachers and the General Population. Journal of Speech, Language, and Hearing Research. 2004;47(2):281-293.

6. Bassi IB, Assuncao AA, de Medeiros AM et al. Quality of life, self-perceived dysphonia, and diagnosed dysphonia through clinical tests in teachers. J Voice. 2011;25(2):192-201.

7. Behlau M, Zambon F, Guerrieri AC et al. Epidemiology of voice disorders in teachers and nonteachers in Brazil: prevalence and adverse effects. J Voice. 2012;26(5):665-670

8. Lira Luce F, Teggi R, Ramella B et al. Voice disorders in primary school teachers. Acta Otorhinolaryngologica Italica. 2014;34(6):412-418.

9. Ministry of Education, Science and Technology. Basic Education statistical booklet 2014 [Available from: https://kicd.ac.ke/wp-content/uploads/2017/10/2014-Basic-Education-Statistical-Booklet.pdf.

10. Tiwari M, Tiwari w. Voice - How humans communicate? Journal of Natural Science, Biology and Medicine. 2012;3(1):3-11.

11. Lee L, Stemple JC, Glaze L et al. Quick screen for voice and supplementary documents for identifying pediatric voice disorders. Lang Speech Hear Serv Sch. 2004;35(4):308-319.

12. Daniel R. Boone SCM, Shelley L. Voice disorders. *The Voice and Voice theray*. eighth ed. boston: allyn and bacon; 2010. 344.

13. Raymond H. colton jKc, rebecca leonard. understanding voive problem: *A physiological perspective for diagnosis and treatment*: wolters kluwer health adis; 2011. 494.

14. Smith E, Lemke J, Taylor M, Kirchner HL, Hoffman H. Frequency of voice problems among teachers and other occupations. J Voice. 1998;12(4):480-488.
15. Flint PW, Haughey BH, Niparko JK et al. The professional Voice: *Cummings Otolaryngology - Head and Neck Surgery E-Book: Head and Neck Surgery*, 3-Volume Set: Elsevier Health Sciences; 2010.
16. American apeech language hearing association. voice disorders 1997 [Available from: https://www.asha.org/PRPSpecificTopic.aspx?folderid=8589942600&section=Overview.
17. Cohen SM, Kim J, Roy N et al. Prevalence and causes of dysphonia in a large treatment-seeking population. Laryngoscope. 2012;122(2):343-348.
18. Fritzell B. Voice disorders and occupation: *Logopedics phoniatrics and vocology*, Taylor and francis, 2009. 7-12.
19. Williams NR. Occupational groups at risk of voice disorders: A review of the literature. Occup Med ,london. 2003;53(7):456-460.
20. Cohen SM jB, Garrett CG, et al. creation and validation of the singing voice handicap index. ann otol rhinol laryngol. 2007(116):402.
21. Fishman JM, Long J, Gugatschka M, et al. Stem cell approaches for vocal fold regeneration. Laryngoscope. 2016;126(8):1865-1870.
22. Miller R. Solutions for teachers: *Tools for performers and teachers*. new york: oxford university press inc; 2003.
23. Charn TC, Hwei Mok PK. Voice Problems Amongst Primary School Teachers in Singapore. Journal of Voice. 2012;26(4):e141-e7.
24. Johnson A, Jacobson B, Grywalski C et al. The Voice Handicap Index (VHI): Development and Validation1997. 66-70.
25. Chen SH, Chiang SC, Chung YM et al. Risk factors and effects of voice problems for teachers. J Voice. 2010;24(2):183-190
26. Charn TC, Mok PK. Voice problems amongst primary school teachers in Singapore. J Voice. 2012;26(4):141-147.
27. Smith E, Gray SD, Dove H et al. Frequency and effects of teachers' voice problems. J Voice. 1997;11(1):81-87.
28. Roy N, Merrill RM, Thibeault S et al. Prevalence of voice disorders in teachers and the general population. J Speech Lang Hear Res. 2004;47(2):281-293.

29. Trinite B, Sokolovs J, Teibe U. using a questionnaire design in the investigation of teachers'voice risk factors. Special Education. 2011(2).
30. Julian A. Evaluation of the voice: *scott's Brown's Otorhinolaryngology, head and neck surgery*, 8th edition. Britain: hodder arnold; 2008.
31. Devadas U, Bellur R, Maruthy S. Prevalence and Risk Factors of Voice Problems Among Primary School Teachers in India. J Voice. 2017;31(1):117.
32. Russell A, Oates J, Greenwood KM. Prevalence of voice problems in teachers. Journal of Voice. 1998;12(4):467-479.
33. Verdolini K, Ramig LO. Review: Occupational risks for voice problems. *Logopedics Phoniatrics Vocology*. 2001;26(1):37-46.
34. Cantor Cutiva LC, Vogel I, Burdorf A. Voice disorders in teachers and their associations with work-related factors: a systematic review. J Commun Disord. 2013;46(2):143-155.
35. Akinbode R, Lam KB, Ayres JG et al. Voice disorders in Nigerian primary school teachers. Occup Med (Lond). 2014;64(5):382-386.
36. Bolbol SA, Zalat MM, Hammam RA et al. Risk Factors of Voice Disorders and Impact of Vocal Hygiene Awareness Program Among Teachers in Public Schools in Egypt. J Voice. 2017;31(2):251.
37. Aratati Alva MM, Kiran Bhojwani, Suja Sreedharan. Study of Risk Factors for Development of Voice Disorders and its Impact on the Quality of Life of School Teachers in Mangalore, India. Journal of Clinical and Diagnostic Research [serial online]. 2017;11(1):1-5
38. Lee SY, Lao XQ, Yu IT. A cross-sectional survey of voice disorders among primary school teachers in Hong Kong. J Occup Health. 2010;52(6):344-352.
39. Trinite B. Epidemiology of Voice Disorders in Latvian School Teachers. J Voice. 2017;31(4):508.
40. Filloon TG. A Review of: Sample Size Calculations in Clinical Research, Second Edition, . Journal of Biopharmaceutical Statistics. 2008;18(5):1034-1035.
41. Ewiss A, Haseeba A. occupational dysphonia among school teachers in beni suef governorate, Egypt. Egyptian Journal of Occupational Medicine. 2013;37(1):1-18.
42. Sataloff RT. Professional voice users: the evaluation of voice disorders. Occup Med. 2001;16(4):633-647.

43. Damrose EJ. Quantifying the impact of androgen therapy on the female larynx. Auris Nasus Larynx. 2009;36(1):110-112.
44. Hunter EJ, Tanner K, Smith ME. Gender differences affecting vocal health of women in vocally demanding careers. *Logopedics Phoniatrics Vocology*. 2011;36(3):128-136.
45. Nichol H, Morrison MD, Rammage LA. Interdisciplinary approach to functional voice disorders: the psychiatrist's role. Otolaryngol Head Neck Surg. 1993;108(6):643-647.
46. Colton RH CJ, Leonard R. Understanding voice problem: *A physiological perspective for diagnosis and treatment*. Fourth edition ed: Wolters Kluwer Health Adis (ESP); 2011.
47. Sliwinska-Kowalska M, Niebudek-Bogusz E, Fiszer M et al. The prevalence and risk factors for occupational voice disorders in teachers. Folia phoniatrica et logopaedica : official organ of the International Association of Logopedics and Phoniatrics (IALP). 2006;58(2):85-101.
48. Huntzinger A. Practice Guidelines: Guidelines for the Diagnosis and Management of Hoarseness,. Am Fam Physician. 2010(2010 Issue):1292-1296.
49. Sapir S, Keidar A, Mathers-Schmidt B. Vocal attrition in teachers: survey findings. Eur J Disord Commun. 1993;28(2):177-185.

TIME LINE

Period	**Activity**
June 2018- Oct 2018	Proposal writing
November 2018	Proposal presentation
January 2019-feb 2019	Corrections anti plagiarism check
March 2019-july 2019	Ethical approval
August 2019-oct 2019	NACOSTI approval
October 2019	Nairobi City County Education Department approval
Nov 2019-febreuary 2020	Data collection
March 2020-June 2020	Report writing and submission

BUDGET

Item	Cost (Kshs)
Stationary	40,000
Transport	30,000
Statistician	30,000
Research assistant	40,000
Dissemination of results	15,000
Printing and binding for submission	10,000
Total	165,000

APPENDICES

APPENDIX I: PARTICIPANT INFORMATION AND CONSENT FORM

TITLE OF STUDY: PREVALENCE AND RISK FACTORS OF VOICE DISORDERS AMONG PRIMARY SCHOOL TEACHERS AND NON TEACHERS IN NAIROBI

Principal Investigator\and institutional affiliation: Dr Alex Malambo (Postgraduate student in Ear Nose and Throat Surgery, University of Nairobi)

Introduction:

I would like to tell you about the study being conducted by the above listed researcher. The purpose of this consent form is to give you the information you will need to help you decide whether or not to be a participant in the study. Feel free to ask any questions about the purpose of the research, what happens if you participate in the study, the possible risks and benefits, your rights as a volunteer, and anything else about the research or this form that is not clear. When we have answered all your questions to your satisfaction, you may decide to be in the study or not. This process is called 'informed consent'. Once you understand and agree to be in the study, I will request you to sign your name on this form. You should understand the general principles which apply to all participants in a medical research: i) Your decision to participate is entirely voluntary ii) You may withdraw from the study at any time without necessarily giving a reason for your withdrawal iii) Refusal to participate in the research will not affect the services you are entitled to any health facility. We will give you a copy of this form for your records.

May I continue? YES / NO

This study has approval by The Kenyatta National Hospital-University of Nairobi Ethics and Research Committee protocol No. _____

WHAT IS THIS STUDY ABOUT?

The researcher above is interviewing teaching staff and non-teaching staff. The purpose of the interview is to find out the prevalence of voice disorders and the impact on primary teachers in Nairobi and compare with the non-teaching staff. Participants in this research study will be asked questions about any voice problems they have or have had and how much it has affected them in their work.

There will be approximately 201 teaching staff and 201 non-teaching staff in this study randomly chosen. We are asking for your consent to consider participating in this study.

WHAT WILL HAPPEN IF YOU DECIDE TO BE IN THIS RESEARCH STUDY?

If you agree to participate in this study, the following things will happen:

You will be interviewed by a trained interviewer in a private area where you feel comfortable answering questions. The interview will last approximately 20 minutes. The interview will cover topics such as demographic data, living habits, health conditions, teaching characteristics and voice symptoms and effects of the voice problems.

We will ask for a telephone number where we can contact you if necessary. If you agree to provide your contact information, it will be used only by people working for this study and will never be shared with others. The reasons why we may need to contact you include possibility to ensure you receive the treatment if we find you with a voice problem.

ARE THERE ANY RISKS, HARMS DISCOMFORTS ASSOCIATED WITH THIS STUDY?

Medical research has the potential to introduce psychological, social, emotional and physical risks. Effort should always be put in place to minimize the risks. One potential risk of being in the study is loss of privacy. We will keep everything you tell us as confidential as possible. We will use a code number to identify you in a password-protected computer database and will keep all of our paper records in a locked file cabinet. However, no system of protecting your confidentiality can be absolutely secure, so it is still possible that someone could find out you were in this study and could find out information about you.

Also, answering questions in the interview may be uncomfortable for you. If there are any questions you do not want to answer, you can skip them. You have the right to refuse the interview or any questions asked during the interview.

If It may be embarrassing for you to answer some questions, we will do everything we can to ensure that this is done in private. Furthermore, all study staff and interviewers are professionals with special training in these examinations/interviews. Also, you may feel stressed recalling some events but you will not be forced to recall what you can't.

ARE THERE ANY BENEFITS BEING IN THIS STUDY?

You may benefit by receiving free diagnosis and referral to a specialist for treatment and support where necessary. Also, the information you provide will help us better understand the prevalence of voice disorders among teachers and compare it with non-teachers.

WILL BEING IN THIS STUDY COST YOU ANYTHING?

You will not incur any costs

WILL YOU GET REFUND FOR ANY MONEY SPENT AS PART OF THIS STUDY?

If u spend any money direct related to this study, u will be refunded.

WHAT IF YOU HAVE QUESTIONS IN FUTURE?

If you have further questions or concerns about participating in this study, please call or send a text message to the study staff at the number provided at the bottom of this page.

For more information about your rights as a research participant you may contact the Secretary/Chairperson, Kenyatta National Hospital-University of Nairobi Ethics and Research Committee

Telephone No. 2726300 Ext. 44102

email uonknh_erc@uonbi.ac.ke.

The study staff will pay you back for your charges to these numbers if the call is for study-related communication.

The principal investigator:

Dr Alex Malambo

Resident in ENT Head and Neck Surgery,

Phone number 0721517513, e-mail address: alexmalambo@yahoo.com

Supervisors:

1. **Dr. Catherine Irungu , MBCHB, MMED (ENT)**

   Consultant ENT Surgeon, lecturer University of Nairob

   E-mail: catherineirungu@uonbi.ac.ke

   Phone number: +254722385710

2. **Dr. Kamau Kabeu, MBCHB, MMED (ENT)**

   Consultant ENT Surgeon, Kenyatta National Hospital

   E-mail: jkkabeu@yahoo.com

   Phone number: +254722784170

WHAT ARE YOUR OTHER CHOICES?

Your decision to participate in research is voluntary. You are free to decline participation in the study and you can withdraw from the study at any time without injustice or loss of any benefits.

CONSENT FORM

Participant's statement

I have read this consent form or had the information read to me. I have had the chance to discuss this research study with a study counselor. I have had my questions answered in a language that I understand. The risks and benefits have been explained to me. I understand that my participation in this study is voluntary and that I may choose to withdraw any time. I freely agree to participate in this research study.

I understand that all efforts will be made to keep information regarding my personal identity confidential.

By signing this consent form, I have not given up any of the legal rights that I have as a participant in a research study.

I agree to participate in this research study: Yes No

I agree to provide contact information for follow-up: Yes No

Participant printed name: _____

Participant signature / Thumb stamp _____

Date _____

Researcher's statement

I, the undersigned, have fully explained the relevant details of this research study to the participant named above and believe that the participant has understood and has willingly and freely given his/her consent.

Researcher's Name: _____ **Date**: _____

Signature

_____

Role in the study: _____ *[i.e. study staff who explained informed consent form.]*

For more information contact _____ at _____ from _____ to _____

Witness Printed Name

Name _____ Contact information _____

Signature /Thumb stamp: _____ Date; _____

APPENDIX II: SWAHILI INFORMATION AND CONSENT FORM

KIAMBATISHO 1: IDHINI KWA KISWAHILI

UTANGULIZI NA MAELEZO YA MTAFITI

Mimi ni Daktari Alex Malambo kutoka chuo kikuu cha Nairobi, Shule ya Utabibu, Idara ya upasuaj ya sikio, pua na koo, yani "ENT". Ninafanya utafiti wa kuangalia "**Prevalence of voice problems in primary school teachers in Nairobi**", yani kuangalia ueneaji wa tatizo la sauti kati ya waalimu wa chuo ya msingi katika jimbo la Nairobi. Umechaguliwa kuungana na utafiti huu lakini idhini yako yahitajika ili kuendelea na utafiti wenyewe.

umuhimu na sababu ya utafiti

Utafiti huu unaangalia asilimia ya waalimu wa chuao la msingi ambo wanapata shida ya sauti na mambo yanayoeneza upati wa shida hili.

manufaa ya utafiti huu

Kibinafsi, hutafaidika kifedha kutokana na utafiti huu. Majibu ya utafiti yatasaidia kusawazisha utaratibu wa kutibu shida ya sauti kwa ujumla.

Hiari ya kujiunga na utafiti

Kukubali kwako ni kwa hiari yako na sio kwa kulazimishwa.

Madhara na gharama ya utafiti

Kujiunga na utafiti huu hakutakudhuru kwa njia yoyote au kukugharama fedha zozote.

Usiri wa msajiliwa

Wewe kama msajiliwa, jina na maelezo yako yakibinafsi yatakua siri. Mimi kama mtafiti mkuu ndiye nitaweza kukutambua. Ruhusa ya kukutambulisha inaweza tu kupatiwa na kamiti kuu ya utafiti, yani KNH-UoN ERC.

<u>Matokeo ya utafiti</u>

Matokeo ya utafiti huu yatasambazwa kwa madaktari, wauguzi na umma kwa ujumla kwani majibu yenyewe yatapatikana katika maktaba wa chuo kikuu cha Nairobi, Hospitali kuu ya Kenyatta na pia kwenye mtandao wa intaneti.

Fomu ya Idhini ya msajiliwa

Mimi (Jina)…….. kwa hiari yangu, nimekubali kushiriki katika utafiti huu ambao unafanywa na Daktari Alex Malambo. Nimeelezewa manufaa na madhara ya utafiti huu kwa kinaa na nimeyaelewa.

Sahihi…… Tarehe……

Nambari ya utafiti……..

Mimi …….. naapa yakwamba nimeelezea msajili manufaa na madhara yote yanayohusu utafiti huu.

Sahihi…… Tarehe……

Maswali ya ziada na ufafanuzi zaidi

Habari zozote zitakazokusanywa kutoka kwako zitashughulikiwa kwa usiri na hazitasambazwa kwa yeyote ila tu kwa ruhusa kutoka kwa kamiti kuu ya utafiti ya chuo kikuu cha Nairobi na hospitali kuu ya Kenyatta (KNH/UON ERC).

Unaweza kupata uchambuzi wa utafiti huu na maelezo zaidi kutoka kwa:

Katibu Mkuu wa utafiti,

Hospitali kuu ya Kenyatta na Chuo kikuu cha Nairobi (KNH/UON ERC).

Sanduku la Posta 20723 KNH, Nairobi 00202.

Nambari ya simu 020726300-9

Barua pepe; uonknh_erc@uonbi.ac.ke

Wasimamizi wa utafiti

Daktari Catherine Irungu

Sanduku la Posta 19676- 00202

Nairobi, Kenya

Barua pepe: catherineirungu@uonbi.ac.ke

Nambari ya simu: 0722385710

Daktari Kamau Kabeu, MBCHB, MMED (ENT)

Sanduku la Posta 19676-00202

Nairobi, Kenya

Barua pepe: jkkabeu@yahoo.com

Nambari ya simu: +254722784170

Mtafiti Mkuu:

Daktari Alex Malambo

Sanduku la Posta19676-00202

Nairobi, Kenya

Nambari ya simu ya rununu: 0721517513

Barua pepe: alexmalambo@yahoo.com

APPENDIX III: VOICE RISK FACTOR QUESTIONNAIRE (TEACHING STAFF)

VOICE RISK FACTOR QUESTIONNAIRE

STUDY NUMBER: ……. SCHOOL CODE: …….

A. DEMOGRAPHIC INFORMATION

1) Age …….

2) Gender M/F ……

B. LIVING HABITS

3. Do you have the following living habits?

Smoking	a) Yes If yes how long……. b) No
Drinking Alcohol	a) Yes b) No
Caffeine drinks(e.g coffee, tea, soda	a) Yes i) coffee (ii)tea (iii) soda b) No
Taking medication	a) Yes For how long? b) No
Other activities requiring prolonged voice use or increased volume	Indicate…….

C. HEALTH CONDITIONS

4.Have you had the following conditions?

Upper respiratory tract infections	a) Yes b) No
Nasal Allergies	a) Yes

	b) No
Gastroesophageal reflux symptoms	a) Yes b) No
Hormonal problems	a) Yes b) No
Stress	a) Yes b) No
Any other chronic conditions	a) Yes Specify……. b) No

4. Have you had the following surgeries?

Throat surgery	a) Yes b) No
Thyroid gland surgery	a) Yes b) No
Chest surgery	a) Yes b) No
Heart surgery	a) Yes b) No
Endotracheal intubation	a) Yes b) No
Other surgeries	a) Yes Specify…… b) No

D. TEACHING CHARACTERISTICS (FOR TEACHING STAFF)

5. How many years have you been teaching in schools?
   a. ≤5
   b. 6–10
   c. 11–2

d. ≥21

6. Which grade do you teach in schools?
   a. 1–3
   b. 4–6
   c. 7–9
7. What subjects do you teach?.....
8. How loud do you use your voice in class?
   a. Small loudness
   b. Moderate loudness
   c. Large loudness
9. Do you use a microphone in class?
   a. Yes b. No

E. VOICE SYMPTOMS AND PHYSICAL DISCOMFORT

10. Does your voice not work or perform or sound as it should normally do so that it interferes with work?

   a. Yes

      If yes please indicate the frequency of the problem

      i. Sometimes ii. Often iii. Always

   b. No

11. If your answer was yes above, which of the following symptoms have you had on your voice? Tick appropriately

Hoarseness	
Breathiness	
Tired voice	
Weak voice	
Strained voice	
Low tone difficulty	
High tone difficulty	
Low speaking voice	
High speaking voice	

Limited singing range	
Others , specify	

12. Have you had discomfort on your throat?

a. Yes (please specify)

i. Dryness

ii. Ache

iii. Strain

iv. Throat clearing

v. Difficulty swallow

vi. Others specify…….

b. No

13. Do you seek professional help for your voice problem?
    a. Yes
    b. No

F. EFFECTS OF VOICE PROBLEMS

14. Have you adjusted teaching method due to your voice problems?

a. Yes . please indicate ways of adjustment by ticking appropriately

Ask for leaves	
Reduce teaching hours	
Talk less in class	
Change teaching style	
Reduce course content	
Others specify	

b. No

15. Have you changed opinions on teaching profession due to your voice problems?

    a. Yes. Please indicate

Change overall job opinions	
Change job	
Retire early	
Other specify	

APPENDIX IV. VOICE RISK FACTOR QUESTIONNAIRE (NON-TEACHING STAFF)

VOICE RISK FACTOR QUESTIONNAIRE

STUDY NUMBER:……. SCHOOL CODE: …….

A. DEMOGRAPHIC INFORMATION

1) Age …….

2) Gender M/F ……

B. LIVING HABITS

3. Do you have the following living habits?

Smoking	c) Yes If yes how long……. d) No
Drinking Alcohol	a) Yes b) No
Caffeine drinks(e.g coffee, tea, soda	c) Yes i) coffee (ii)tea (iii) soda d) No
Taking medication	c) Yes For how long? d) No
Other activities requiring prolonged voice use or increased volume	Indicate…….

C. HEALTH CONDITIONS

4. Have you had the following health condition related symptoms?

Upper respiratory tract infections	c) Yes d) No
Nasal Allergies	c) Yes

	d) No
Gastroesophageal reflux symptoms	c) Yes d) No
Hormonal problems	c) Yes d) No
Stress	c) Yes d) No
Any other chronic conditions	c) Yes Specify……. d) No

5. Have you had the following surgeries?

Throat surgery	c) Yes d) No
Thyroid gland surgery	c) Yes d) No
Chest surgery	c) Yes d) No
Heart surgery	c) Yes d) No
Endotracheal intubation	c) Yes d) No
Other surgeries	c) Yes Specify…… d) No

D. VOICE SYMPTOMS AND PHYSICAL DISCOMFORT

6. Does your voice not work or perform or sound as it should normally do so that it interferes with work?

c. Yes

If yes please indicate the frequency of the problem

ii. Sometimes ii. Often iii. Always

d. No

7. If your answer was yes above, which of the following symptoms have you had on your voice? Tick appropriately

Hoarseness	
Breathiness	
Tired voice	
Weak voice	
Strained voice	
Low tone difficulty	
High tone difficulty	
Low speaking voice	
High speaking voice	
Limited singing range	
Others , specify	

8. Have you had discomfort on your throat?

c. Yes (please specify)

vi. Dryness

vii. Ache

viii. Strain

ix. Throat clearing

x. Difficulty swallowing

xi. Others specify……...

d. No

9. Do you seek professional help for your voice problem?
   c. Yes
   d. No

APPENDIX V. VOICE HANDICAP INDEX QUESTIONNAIRE

STUDY NUMBER…… **SCHOOL CODE**……

These are statements that many people have used to describe their voices and the effects of their voices on their lives. Circle the response that indicates how frequently you have the same experience.

0-never 1-almost never 2-sometimes 3-almost always 4-always

Part 1

My voice makes it difficult for people to hear me.	0	1	2	3	4
People have difficulty understanding me in a noisy room.	0	1	2	3	4
My family has difficulty hearing me when I call them throughout the house.	0	1	2	3	4
I use the phone less often than I would like to	0	1	2	3	4
I tend to avoid groups of people because of my voice.	0	1	2	3	4
I speak with friends, neighbors, or relatives less often because of my voice.	0	1	2	3	4
People ask me to repeat myself when speaking face-to-face.	0	1	2	3	4
My voice difficulties restrict my personal and social life.	0	1	2	3	4
I feel left out of conversations because of my voice.	0	1	2	3	4
My voice problem causes me to lose income	0	1	2	3	4

SUBTOTAL----------

PART II

I run out of air when I talk.	0	1	2	3	4
The sound of my voice varies throughout the day.	0	1	2	3	4
People ask, “What’s wrong with your voice?”	0	1	2	3	4
My voice sounds creaky and dry.	0	1	2	3	4
I feel as though I have to strain to produce voice.	0	1	2	3	4
The clarity of my voice is unpredictable.	0	1	2	3	4
I try to change my voice to sound different.	0	1	2	3	4
I use a great deal of effort to speak.	0	1	2	3	4
My voice is worse in the evening.	0	1	2	3	4
My voice “gives out” on me in the middle of speaking.	0	1	2	3	4

SUBTOTAL----------

PART III

I am tense when talking to others because of my voice.	0	1	2	3	4
People seem irritated with my voice.	0	1	2	3	4
I find other people don’t understand my voice problem.	0	1	2	3	4
My voice problem upsets me.	0	1	2	3	4
I am less outgoing because of my voice problem.	0	1	2	3	4
My voice makes me feels handicapped.	0	1	2	3	4
I feel annoyed when people ask me to repeat.	0	1	2	3	4
I feel embarrassed when people ask me to repeat.	0	1	2	3	4
My voice makes me feel incompetent.	0	1	2	3	4
I am ashamed of my voice problem.	0	1	2	3	4

SUBTOTAL----------

TOTAL----------

SCORE RANGE	SEVERITY	COMMON ASSOCIATION
0-30	Mild	Minimal amount of handicap
31-60	Moderate	Often seen in patients with vocal nodules, polyps, or cysts
61-120	Severe	Often seen in patients with vocal fold paralysis or severe vocal fold scarring.

APPENDIX VI: KNH-UON ERC APPROVAL

UNIVERSITY OF NAIROBI
COLLEGE OF HEALTH SCIENCES
P O BOX 19676 Code 00202
Telegrams: varsity
Tel:(254-020) 2726300 Ext 44355

KNH-UON ERC
Email: uonknh_erc@uonbi.ac.ke
Website: http://www.erc.uonbi.ac.ke
Facebook: https://www.facebook.com/uonknh.erc
Twitter: @UONKNH_ERC https://twitter.com/UONKNH_ERC

KENYATTA NATIONAL HOSPITAL
P O BOX 20723 Code 00202
Tel: 726300-9
Fax: 725272
Telegrams: MEDSUP, Nairobi

Ref: KNH-ERC/A/293

25th July, 2019

Dr. Alex Malambo
Reg. No. H58/83088/2015
Dept.of Surgery
School of Medicine
College of Health Sciences
University of Nairobi

KENYATTA NATIONAL HOSPITAL APPROVED 25 JUL 2019 KNH/UoN-ERC P.O. BOX 20723 - 00202 NAIROBI

Dear Dr. Malambo

RESEARCH PROPOSAL: PREVALENCE AND RISK FACTORS OF VOICE DISORDERS AMONG PRIMARY SCHOOL TEACHERS IN NAIROBI (P197/03/2019)

This is to inform you that the KNH- UoN Ethics & Research Committee (KNH- UoN ERC) has reviewed and **approved** your above research proposal. The approval period is 25th July 2019 – 24th July 2020.

This approval is subject to compliance with the following requirements:

a. Only approved documents (informed consents, study instruments, advertising materials etc) will be used.
b. All changes (amendments, deviations, violations etc.) are submitted for review and approval by KNH-UoN ERC before implementation.
c. Death and life threatening problems and serious adverse events (SAEs) or unexpected adverse events whether related or unrelated to the study must be reported to the KNH-UoN ERC within 72 hours of notification.
d. Any changes, anticipated or otherwise that may increase the risks or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH- UoN ERC within 72 hours.
e. Clearance for export of biological specimens must be obtained from KNH- UoN ERC for each batch of shipment.
f. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. (*Attach a comprehensive progress report to support the renewal*).
g. Submission of an *executive summary* report within 90 days upon completion of the study. This information will form part of the data base that will be consulted in future when processing related research studies so as to minimize chances of study duplication and/ or plagiarism.

Protect to discover

For more details consult the KNH- UoN ERC website**http://www.erc.uonbi.ac.ke**

Yours sincerely,

PROF.M.L. CHINDIA
SECRETARY, KNH-UoN ERC

c.c. The Principal, College of Health Sciences, UoN
The Director, CS, KNH
The Chairperson, KNH- UoN ERC
The Assistant Director, Health Information, KNH
The Dean, School of Medicine, UON
The Chair, Dept. of Surgery, UON
Supervisors: Dr. Catherine Irungu, Dept.of Surgery, UoN
Dr. Kabeu Kamau, Dept. of E.N.T, KNH

APPENDIX VII: TURNITIN REPORT