

A SURVEY OF HEARING IMPAIRMENT IN  
THE EMPORIA CITY SCHOOLS

A THESIS

SUBMITTED TO THE DEPARTMENT OF EDUCATION AND THE  
GRADUATE COUNCIL OF THE KANSAS STATE TEACHERS COLLEGE OF  
EMPORIA IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR  
THE DEGREE OF MASTER OF SCIENCE

By

John Elliot Beck

July 1938

Received 3 '38 7-17 From Robert Bush

Approved for the Major Department

*[Handwritten Signature]*  
\_\_\_\_\_

Approved for the Graduate Council

*[Handwritten Signature]*  
\_\_\_\_\_

82689

#### ACKNOWLEDGMENTS

Sincere appreciation is extended to Dr. Edwin J. Brown, Director of the Graduate Division, Kansas State Teachers College of Emporia, who so kindly directed this study. Appreciation is also extended to Miss Stella E. Klein, School Nurse, Emporia city schools, to Mrs. Frances E. Gwinn, Lip Reading Instructor, Emporia city schools, and to Dr. W. B. Granger, Eye, Ear, Nose and Throat Specialist, Emporia, Kansas, for their generous assistance and advice. To my wife, Ethel L. Beck, for the encouragement and assistance received throughout the study, the writer is truly grateful.

## TABLE OF CONTENTS

CHAPTER	PAGE
I. INTRODUCTION . . . . .	1
The Nature of the Study . . . . .	1
Previous Studies . . . . .	2
Scope of the Study . . . . .	4
Method of Procedure . . . . .	4
Sources of Data . . . . .	5
Types of Data Collected . . . . .	6
Definition of Terms . . . . .	6
Presentation of the Data . . . . .	7
II. PROBLEM OF HEARING LOSS IN EMPORIA CITY SCHOOLS . . . . .	8
Explanation of the 4-B Audiometer and its Use . . . . .	8
Advantages . . . . .	9
Records . . . . .	10
Recording Sheets Used . . . . .	10
Grading . . . . .	11
The Audiometer Tests in Emporia . . . . .	12
Summary . . . . .	24
III. PROBLEM OF MEDICAL TREATMENT OF CHILDREN WITH	
IMPAIRED HEARING . . . . .	25
Causes of Deafness . . . . .	26
Recommendations Made . . . . .	27
Parental Indifference . . . . .	28

CHAPTER

PAGE

IV. RELATIONSHIP BETWEEN HEARING LOSS AND VISION DEFECTS,

DEFECTS, DENTAL DEFECTS, SPEECH DEFECTS, DISEASE

CAUSED DEFECTS, IMPAIRED TONSILS AND ADENOIDS,

SWIMMING, INJURIES, AND HEREDITY . . . . . 51

Vision Defects . . . . . 51

Dental Defects . . . . . 52

Speech Defects . . . . . 52

Disease Caused Defects . . . . . 53

Swimming . . . . . 41

Injuries . . . . . 42

Heredity . . . . . 43

Summary . . . . . 45

V. RELATIONSHIPS THAT SEEM TO EXIST BETWEEN INTELLIGENCE

QUOTIENTS, SCHOOL GRADES AND HEARING LOSS OF EIGHTY-

TWO CHILDREN IN THE EMPORIA CITY SCHOOLS . . . . . 47

VI. THE PROGRAM FOR THE HARD OF HEARING CHILDREN IN THE

EMPORIA CITY SCHOOLS . . . . . 55

Lip Reading . . . . . 55

Some Advantages of the 4-B Audiometer . . . . . 61

Where the Emporia Program Needs Strengthening . . . . . 64

VII. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS . . . . . 67

Summary . . . . . 67

Conclusions . . . . . 68

Recommendations . . . . . 70

BIBLIOGRAPHY . . . . . 71

LIST OF TABLES

TABLE	PAGE
I. Record of Audiometer tests by Schools . . . . .	12
II. Hearing Loss Listed by Number Taking Tests in Each School and Per Cent of Total Having Hearing Loss . . . .	15
III. Hearing Loss in the Various Schools by Age . . . . .	18
IV. Hearing Loss in All Emporia City Schools Listed by Grades	20
V. Hearing Loss Listed by Sex According to School Groups . .	21
VI. Distribution Showing Hearing Loss by Race . . . . .	22
VII. Social Status of Children Having a Hearing Loss . . . . .	23
VIII. Report of Medical History Questionnaires as Reported by the Parents of Fifty-six Children with Impaired Hearing	34
IX. Reports of Eighteen Children Who Have Had a <u>Draining Ear</u> as Reported by Their Parents . . . . .	38
X. Condition of Tonsils and Adenoids and Complications with Colds of Fifty-six Children as Reported by Their Parents . . . . .	40
XI. Immediate Relatives With a Hearing Loss as Reported by the Parents of Eighteen Children . . . . .	43
XII. Intelligence Quotients and Grade Averages Tabulated in Ranges of Five for Eighty-two Emporia School Children .	48
XIII. The Upper Twenty-five Per Cent and the Lower Twenty-five Per Cent of the Intelligence Quotients Range in Groups A and B . . . . .	50
XIV. Some Individuals Who Have Repeated Grades in the Emporia City Schools . . . . .	53
XV. Complete Data Chart . . . . .	73

LIST OF FIGURES

FIGURE	PAGE
1. Making Tests With the 4-B Audiometer . . . . .	9
2. Typical Case Showing Normal Hearing . . . . .	11
3. Typical Case Showing Hearing Loss in Both Ears . . . . .	11

## CHAPTER I

### INTRODUCTION

#### THE NATURE OF THE STUDY

The ability to hear the spoken word is one of God's greatest gifts to mankind. It contributes greatly to an individual's happiness all through life. Since a child's education depends upon oral instruction as well as his ability to converse with other children, too much attention can not be given to this important factor in the educative process.

There have always been hard of hearing children in the public schools, and until recent years they have not received the attention they should justly receive.

The most recent figures carrying the authority of the Federal Government indicate fifteen million hard of hearing individuals in the United States. Of these at least three million are of school age or younger.<sup>1</sup>

Ciocco<sup>2</sup> says in a Public Health Report, "Since the first survey conducted by Fowler and Fletcher in 1926 using the 4-A Audiometer, numerous surveys have been conducted in this country with the same type of instrument. The immediate and practical objectives of such studies are to detect hearing impairment in children and, on the basis of these findings, to give to the hard of hearing child the benefits of special medical and educational care."

---

<sup>1</sup> Roy H. Gilpatrick, "Selling the Phono-Audiometer Idea", The Auditory Outlook, Vol. I, No. 4, p. 162, (July, 1930).

<sup>2</sup> Antonio Ciocco, "Audiometric Studies on School Children." "I. The Consistency and Significance of Tests made with the 4-A Audiometer." Reprint No. 1776, p. 2, from the Public Health Reports, Washington, D. C., Vol. 51, No. 41, p. 1402-1416, (October 9, 1936).



In making a survey of hearing impairment in the Emporia city schools several steps were required. The first step was of necessity the discovery and identification of the affected individuals. This was done with the 4-B Audiometer by giving hearing tests to all children in school from the third grade to the senior year in the high school inclusive. After a series of retests, or sifting process, only those with a hearing loss of over 9% were considered for the problem.

Next, a medical history questionnaire was filled out by the parents of these students. The results of the questionnaire, along with other noted physical defects, will be discussed in a later chapter. Some individuals, whose medical history was known by the school nurse, were referred to ear specialists. Their reports are tabulated in a later chapter, also.

The relationship between hearing loss and intelligence quotient, and hearing loss and school marks has been compared and presented. The attempt that has been made to prevent and alleviate hearing loss, as well as a history of the lip reading class, has been given. Finally, the writer will summarize the study and conclude with some possible recommendations.

#### PREVIOUS STUDIES

Warren H. Gardner<sup>3</sup> has prepared a report of hearing surveys by the Psychological Clinic of the State University of Iowa, resulting in the testing of 37,495 pupils in 37 school systems. In classifying and recording the results, they have mentioned some important facts concerning the physical defects accompanying hearing loss. Mr. Gardner concludes

---

<sup>3</sup> Warren H. Gardner, "Hearing Tests in 37 Iowa School Systems." Volta Review, Vol. 39, No. 12, p. 699-701. (December, 1937).

with this statement, "Immediate rescue of the hearing-handicapped from their unfortunate position in the school life furnishes ample evidence of the audiometer's importance in educational diagnosis."

Ciocco<sup>4</sup> presents the results of an investigation on the hearing of school children begun in 1931 by the Office of Child Hygiene of the United States Public Health Service. This investigation consisted of a general survey of the hearing of an unselected group of approximately 14,000 Washington, D. C., school children. Two years later, approximately 500 children of this group of 14,000 were given another series of tests. In conclusion, he summarizes some of the facts disclosed. Some of these conclusions are referred to in a later chapter.

Ciocco<sup>5</sup> reports that, in the first survey reported by Fowler and Fletcher in 1926, the authors stated that 14.4 per cent of the New York school children had impaired hearing. They regard the hearing impaired when the test reveals a hearing loss of 9 S. U. (sensation units) or more. Although in a later paper they advised that a loss of 6 S. U. should be considered significant, 9 S. U. generally is accepted as the lower limit of impairment. Fowler and Fletcher also suggested that children who showed impairment at the first test should be retested before being placed in the category of those needing special attention. It has been noted that the second test usually reduces the number of children with "impaired" hearing by 50 per cent or more. And, even of these, a certain percentage is found to have normal hearing when further examined.

---

<sup>4</sup> Ciocco, op. cit., p. 1.

<sup>5</sup> Ibid., p. 1.

Margaret Dunn<sup>6</sup> prepared a mimeographed report containing data concerning the hearing tests conducted among 1,711 school children in Port Washington, New York. She offers general suggestions for the care of the ears and the prevention of deafness, and describes the value of lip reading and hearing aids in cases where hearing impairment is present.

Aphrodite J. Hofsommer<sup>7</sup>, in a report on "Lip Reading and the Intelligence Quotient of the Hard of Hearing Child", makes a comparison of two groups of hard of hearing children in the Webster Groves, Missouri, public schools. One group was in the lip reading class, while the other group refused to take lip reading. The importance and significance of lip reading and its influence on the intelligence of students in reading classes is clearly shown.

#### THE SCOPE OF THE STUDY

This study undertakes to analyze the cause, as far as possible, of the hearing loss of 82 Emporia city school children who were found to have deficient hearing. And, to determine, if possible, the relationship of hearing loss and educational progress.

#### METHOD OF PROCEDURE

This study is an attempt to answer the question of equalizing the educational opportunities for school children with deficient hearing.

---

<sup>6</sup> Margaret Dunn, "Lend Me Your Ears." Mimeographed Report. Public Schools, Port Washington, New York. 1937.

<sup>7</sup> Aphrodite J. Hofsommer, "Lip Reading and Intelligence Quotient of the Hard of Hearing Child." Journal of American Medical Association. Vol. 107, No. 9, p. 648-650. (Aug. 29, 1936).

Audiometer tests were given to 2,126 children in the Emporia city schools from the third grade to the twelfth grade inclusive. Medical history questionnaires were sent to parents of children with deficient hearing. Intelligence tests were given to each child with a hearing loss. School marks were recorded. The school nurse was interviewed concerning treatment recommended and treatment received from specialists. The progress of lip reading classes was recorded. In making this study many questions have been suggested; some of the more important are listed:

1. How are the deficient hearing pupils determined?
2. Are there any diseases that might have contributed to hearing loss?
3. Are there any physical defects that might have caused deficient hearing?
4. What did the specialists report concerning the condition of pupils with deficient hearing?
5. Does hearing loss "affect" intelligence?
6. What effect does hearing loss have on school marks?
7. What per cent of students having hearing loss have repeated grades?
8. What is being done for children who have deficient hearing?
9. What else can be done?

#### SOURCES OF DATA

The sources of data used for the study were as follows:

1. Audiometer tests of 2,126 children.
2. Detailed study of 82 children found to have "hearing loss."

3. Medical examination of the "hearing loss" students.
4. Group intelligence tests.
5. Superintendent's office reports.
6. School Nurse's office reports.
7. Lip reading instructor's reports and aid.

#### TYPES OF DATA COLLECTED

1. Percentage of hearing loss for all students was taken from individual record sheets of the 4-B Audiometer hearing tests.
2. Items of information about eye defects, dental defects, speech defects, and specialist's reports were received from student health records in the office of the school nurse.
3. Information regarding childhood diseases which might affect hearing loss was obtained from a questionnaire sent to parents of children with deficient hearing.
4. Intelligence quotients for all children with deficient hearing was obtained from Hermon-Nelson Mental Ability Tests - Form B.
5. Index of school marks was taken from all the grades recorded for a child since entering school.
6. Information related to lip reading was received from an interview with the instructor in lip reading, Mrs. Frances E. Gwinn.

#### DEFINITION OF TERMS

The 4-B Audiometer is essentially an instrument to test the hearing acuity of a group of individuals.

As used in this study, hearing loss refers to the hearing acuity of an individual whose Audiometer test shows 9% or more hearing loss.

Deficient hearing and impaired hearing are the same and may be defined as: hearing loss varying in degree from almost perfect hearing to all but perfect deafness.

Percentage hearing loss is a unit of measurement of hearing loss.

Sensation Unit is also a unit of measuring hearing loss and is the same as percentage hearing loss.

Grade index refers to a unit representing all the school marks made by an individual child.

Lip reading is referred to as the art by means of which speech is understood through seeing and interpreting the visible movements which accompany it.

The term social status refers to the economic level. (To be in the lower level one must have been known to have been on relief or received charitable help.)

Otosclerosis is progressive, inherited deafness caused by the hardening of the spongy bone in the inner processes of the ear.

#### PRESENTATION OF DATA

It is planned to present the data in statistical tables and to precede and follow with discussion and analysis of findings as presented in the tables.

## CHAPTER II

### PROBLEM OF HEARING LOSS IN EMPORIA CITY SCHOOLS

#### \*EXPLANATION OF THE 4-B AUDIOMETER AND ITS USE

The 4-B Audiometer is a school or group audiometer and is a phonograph to which has been added telephonic apparatus so that the sounds produced in the phonograph can be transmitted directly to the ears of the individuals under examination. The 4-B Audiometer consists of a spring motor phonograph using a magnetic reproducer instead of the usual acoustic reproducer. The magnetic reproducer picks up the vibrations originated by the record and transforms them into electrical vibrations. These in turn are conveyed to a telephone headset, transformed into sound waves and delivered to the ear of the person or persons under examination, who hear as if by telephone. In Figure 1, it will be observed that the audiometer is similar to a phonograph in operation and appearance. It will be noted that one ear is tested at a time and when the telephone head set is on the right ear all pupils must have it on that ear.

---

\* Explanation and illustrations are used by permission of Western Audiphone Distributors, Kansas City, Mo.



FIGURE 1.

MAKING TESTS WITH THE 4-B AUDIOMETER

ADVANTAGES

The principal advantage of the 4-B Audiometer is that with its use it is possible to make hearing acuity tests on a group of persons with a greater degree of accuracy and uniformity than is obtainable in any other method now employed.

The 4-B Audiometer affords a faithful reproduction of conversational speech covering a wide frequency range. A test made with the 4-B Audiometer is therefore superior to the watch tick or whispered speech test in which higher pitches predominate.

The 4-B Audiometer permits the detection of conditions of hearing acuity impairment in either ear, a condition which by special concentration of attention might pass through two ear tests unnoticed.



Permanent records may be kept of pupils' hearing acuity so that they may be checked with subsequent records.

### RECORDS

The phonograph records employed with the 4-B Audiometer are double faced, one side for the right ear and the other side for the left ear. They have been made so that the intensity of speech sounds (numbers) transmitted to the listener's ear decreases in small steps to a minimum, returns abruptly to the maximum, then decreases again. The process occurs four times in playing each side of the record. The first two series of numbers on each face are spoken in a woman's voice and the second two in a man's voice. Each decreasing series is composed of different numbers, since repetition would introduce the memory factor into the test. The same rate of intensity attenuation is, however, maintained in all eight series. Each ear can, therefore, be tested four times at each intensity. The determination of hearing loss can thus be made with considerable accuracy.

Two records are provided, one with two digit numbers for use in classes below the 5th grade, the other with three digit numbers for the 5th grade and above. Experience has shown that grades below the last half of the 2nd year can not be tested satisfactorily in large groups.

### RECORDING SHEETS USED

The individual being examined is provided with a special recording sheet as illustrated in Figures 2 and 3 which follow. They contain all the instructions necessary for their use. The listener writes the numbers

heard on these special forms, thus indicating the sound intensity at which intelligibility ceases. The intensity determines the persons' acuity of hearing.

NAME Jamuel Smith  
 AGE 18  
 GRADE 12  
 DATE February 19, 1927

DO NOT MAKE ANY NOISE AS IT WILL SPOIL THE TEST

INSTRUCTIONS  
 YOU WILL HEAR NUMBERS SPOKEN BY A PERSON WHO IS MOVING AWAY FROM YOU. THE VOICE WILL GET WEAKER AND WEAKER. LISTEN CAREFULLY AND WRITE AS MANY NUMBERS AS YOU CAN.

HEARING LOSS	RIGHT EAR				LEFT EAR				HEARING LOSS
	1	2	3	4	5	6	7	8	
30	516	517	518	519	520	521	522	523	30
27	517	518	519	520	521	522	523	524	27
24	518	519	520	521	522	523	524	525	24
21	519	520	521	522	523	524	525	526	21
18	520	521	522	523	524	525	526	527	18
15	521	522	523	524	525	526	527	528	15
12	522	523	524	525	526	527	528	529	12
9	523	524	525	526	527	528	529	530	9
6	524	525	526	527	528	529	530	531	6
3	525	526	527	528	529	530	531	532	3
0	526	527	528	529	530	531	532	533	0
-3	527	528	529	530	531	532	533	534	-3

HEARING LOSS 0                      HEARING LOSS 0

HISTORY  
 DID YOU EVER HAVE AN ACHES OR PAIN IN YOUR EAR? No WHICH EAR? None  
 DID YOU EVER HAVE A RINGING EAR? No WHICH EAR? None  
 DOES IT RING NOW? No  
 DO YOU EVER HAVE NOISES IN YOUR EAR, LIKE BUZZING, HISsing OR ROARING? No  
 WHICH EAR? None WHEN? None

FIGURE 2.

TYPICAL CASE SHOWING  
 NORMAL HEARING

NAME William Jones  
 AGE 11  
 GRADE 5 B  
 DATE February 1, 1927

DO NOT MAKE ANY NOISE AS IT WILL SPOIL THE TEST

INSTRUCTIONS  
 YOU WILL HEAR NUMBERS SPOKEN BY A PERSON WHO IS MOVING AWAY FROM YOU. THE VOICE WILL GET WEAKER AND WEAKER. LISTEN CAREFULLY AND WRITE AS MANY NUMBERS AS YOU CAN.

HEARING LOSS	RIGHT EAR				LEFT EAR				HEARING LOSS
	1	2	3	4	5	6	7	8	
30	516	517	518	519	520	521	522	523	30
27	517	518	519	520	521	522	523	524	27
24	518	519	520	521	522	523	524	525	24
21	519	520	521	522	523	524	525	526	21
18	520	521	522	523	524	525	526	527	18
15	521	522	523	524	525	526	527	528	15
12	522	523	524	525	526	527	528	529	12
9	523	524	525	526	527	528	529	530	9
6	524	525	526	527	528	529	530	531	6
3	525	526	527	528	529	530	531	532	3
0	526	527	528	529	530	531	532	533	0
-3	527	528	529	530	531	532	533	534	-3

HEARING LOSS 12                      HEARING LOSS 9

HISTORY  
 DID YOU EVER HAVE AN ACHES OR PAIN IN YOUR EAR? Yes WHICH EAR? Both WHEN? last year  
 DID YOU EVER HAVE A RINGING EAR? Yes WHICH EAR? Right WHEN? last year  
 DOES IT RING NOW? No  
 DO YOU EVER HAVE NOISES IN YOUR EAR, LIKE BUZZING, HISsing OR ROARING? Yes  
 WHICH EAR? Both WHEN? Often

FIGURE 3.

TYPICAL CASE SHOWING  
 HEARING LOSS IN BOTH EARS

GRADING

The approved method of determining hearing losses for grading purposes is simple and accurate. A pupil who hears the numbers correctly with both ears, down to zero level, as indicated on the chart, Figure 2, has a zero hearing loss or normal hearing. If, however, the last number heard correctly, with either ear, in any one of the four groups of the test is opposite say 12, the pupil is graded with a 12 per cent hearing

loss for that ear. (See right ear, Figure 3.) The last number heard correctly is checked in each group. A master sheet is provided, with which an accurate check is quickly made for each test in order to determine the listener's hearing loss.

#### THE AUDIOMETER TESTS IN EMPORIA

In the Emporia survey all scores up to and including 6% loss were listed as beginning loss and all with 9% and above were listed as a definite loss. All pupils whose first test indicated a loss of 6% or more in hearing were retested. Upon being retested, many pupils made better scores and were reclassified.

The final tabulation by schools is shown in Table I.

TABLE I  
RECORD OF AUDIOMETER TESTS BY SCHOOLS

School	Percentage of Hearing Loss													
	-3	0	3	6	9	12	15	18	21	24	27	30	30+	
Union	38	13	50	11	2	1								
Century	25	11	39	6	6	1	2	1						
Walnut	39	21	74	19	1	1		2						
Mary Herbert	23	16	43	22										
Kansas Avenue	26	17	34	16	1	4	2	1						
Maynard	33	24	63	18	2	2		1	1					
Riverside		2	6	5			1							
Junior High	276	63	189	130	9	7	5	8	1				1	1
Senior High	472	42	106	67	4	6	5	2	2	1	1	1		

Read table thus: Union school had 38 pupils with a -3% loss, 13 with a 0% loss, 50 with a 3% loss, etc.

The range of hearing loss found on the recording sheet ranges from 3% to 30% in ranges of 3%. The 4-B Audiometer does not disclose the per cent of hearing loss over 30%, neither does it disclose the per cent of hearing acuity of the better than normal group. There is a type of audiometer called the 6-A, made for diagnostic purposes, which will test any desired frequency from 100 to 10,000 cycles per second. Thus, it is possible to test the extent of a pupil's loss throughout the entire auditory range. Pupils showing a loss as high as 30% hear the loud numbers while the pupils with normal or better hearing will be able to hear the faintest of numbers. The normal group will fall in the range of 0% and below. The pupils whose hearing loss falls in ranges 3% and 6% have a slight hearing loss. Losses of 6% were considered as significant in many cases and were referred to specialists. Others with a 6% loss had slight colds and later when retested were normal. Individuals whose range falls between 9% and 30% inclusive, were considered as having impaired hearing. They are able to hear ordinary conversation but have difficulty in hearing at times. For example: a boy in Lowther Junior High School, with a hearing loss of 30% in both ears, is not able to hear ordinary classroom conversation but is able to hear if spoken to, directly, in a loud tone.

Between normal hearing and deafness there stretches a broad transitional area which is commonly described as hardness of hearing in which may be found every degree of hearing deficiency from almost perfect hearing to all but perfect deafness.

In Table I, it will be observed that there is a considerable drop in hearing loss after 6%. Cioceo<sup>1</sup> reports that when Fowler and Fletcher began audiometer tests in 1926, they regarded hearing impaired when the test showed a hearing loss of 9% or more. Although, in a later paper they advised that a loss of 6% should be significant, 9% generally is accepted as the lower limit of impairment.

Table II presents the total number taking the audiometer tests in the Emporia city schools. It shows the number and per cent that were found to have a hearing loss in each school and finally the total number and per cent having a hearing loss in all the schools.

---

<sup>1</sup> Antonio Cioceo, "Audiometric Studies on School Children." "I. The Consistency and Significance of Tests made with the 4-A Audiometer." Reprint No. 1776, p. 2, from the Public Health Reports, Washington, D. C., Vol. 51, No. 41, p. 1402-1416, (October 9, 1936).

TABLE II

HEARING LOSS LISTED BY NUMBER TAKING TESTS IN EACH  
SCHOOL AND PER CENT OF TOTAL HAVING HEARING LOSS

	No. tested	No. with hearing loss	Per cent
Union . . . . .	115	3	2.60
Century . . . . .	85	4	4.70
Walnut . . . . .	157	4	2.54
Mary Herbert . . . . .	110	1	.99
Kansas Avenue . . . . .	101	8	7.92
Maynard . . . . .	144	6	4.16
Riverside . . . . .	14	1	.71
Elementary schools total	726	27	3.85
Junior High . . . . .	692	33	4.76
Senior High . . . . .	708	22	3.10
Totals	2126	82	3.85

Read table thus: Union school had 115 tested. There were 3 children with a hearing loss which was 2.6% of the total children tested,

It is reported<sup>2</sup> that approximately 3% of the children in the public schools throughout the country have impaired hearing. The totals in Table II support those reports. There are some probable explanations for the higher per cent in the Junior High School. First, is the compulsory school age law which requires all children to attend school until sixteen years of age. Then, apparently, the Junior High School has a holding power that the higher level does not have, due possibly, to more consideration being given to individual differences and guidance. Another probable reason is otosclerosis (congenital deafness), which commonly shows up in girls about thirteen to fifteen years of age. Otosclerosis is sometimes called dry catarrh. No pain or discharge may be present. While this trouble more often affects the adult in the twentieth or thirtieth year, it often makes its appearance in the "teen" age by attacking one ear, at that time.

It will be noticed that Kansas Avenue School has 101 enrolled, and that 7.92% of the enrollment have impaired hearing. While Mary Herbert School with 110 enrolled has only .99% with a hearing loss. This difference might be due to the communities which each school represents. In the Kansas Avenue district, the town has been settled a long time and many of the patrons belong to the unskilled laboring class, while the Mary Herbert district is a comparatively new section of town. The parents are young and progressive. More of the patrons probably have regular employment and

---

<sup>2</sup> Fredrika Moore, "Summary of the Work Done for Hard of Hearing Children in the Different States." The Auditory Outlook, Vol. No. 4, p. 173, (July, 1930).

naturally would have more money for medical expenditures. Joseph. A. Murray, M. D.,<sup>5</sup> gave the following report concerning an investigation in the Washington, D. C., schools:

The U. S. Bureau of Education reports interesting differential statistics of prevalence of hearing defects at different economic levels. Three thousand, one hundred and sixty-three children were tested with the phone-audiometer. In a school in the foreign section, where lack of means of education resulted in poor hygiene and little or no medical care, the percentage of children with hearing impairment was found to be 25. In a school where the pupils came about equally from the foreign class and middle class American, it was 15 per cent. Where the children were all from middle class families, the percentage was 10, and in a private school of children from homes of wealth, the percentage was less than one per cent.

Table III shows the number of pupils with a hearing loss according to age. The age was taken from the individual recording sheets of the audiometer test.

---

<sup>5</sup> Joseph A. Murray, M. D., "Common Sense Means of Conserving Hearing", Hearing News, Vol. 5, No. 4, p. 1, (April, 1937).



TABLE III  
 HEARING LOSS IN THE VARIOUS SCHOOLS BY AGE

Age	Number with hearing loss
Seven . . . . .	1
Eight . . . . .	6
Nine . . . . .	7
Ten . . . . .	5
Eleven . . . . .	7
Twelve . . . . .	5
Thirteen . . . . .	9
Fourteen . . . . .	8
Fifteen . . . . .	17
Sixteen . . . . .	11
Seventeen . . . . .	3
Eighteen . . . . .	3
Total . . . . .	82

Read table thus: There was one child, age seven with a hearing loss.

In Table III, it will be noted that the number of cases of hearing loss is fairly constant for ages seven to fourteen. The increased number for ages fifteen and sixteen is probably due to several reasons. There is a group that find the "going too tough" about the freshman year and as a result, are required to repeat the grade. This retarded group, sometimes, causes a congestion in the freshman year. Many of this group drop out of school after completing their freshman year, or after they become sixteen years of age.

Those who remain in school apparently do better work. Margaret Dunn<sup>4</sup> reports that, "Other factors which might be responsible for apparent improvement after sixteen is an actual increase in acuity and that the older child makes a more determined effort to hear faint numbers."

The data for Table IV was taken from the individual recording sheets of the audiometer tests. It shows the number in each grade, in all the Hyporia schools, with a hearing loss.

---

<sup>4</sup> Margaret Dunn, "Lend Me Your Ears."  mimeographed Report.  
P. C. Public Schools, Port Washington, New York. (1937).

TABLE IV  
HEARING LOSS IN ALL EMPORIA CITY SCHOOLS  
LISTED BY GRADES

Grade	Hearing loss
Third . . . . .	7
Fourth . . . . .	5
Fifth . . . . .	11
Sixth . . . . .	9
Seventh . . . . .	6
Eighth . . . . .	3
Freshman . . . . .	19
Sophomore . . . . .	6
Junior . . . . .	8
Senior . . . . .	5
Total . . . . .	<u>82</u>

Read table thus: In the third grade there were seven with a hearing loss.

Table IV shows about a 250% increase for the freshman year. There are several explanations which might be given for the large number in the freshman class. All the factors, that have been suggested for the large number of hearing loss cases for ages fifteen and sixteen on the preceding page, might be presented as a cause for the increase in the freshman class. In addition to these factors, there are about seventy additional students added each year to the freshman class of the Emporia High School, from the rural schools. There are also, about eighteen who enter high school each year from the Sacred Heart Parochial School.

In Table V, the total number and per cent of boys and girls, in the Emporia City Schools, with a hearing loss is shown.

TABLE V  
HEARING LOSS LISTED BY SEX ACCORDING  
TO SCHOOL GROUPS

Schools	Boys	Per cent	Girls	Per cent
Elementary (grades 3-6)	14	51.8	13	48.2
Junior High	15	45.5	18	54.4
Senior High	6	27.3	16	72.7
Totals	35	42.7	47	57.3

Read table thus: In the elementary grades there were 14 boys and 13 girls with a hearing loss.

Table V shows that, in the elementary grades and the Junior High School, the number of cases of hearing loss is divided fairly even, as far as sex is concerned. But, in the Senior High School there is considerable difference in favor of the boys. This is probably the exception rather than the rule and likely has no statistical significance. In the Port Washington, New York, public schools<sup>5</sup> (a community comparable to Emporia in school population) the results of audiometer tests show that there are slightly more boys than girls with a hearing loss. The difference in the number of boys and girls with a hearing loss, in the Emporia Senior High School, might be explained by the fact that boys who are in the retarded group usually drop out of school, while there is evidence that girls are more stable and stay in school longer.

<sup>5</sup> Ibid., p. 19.

Table VI shows the number and per cent of each race, represented in the Emporia City Schools, with a hearing loss.

TABLE VI  
DISTRIBUTION SHOWING HEARING LOSS BY RACE

Race	Number taking tests	Number with hearing loss	Per cent
White . . . . .	1989	78	3.92
Colored . . . . .	103	2	1.94
Mexican . . . . .	34	2	5.88
Totals	2126	82	3.85

Read table thus: There were 1,989 white children who took the audiometer tests; 78 had a hearing loss, which is 3.72%.

Table VI shows that the per cent of colored children with a hearing loss, is below normal and that the per cent of Mexican children is above normal for all Emporia children taking the audiometer tests. This would indicate that the hearing acuity of colored children is better than normal, and that the hearing acuity for the Mexican children is below normal. There are no general figures available to support these findings. However, there is reason to believe that, had there been several hundred children from these two race groups taking the test, the percentages would have been closer to the normal. The fact that the fourteen and fifteen year old groups, where hearing loss is apparently greatest, is not well represented makes this conclusion reasonable. The reason that the number of Mexican children enrolled in the Emporia City Schools is less than the number of colored children enrolled, is probably due to the fact that many of the Mexican children attend the Sacred Heart Parochial School.

Table VII gives the social status of the children who have a hearing loss. Each case was classified by the school nurse, who is informed about the economic welfare of most all the parents of Emporia school children. Her records show whether parents have been on relief or have received charitable help. It is on this basis that the classification was made.

TABLE VII  
SOCIAL STATUS OF CHILDREN HAVING A HEARING LOSS

Level	Number with hearing loss	Per cent
Lower level	45	54.9
Upper level	37	45.1
Totals	82	100.0

Read table thus: There are 45 children or 54.9% with a hearing loss who are in the lower social level.

It will be noticed, that in Table VII, a greater per cent of the children come from homes of parents placed in the lower social level. This condition is very similar to the report of Joseph A. Murray, M. D.,<sup>6</sup> concerning the prevalence of hearing defects at different economic levels. However, the difference in the prevalence in Emporia is not as great as that found in other reports, probably because Emporia's economic strata is not so clearly defined.

<sup>6</sup> Joseph A. Murray, loc. cit.

## SUMMARY

As a result of the 4-B Audiometer tests, conducted in the Emporia city schools, the following facts were disclosed:

1. Out of 2,126 taking the tests 82, or 3.85% were found to have impaired hearing.
2. There is a difference in the prevalence of hearing loss for the various schools.
3. A high per cent of the children, found with a hearing loss, are ages fifteen and sixteen, respectively.
4. The freshman group have an increase of 250% in frequencies over the other groups.
5. There are slightly more girls than boys with a hearing loss.
6. The colored children were found to have better than normal hearing acuity, while for Mexican children, the hearing acuity is below normal.
7. The per cent of children with impaired hearing is slightly higher in the lower social level.

## CHAPTER III

### PROBLEM OF MEDICAL TREATMENT OF CHILDREN WITH IMPAIRED HEARING

Of the eighty-two children in the Emporia schools with impaired hearing, the school nurse knew from the medical history of the children that it would be unnecessary to recommend sixteen of them for treatment. The reason the sixteen children were not recommended for treatment, was due to the fact that their deficient hearing had been reported by teachers and the school nurse, previous to the first audiometer tests of September, 1937. The nurse had advised the parents of these children to consult a specialist which the parents, in most cases, had done. These children were already in the lip reading class that had been organized two years previously. The remaining sixty-six children were each given a letter to take to their parents. The parents were asked to take the child and the letter to a specialist. The letter with the physician's report was to be returned to the school nurse. A copy of the letter is found below:

#### Emporia Public Schools

Dear Parent:

September 22, 1937

Your child \_\_\_\_\_ has been given two audiometer hearing tests at school, and the tests seem to show that he has a loss in hearing.

This amount of hearing loss in children would indicate for this case the need for immediate medical attention to determine if his hearing could be improved by treatment.

If his hearing can not be improved by treatment and, if the loss is of the progressive type, the school will then offer special educational help for the child.



So we urge you to take the child to an ear specialist for examination and advice, taking this note with you so he may see the amount of hearing loss the test showed.

If you can not plan to go to the doctor within a week or two, will you not come to my office in Junior High School between the hours of 1 and 2 p.m. to talk this over?

To the Physician:

This child has a loss of \_\_\_\_\_ sensation units in the right ear and \_\_\_\_\_ sensation units in the left ear.

Is treatment indicated? \_\_\_\_\_

Would he benefit from lip reading instruction? \_\_\_\_\_

Stella E. Klein

It was hoped that the parents would cooperate one hundred per cent in giving the children needed attention. However, only about one-half of the letters were reported back to the school nurse by the children after visiting the ear specialist.

#### CAUSES OF DEAFNESS

Nine of these children were not recommended for medical treatment by the specialist but were advised to enter lip reading classes. Some of the reasons no treatments were advised are as follows:

1. Ear drum gone as a result of radical mastoid operation.
2. Ear drum was gone, caused by a discharging ear when child was younger.
3. Ear damaged when a baby.
4. Nerve deafness.
5. Nerve affected.
6. Deafness a family characteristic.

7. Blood test recommended.
8. Attention to general health recommended.
9. Has chronic middle ear disease--has definite conductive deafness.

#### RECOMMENDATIONS MADE

The reports and recommendations of the specialists were received by the nurse on the returned special letter sent to the parents and the physician. The results of the examinations and recommendations made by the specialists are listed as follows:

1. Thirteen children were advised to have tonsils and adenoids removed.
2. One was advised to have adenoids removed.
3. Five had received tonsilectomies. (Two were retested and found to have normal hearing.)
4. Nasal treatments were advised for three.
5. Fourteen were reported as receiving treatment.
6. Five showed definite response to treatment.
7. Cerumen removed--retest showed normal hearing.
8. Wad of cotton removed from girl's ear (no one knew how long it had been there.) Retest showed normal hearing.
9. Conductive deafness - should respond to treatment.
10. Wasserman test advised - test was made - showed negative.
11. Fungus in ear removed - retest advised.
12. Retracted ear drum. Tonsils and adenoids removed - advise retest.

From these reports and examinations, it will be observed that upon being retested, nine children showed normal hearing as a result of the medical attention received. It is highly probable that a large per cent

of the children who required a series of treatments will respond in such a manner that in future tests, their hearing will be found normal. Due to the fact that the school nurse's time was taken up largely by her routine duties, in addition to giving all the Emporia city school children tuberculin tests, not as many audiometer retests were given as were desirable. However, it is planned to carry on the ear-testing program each year. Then the results of medical treatments can be recorded in a definite way.

#### PARENTAL INDIFFERENCE

The fact that only about fifty per cent of the children visited a doctor, or explained failure to do so to the proper school authorities, would indicate that there is a lack of cooperation on the part of the parents. This lack of cooperation may be the result of several things. It may be indifference, ignorance, no money, pride, and so on. However, from reports of other investigations, there is reason to believe that it is largely indifference.

Margaret Dunn<sup>1</sup> in her survey of hearing loss in the Port Washington, New York, schools says, "Who is going to educate the parents to realize that early treatment, as well as sufficient treatment, is a vital factor in the conservation of hearing."

Pauline Maclean<sup>2</sup> writes, "The parents of hard of hearing children are our greatest problem. They do not want to admit that their child needs any special attention."

---

<sup>1</sup> Margaret Dunn, "Lend Me Your Ears." Mimeographed Report, p. 5, Public Schools, Port Washington, New York. (1937).

<sup>2</sup> Pauline Maclean, "The Problem of the Hard of Hearing Junior." Hearing News, Vol. 4, No. 5, p. 4. (May, 1936).

Here is a case which shows typical parental indifference. Recently, an Emporia mother of a third grade child (who had a hearing loss of 21% in the right ear and 27% loss in the left ear) made the following remarks to the writer in a conversation about her child, "I don't know what is the matter with Mary; sometimes when I tell her to do something she doesn't pay a bit of attention to me, and other times she seems to hear me just fine. Sometimes I think she does it just to work me--pretending she doesn't hear." When asked if she had ever had Mary's ears examined by a specialist, she replied, "Well, Miss Klein did say Mary was hard of hearing, but I just haven't got around to taking her to a doctor. The only time Mary ever had any trouble with her ears was one time after she had been in swimming, we had some dry wax removed--I think kids just have to 'kinda outgrow' those things."

It is not always parental indifference, however. A year or so before the first audiometer tests were given, the teachers in one of the grade schools called the nurse's attention to a fourth grade boy's inability to hear. The nurse asked the parents to have the boy's ears examined by a physician. After examining the boy's ears, the practitioner said, "There is nothing the matter with Bobby's ears--he can hear all right." But, the recent audiometer tests showed definitely that Bobby had 18% hearing loss in each ear. Bobby also had defective vision, and it took several visits and considerable persuasion by the school nurse to convince the parents that glasses were necessary.

Many of the children, who visited an ear specialist and received attention found their hearing improved or restored. This would lead one

to believe that many more could have been benefited had they been taken to an ear specialist.

For those who did not have the money to pay for medical attention, the school nurse provided for them for special funds. Always, however, there are some people who are too proud to accept charity even to save a child's hearing.

In spite of follow-up visits by the school nurse, it is seemingly impossible to get parents to cooperate one hundred per cent.

## CHAPTER IV

### RELATIONSHIP BETWEEN HEARING LOSS AND VISION DEFECTS, DENTAL DEFECTS, SPEECH DEFECTS, DISEASE CAUSED DEFECTS, IMPAIRED TONSILS AND ADENOIDS, SWIMMING, INJURIES, AND HEREDITY

It is not the purpose of this study to attempt to determine the cause of defective hearing. That will be left for the specialists to determine. It is the purpose, however, to disclose some of the relationships that exist between hearing loss and some of the common physical defects, some of the common infectious childhood diseases, impaired tonsils and adenoids, swimming, some of the physical injuries to the ear, and heredity.

The data for this part of the survey were taken from the individual medical history records of the students, which are on file in the office of the Emporia School Nurse. A medical history questionnaire was prepared and sent to the parents of each child who was found to have impaired hearing. Finally, an interview was held with Dr. W. B. Granger,<sup>1</sup> Eye, Ear, Nose and Throat Specialist, concerning the above mentioned relationships.

#### VISION DEFECTS

The investigations show that twenty-one, or 25.6%, of the eighty-two children with impaired hearing in the Emporia city schools, have defective vision. If there is any relationship existing between hearing loss and defective vision, according to Dr. Granger, it would probably be congenital, e.g., inherited syphilis which might affect the eyes and ears together.

---

<sup>1</sup> W. B. Granger, M. D., F.A.C.S., Interview, Office, Emporia, Kansas, June 23, 1938.

## DENTAL DEFECTS

Although twenty-two cases were recorded as having dental defects, no evidence could be found to show that there is any direct relationship between dental defects and hearing loss in children.

## SPEECH DEFECTS

Five children, or .61%, were reported as having a slight defect in speech. Martha Pehrsson Henning, M. D.,<sup>2</sup> has the following to say about the relationship of defective speech and deafness:

It is clear that the grade of defective hearing and the age when it is acquired are of the highest importance in the acquisition of speech. If an infant who has not yet learned to speak acquires such hearing loss that he cannot hear ordinary speech, he does not learn to speak. And if a child who has not yet acquired full speech is struck by total deafness, he will also become deaf-mute, because he soon forgets the language he no longer hears. If an adult is totally deafened, however, he will not become mute, though some speech defects will appear.

Dr. Granger says, "Where there is some difficulty in speech, hearing incorrectly might cause a child to learn to speak those words incorrectly." He also said, "Eye, dental, and speech defects might accompany ear defects in a slightly subnormal child." Three, of the five children referred to as having slight speech defects, are known to have damaged ear drums as a result of infections or injury. The other two children might be classed as subnormal, since they both have defective vision and low intelligence quotients.

---

<sup>2</sup> Martha Pehrsson Henning, M. D. "Deafness and Its Prevention," Volta Review, Vol. 39, No. 1, p. 5, (January, 1937).

## DISEASE CAUSED DEFECTS

The following questionnaire was sent to the parents of the eighty-two children who were found to have impaired hearing:

## Medical History of Children Who Have a Hearing Loss.

Name \_\_\_\_\_

Birthday \_\_\_\_\_

Year      Month      Day

Please check the disease your child has had and give his age at the time of the disease as accurately as possible.

Red measles \_\_\_\_\_ Did he have ear complications? \_\_\_\_\_

Scarlet fever \_\_\_\_\_ " " " " " \_\_\_\_\_

Whooping cough \_\_\_\_\_ " " " " " \_\_\_\_\_

Diphtheria \_\_\_\_\_ " " " " " \_\_\_\_\_

Asthma and Hay Fever \_\_\_\_\_ " " " " " \_\_\_\_\_

Common colds \_\_\_\_\_ " " " " " \_\_\_\_\_

Has he ever had a draining ear? \_\_\_\_\_ Right \_\_\_\_\_ Left \_\_\_\_\_

Has he had a mastoid operation? \_\_\_\_\_ Right side \_\_\_\_\_ Left side \_\_\_\_\_

Has he had tonsils and adenoids out? \_\_\_\_\_

Has he ever had an injury which has affected hearing? \_\_\_\_\_

Are there others in the immediate family, as parents, aunts, uncles, who have had a hearing loss? \_\_\_\_\_

Other remarks or explanations \_\_\_\_\_

In tabulating the reports of the medical history questionnaire, it was found that fifty-six or 68.3% of the questionnaires had been returned to the proper school authorities. These reports are tabulated in Tables VIII, IX, X, and XI.



Table VIII shows the number and per cent of children having had the various childhood diseases and ailments, which, with certain complications might cause a hearing loss. Along with the number who have had the diseases or ailments, the number and per cent of complications resulting from those diseases and ailments are also tabulated.

TABLE VIII

REPORT OF MEDICAL HISTORY QUESTIONNAIRE AS REPORTED  
BY THE PARENTS OF FIFTY-SIX CHILDREN  
WITH IMPAIRED HEARING

Disease, ailment or injury	No. of reports	Per cent	Reports of complication	Per cent
Common colds	43	76.8	15	34.9
Scarlet fever	15	26.8	4	26.6
Red measles	50	89.3	6	12.
Whooping cough	48	85.7	1	.2
Diphtheria	0	0.	0	0.
Asthma and Hay Fever	5	8.9	1	20.
Encephalitis	1	1.8	1	100.
Pneumonia	1	1.8	1	100.
Mastoid operation	3	5.4	3	100.
Fungus in ear	1	1.8	1	100.
Convulsions at birth	1	1.8	1	100.
Swimming	2	3.6	2	100.
Physical injury	6	10.7	3	50.
Draining ear	18	32.1		
Tonsils and adenoids removed	30	53.6		
Immediate relatives with hearing loss	18	32.1		

Read table thus: Forty-three or 76.8% of the fifty-six children have had common colds, 15 of the 43 or 34.9% report complications with colds. Read in like manner for the other diseases.

In the group of infectious childhood diseases found in Table VIII, the common cold is found to be the disease causing the highest per cent of complications. Next, comes scarlet fever which shows 26.6% of the complications directly as a result of the disease. While red measles was reported as the most frequent disease, the per cent of direct complications is comparatively low. Whooping cough follows measles in frequency, and the per cent of complications is also very low. The fact, that there was such a high percentage of complications resulting from common colds, may be explained in this way. It is possible that many of the children reported as having complications with colds have had measles or scarlet fever, and at that time the disease did not seem to affect the ears to the extent that the parents thought medical attention was necessary. There could have been a slight infection present, which would remain comparatively dormant until such a time when an inflammation in the throat or a congestion in the eustachian tube would cause a serious infection in the middle ear, where the auditory nerve is located. A gradual loss of hearing from repeated colds is usually brought to the attention of parents and teachers only after considerable hearing loss is sustained. This insidious progress in chronic colds is especially serious.

Dr. W. B. Granger made the following statements concerning the age of children at the time of childhood diseases:

The chances of complications or infection in the ear accompanying childhood disease is in proportion to age. Because the eustachian tube, the path of infection to the ear, becomes bent and smaller as the child grows older. Therefore, the probability of infection would become less as the child grows older.

Dr. Granger goes on to say, "Infectious diseases of childhood (notably measles and scarlet fever) are prone to cause otitis media,

which may persist as a discharging ear. The continuance of this discharge is often favored by diseased tonsils and adenoids."

Dr. Martha Pehrsson Henning<sup>5</sup> has the following to say,

Acquired deafness is often among the effects of contagious diseases, but may also be acquired in the fetus or at birth. Catarrh in the middle ear and a beginning otosclerosis are characterized by poor perception of low notes. A perforation of the drum membrane such as performed by the physician when an inflammation in the middle ear makes it necessary to drain the cavity, generally heals within a short time. But serious inflammation caused through scarlet fever may damage the drum seriously and lastingly. Total deafness is never the result of a defective, even a wanting drum. It is now possible to construct artificial drums. Complete deafness occurs only when the inner ear or the auditory nerve is damaged.

Apparently there is a very close relationship between infectious childhood diseases and hearing loss. At least, the investigations show that there is a relationship between common colds, scarlet fever, red measles, and complications which cause hearing impairment. This might mean that there is need for parent education in seeking proper medical attention at the proper time, for their children, in order to prevent permanent damage to their children's hearing.

Asthma and hay fever (asthma and hay fever usually accompany each other) was reported by five or 8.93% of the cases reported. Only one case was reported as causing complications with hearing. This may be explained by stating that when there is an inflammation in the nasal canal, a congestion appears which might cause the eustachian tube to become deflated, thus, affecting the hearing at the time of the ailment.

The single instance of hearing loss following encephalitis might be only incidental. On the other hand, it is possible that a nerve deafness could follow encephalitis due to inflammation in the brain.

One case of pneumonia was reported and complications with hearing resulted. Since pneumonia is a disease of the respiratory tract, it is reasonable to infer that ear complications might easily result.

Mastoid operations were reported by four or 7.14% of all reports received. A mastoid operation is usually necessary when an infection which originates in the eustachian tube advances to the middle ear and then to the mastoid process which is only a short distance from the middle ear. It is also only a short distance to the brain from the mastoid process. There is every reason to believe that hearing impairment might result from a major operation so closely related to the ear. In the four cases mentioned, the hearing loss for the ears affected are 18% for two students and 24% and 30% respectively for the other two.

The child reported as having a fungus growth in the ear was taken to a specialist, and the growth was removed. The growth caused an obstruction in the outer ear. When this child's hearing was retested after the visit to the doctor, her hearing was found to be normal.

The eighteen cases of draining ear (otitis media) have been tabulated in Table IX to show each child's present age; his age (where it was reported) when he had scarlet fever, measles or whooping cough; complications with colds; which ear was affected; and his hearing loss as found with the 4-B audiometer.

TABLE IX

REPORTS OF EIGHTEEN CHILDREN WHO HAVE HAD A DRAINING  
EAR AS REPORTED BY THEIR PARENTS

Age	Age at time of scarlet fever (SF), measles (M), whooping cough (WC)			Complications from colds	Ear affected	Hearing loss
	SF	M	WC			
9	?	?	?	No	Right	18-3
12		5		Yes	"	9-3
9		3	8 mo.	"	"	12-3
16		?	?	"	"	18-3
14		11	7	"	Left	0-18
12	11	?	4	"	Right	21-6
14		9	?	"	"	21-9
15		3	6	No	Left	3-12
16			8	Yes	"	3-9
15	5		?	No	Right	12-3
8		6	6	Yes	Both	3-18
11		11	6	"	"	3-12
10		5	4	No	"	3-12
10	8		7	"	"	3-12
13		7	2	Yes	"	9-12
13		9	1	"	"	9-12
18		16	5	"	"	3-12
17		11	3	"	"	9-15

Read table thus: The first child is nine years of age; his age was not reported for the time of having all three diseases; he has not had complications from colds; his right ear was affected; his hearing loss is 18% for the right ear and 3% for the left.

In all cases of draining ear recorded in Table IX the child has had one (most of them had at least two) of the common infectious childhood diseases. The reports of complications with colds, show that thirteen, or 72.2%, of the cases of draining ears have had complications. A high percentage of cases probably should be expected in this situation since there were only fifteen cases reported out of the entire fifty-six questionnaires.

Where just one ear was reported as having been affected, the record for hearing loss shows that 100% suffered impairment for that ear. Where drainage was reported in both ears, 37.5% show hearing impairment in both ears, while the remaining 62.5% have a hearing loss in one ear only.

An odd fact is disclosed in Table IX, for all cases of drainage in both ears, the findings show that the greatest per cent of hearing loss is in the left ear. As far as could be determined, this is just a coincidence.

The relationship of age, at the time of the disease and infection, has been discussed on page 35.

Table X was prepared in order to show the relationship between the condition of tonsils and adenoids and colds resulting in complications.

TABLE X

CONDITION OF TONSILS AND ADENOIDS AND COMPLICATIONS WITH COLDS OF FIFTY-SIX CHILDREN AS REPORTED BY THEIR PARENTS

Impaired tonsils and adenoids			Total no. reports	Per cent	Complications with colds			
No	Yes	Out			Yes	Per cent	No	Per cent
13	"	"	13	23.2	3	23.1	10	76.9
"	13	"	13	23.2	3	23.1	10	76.9
"	"	30	30	56.5	9	30.	21	70.
Totals			56	100.	15	26.8	41	73.2

Read table thus: Thirteen or 23.2% reported no impairment of tonsils and adenoids, three or 23.1% of those thirteen report complications with colds, while ten or 76.9% report no complications.

In the above table the per cent of complications as a result of colds is just the same, 23.1%, for the thirteen children reported as having no tonsil and adenoid impairment as it is for the thirteen reported as having impairments. This would indicate that no relationship exists between complications from colds and tonsils and adenoids.

The per cent, of complications from colds for the thirty children reported as having had tonsils and adenoids removed, is 30%. There are no figures available to show the per cent of complications from colds after tonsils and adenoids were removed. (The figures in Table X are for both before and after tonsilectomies.) Therefore, it would be unwise to predict any relationship that might exist. However, further study and a more detailed history in this type of case might indicate that the complications would show less severity after the removal of tonsils and adenoids.

Dr. Joseph A. Murray<sup>4</sup> has given some practical suggestions for the

<sup>4</sup> Joseph A. Murray, M. D., "Common Sense Means of Conserving Hearing," Hearing News, Vol. 5, No. 4, p. 2, (April, 1937).

conservation of hearing in children. Some of them are presented as follows:

It has been shown that hearing loss occurs in a considerable percentage of cases during the preschool and school ages. This is the period when there is the minimum immunity to infection, and acute infections are the most frequent sources of acquired deafness. Early vaccination and immunizations may prevent some specific infections, but only a few may be avoided in this way.

A higher standard of personal hygiene aimed at breaking the chain of transmission of disease organisms, will lower the transmission and carrier rate. These measures include: Constant scrupulous hand cleanliness, especially before eating or handling food or dishes; and early isolation of ill persons.

Colds and grippe, and throat, tonsil, and upper respiratory tract infections are easily spread through hand and personal contact. Many persons readily become carriers of septic or pus producing organisms which remain latent in the tonsil or adenoid tissues and membranes of the nose, throat and sinuses. These frequently remain latent until resistance is lowered by poor hygiene, diet, or freshly acquired infections, such as colds or influenza. Repeated attacks of ear trouble frequently occur among chronic carriers of septic organisms.

Never trifle with earache. Consult a physician. Do not use home remedies.

Certain drugs, if taken in sufficient quantity, may impair hearing. Quinine and salicylates, of which aspirin is an example, belong to this group.

#### SWIMMING

Swimming was reported as the cause of two children's impaired hearing. The following discussion,<sup>5</sup> about the infections that may result from swimming, explains how the hearing of the two individuals might have become damaged:

The reason that swimming may cause harm even to the healthy ear is that infectious material which gets into the back of the nose

---

<sup>5</sup> E.P.F., "Swimming and the Ear," Hearing News, Vol. 5, No. 8, p. 1, (August, 1937).



near the opening of the eustachian tube may be sucked in whenever the middle ear becomes deflated, following forcible snuffling or swallowing with the nose closed in any way. The middle ear then acts like a rubber ball squeezed under water; when the vacuum is released, anything near the tubal opening will be sucked up towards the ear.

This is the way in which infectious material in your own nose, or from the noses of others in the sea, lake or swimming pool, may be drawn into the ear. All noses contain bacteria and there are many diseased noses which harbor them in larger numbers, so that those who do the snuffling and nose blowing in the water are apt to be the ones who suffer most. Anyone with an infection of the ears or nose or of any part of the body, is a potential source of danger to self and to others. All such should be prohibited from bathing near other people. Swimming pools are often little better than septic tanks because of failure to prohibit bathing by those with nose, throat, ear, and other infections.

Evidently a course in nasal hygiene should accompany all swimming classes.

#### INJURIES

The case reported as a hearing loss as a result of convulsions at birth is possibly due to an injury to the auditory nerve which could have occurred at that time.

Six, or 10.7%, of the children were reported as having received injuries received by three children was not reported. Two children were reported as having been struck directly on the ear by a bat or ball, and one child as receiving a fall, which might have resulted in complications. Upon receiving a blow on the ear, an injury to the ear drum or a dislocation of the ossicles could easily have occurred. The child, who received the fall, possibly suffered some nervous disorder which might have affected the auditory nerve.

## HEREDITY

Table XI will show the number of immediate relatives of children with impaired hearing, the number of times each relative was mentioned, and the per cent of times mentioned.

TABLE XI  
IMMEDIATE RELATIVES WITH A HEARING LOSS  
AS REPORTED BY THE PARENTS OF EIGHTEEN CHILDREN

Relatives	No. times mentioned	Per cent
Father . . . . .	5	18.5
Mother . . . . .	5	18.5
Brother . . . . .	0	0.0
Sister . . . . .	2	7.4
Aunt . . . . .	1	3.8
Uncle . . . . .	2	7.4
Grandfathers . . . . .	5	18.5
Grandmothers . . . . .	5	18.5
Relatives not specified.	2	7.4
Totals . . . . .	27	100.0

Read table thus: The father was mentioned five times which is 18.5% of the total number of relatives mentioned.

Eighteen parents reported that there were immediate relatives of their children with impaired hearing. In only two cases were parents and grandparents of the same family. The frequency in which parents and grandparents are mentioned is very consistent. While the frequency for sisters, aunts, and uncles was somewhat lower. It is problematical as to the relationship of hardness of hearing between children and grandparents since people old enough to be grandparents could have been exposed to a multitude of causes of hearing impairments. However, there is a possibility of

some relationship of hearing loss between the parents and children. There is still a greater possibility of relationship, of hearing loss, between sister and sister, if heredity is a factor. There have been some recent discussions, by some noted specialists, regarding heredity as a factor in deafness. Dr. Martha Pehrsson Henning<sup>6</sup> has the following to say:

It is a very difficult thing to state the percentage of congenital deafness. It demands a minute study of the families through generations; but it is likely that about 25-30 per cent of the deaf suffer therefrom.

Congenital deafness might be diminished through preventive measures, but as it is so difficult to prove what is congenital and what is not, the problem is intricate.

An address, by Dr. H. Marshall Taylor of Jacksonville, Florida, is discussed by Clyde W. Johnson<sup>7</sup> in a recent issue of The Volta Review. The address is about the prevention of deafness in the unborn child. The following paragraphs are taken from the discussion:

"The presence of deafness at birth," the southern physician told the American College of Surgeons, "does not necessarily indicate that the condition is due to some hereditary defect, for it may result from injury to the organ of hearing in the course of the intra-uterine life of the child. This type of deafness should, therefore, be classified as deafness acquired prenatally and not as hereditary deafness. The study of the prevention of deafness should, then, begin with the prenatal life of the child, which would also necessarily include the proper care of the expectant mother."

.....

The increasing support Dr. Taylor has since won for his cause is demonstrated by the comment of Dr. George E. Shambaugh of Chicago in the Eye, Ear, Nose and Throat Year Book for 1935: "The author (Dr. Taylor) has apparently proved his point that fetal idiosyncrasy to quinine is responsible for congenital deafness in certain cases and perhaps in many more cases than have ever been suspected. The tragedy of congenital deafness is so serious that the abandonment of quinine in obstetrics should be considered in favor of other methods of stimulating uterine contractions."

---

<sup>6</sup> Martha Pehrsson Henning, M. D., op. cit., p. 6.

<sup>7</sup> Clyde W. Johnson, "Prevention of Deafness in the Unborn Child", Volta Review, Vol. 39, No. 8, p. 437, (August, 1937).

On another page, Dr. Shanbaugh showed further agreement with Dr. Taylor's theories by stating: "The attempt to attribute 'heredity' or congenital deafness to Mendelian inheritance has resulted in such a complicated formula that we are encouraged to believe that heredity may not be the important factor in all cases of congenital deafness. Thus the importance of prenatal medication, especially of quinine, has recently been pointed out."

Some interesting remarks of some of the parents, taken from the medical history questionnaire are shown here to give an idea of the type of cooperation received:

We appreciate the interest taken in Thelma and are anxious to help in any way.

I used to have trouble with my ears like Virginia when I was a child at home. Her ear does not seem to give her any pain but drains when she has a cold.

Donald lost his hearing from swimming too much.

When Pauline was a nursing baby, she had draining ears, and mother had draining ears at the same time and has had several times since, but Pauline has never had much trouble since that time that I recall.

He had a vertebrae on right side of his neck behind his ear that has been dislocated twice but has had attention at once.

She never had a draining ear except during scarlet fever. The ear infection was more serious than the scarlet fever. There were abscesses in both ears.

Most of Celeste's aunts and uncles on her father's side are hard of hearing her great-grandmother was very deaf, and my father doesn't hear well.

Willa's tonsils have given considerable trouble, and I know they are in bad shape, and I feel quite sure she has adenoids which are also causing some of the trouble.

#### SUMMARY

From a study of the records and reports of eighty-two children found to have impaired hearing, and the fifty-six returned questionnaires, the

following relationships were disclosed:

1. There is very little, if any, relationship between hearing loss and defective vision.
2. No relationship between hearing loss and dental defects could be found.
3. There is some relationship between hearing loss and speech defects.
4. There is a decided relationship between hearing loss and disease caused defects.
5. To show any relationship that might exist between hearing loss and impaired tonsils and adenoids, further and more detailed study is necessary.
6. There is some relationship between hearing loss and infections in ears resulting from swimming.
7. There is some relationship between hearing loss and physical injuries to the ear.
8. Very little relationship, if any, exists between hearing loss and relatives with impaired hearing.

## CHAPTER V

### RELATIONSHIPS THAT SEEM TO EXIST BETWEEN INTELLIGENCE QUOTIENTS, SCHOOL GRADES, AND HEARING LOSS OF EIGHTY-TWO CHILDREN IN THE EMPORIA CITY SCHOOLS

The Harmon-Nelson tests of mental ability for grades 3-8, form B, were given to the third, fourth, fifth, and sixth grade children. The same form of the tests for grades 7-12 was given to the junior and senior high school students. The intelligence quotient for each individual was taken from these tests. Because of the type of test used, the reliability of measurement is probably "good" but not "excellent".

All grades recorded for each student in the superintendent's office were taken and an index number was substituted. The average grade for each student was computed and recorded. The grades were converted to an index number in the following manner: Each grade of E equals 1, G equals 2, M equals 3, P equals 4, and F equals 5. Therefore, the lower the index number, the higher the grade would be.

No attempt was made to compute correlations, between intelligence quotients, grades, and hearing loss, because it is impossible to determine the exact amount of total hearing impairment that an individual has unless the per cent of hearing loss is the same for both ears. In this study there are only four with hearing loss the same for both ears. However, there are some relationships that seem to exist between hearing loss, intelligence quotients, and school grades for students with a hearing loss as high as 9% in one ear. With the aid of Tables XII, XIII, and XIV, some of the relationships will be pointed out and discussed.

In Table XII, the intelligence quotients and grade averages, for the eighty-two children who were found to have a hearing loss, are tabulated. The intelligence quotients and averages are ranked in ranges of five. The number of frequencies for each range is also tabulated.

TABLE XII

INTELLIGENCE QUOTIENTS AND GRADE AVERAGES  
TABULATED IN RANGES OF FIVE FOR EIGHTY-TWO  
EMPORIA SCHOOL CHILDREN

(Hemmon-Nelson Form B)

Intelligence quotients	Frequencies	Grade averages
135-139	3	2.12
130-134	2	2.14
125-129	0	0.00
120-124	3	2.29
115-119	9	2.47
110-114	10	2.36
105-109	21	2.62
100-104	9	2.62
95- 99	5	2.91
90- 94	9	3.04
85- 89	5	2.97
80- 84	3	3.33
75- 79	3	3.40
70- 74	1	3.40

Read table thus: Three children have intelligence quotients that fall in the range 135-139; the grade average for the three children is 2.14.

It is quite noticeable that grade averages go down as intelligence quotients go down. It seems reasonable to expect this since scores of investigations show the same thing to be true.

The two extremes of the normal range of sixty-two intelligence quotients, of the eighty-two students, found in Table XII, are tabulated in Table XIII. In the upper twenty-five per cent of the range, there are eight cases. For the lower twenty-five per cent of the range there are eleven cases. The intelligence quotient, the grade average, and the hearing loss for each individual are recorded. The upper part of the range is represented in Group A, and the lower part of the range is represented in Group B.



TABLE XIII

THE UPPER TWENTY-FIVE PER CENT  
AND THE LOWER TWENTY-FIVE PER CENT OF THE  
INTELLIGENCE QUOTIENT RANGE IN GROUPS A AND B

GROUP A			GROUP B		
I.Q.	Grade average	Hearing loss right-left	I.Q.	Grade average	Hearing loss right-left
137	1.77	30-30	89	2.64	15- 6
137	1.80	5-12	88	3.00	12-15
137	2.80	12- 3	88	3.23	21- 3
133	1.52	6-12	86	3.00	9- 6
130	2.77	12- 6	81	3.50	18- 3
124	2.43	9- 3	80	4.00	9- 6
122	2.94	12- 3	80	4.00	15-15
121	1.52	9-15	78	3.15	-3-18
			76	3.43	12- 6
			75	3.62	18-15
			73	3.40	9-15

Read table thus: In Group A, the first individual has an intelligence quotient of 137, his grades average 1.77, and his hearing loss is 30% for the right ear, and 30% for the left ear. Read Group B the same way.

In comparing Group A and Group B of Table XIII, there are several differences that seem to stand out. First, there are the grade averages that parallel the intelligence quotients for each group. The number that have a hearing loss in only one ear, for Group A, is fifty per cent, while the number that have a hearing loss in only one ear in Group B is only 27.2%. The number of children with a hearing loss in both ears in Group A is fifty per cent against 72.8% in Group B. The children with a hearing loss in both ears are the ones who cause the most concern educationally. One might be led to believe that children with impaired hearing in both ears have a greater handicap than children with hearing impairment in only one ear. Margaret Dunn<sup>1</sup> makes the following remarks concerning some cases where the hearing loss is severe in one ear only:

For educational and social purposes, these cases are not handicapped, even remotely so. True, their sense of direction may at times be faulty, but if one ear is truly within the normal range, there is no handicap. Often, their only worry socially is that someone may discover only one ear is normal, and not the two ears. This type is apt to resent detection and assistance.

.....  
 Another example of the importance of keeping in mind cases where one ear is normal and the other is definitely not, is in scarlet fever cases. Some may go through life retaining this blessing, while others will be forced to refer to the time, "when I heard all right."

There are exceptions as well as other things to consider before drawing conclusions about the relationships between hearing loss and intelligence. For instance, a twelve year old boy, with the highest intelligence quotient for the whole group, has the highest percentage of hearing loss. This boy's hearing has not been impaired very long. His parents are very much concerned, and they are anxious to cooperate with the school authorities in every way.

---

<sup>1</sup> Margaret Dunn, "Lend Me Your Ears." Mimeographed Report, p. 6. Public Schools, Port Washington, New York. (1937).

An exception in the lower group is a Mexican boy with an intelligence quotient of 80. He has a hearing loss of 12% in one ear and 6% in the other. It is reasonable to believe that if an intelligence test, involving Spanish vocabulary should be given to him, his intelligence quotient possibly would be higher, and he might be classed in the other group.

There are other things to consider besides the amount of hearing loss, and intelligence quotients; some of them are: How long has the impairment been present? Is the ear drum affected? Is the auditory nerve affected? Are the ossicles affected?

Some children with low hearing losses might be found to have normal hearing when their hearing is tested next year, because some have had medical and surgical treatments since the last audiometer tests were given. Some children with hearing loss in only one ear, upon being retested next year, may have both ears involved.

It would not be reasonable to assume that the range of intelligence for a group of "hard of hearing" children is somewhat lower than that for a group of normal hearing children. It is true that some of the children in the lower group might be subnormal and that there may be physical defects present. The same thing might be said of a comparable group of children without hearing loss.

In comparing these two groups, there seems to be some degree of relationship existing between intelligence quotients and hearing loss. However, it would be necessary to have better and more detailed information in order to determine the actual relationships that might exist.

Of the eighty-two children in the Emporia city schools who are listed as having hearing impairments, there are eighteen or 21.9% of them who have repeated grades or half grades. They are listed in Table XIV and ranked in order of intelligence quotients. The cases with only one ear affected are found in Group A; Group B consists of cases with a hearing loss in both ears.

TABLE XIV

SOME INDIVIDUALS WHO HAVE REPEATED  
GRADES IN THE EMPORIA CITY SCHOOLS

GROUP A			GROUP B		
I.Q.	Grade average	Hearing loss right-left	I.Q.	Grade Average	Hearing loss right-left
94	3.10	9- 3	116	2.87	6-15
90	3.43	3- 9	110	2.00	9- 6
88	3.23	21- 3	105	2.45	12- 6
81	3.50	18- 3	104	2.90	27- 6
78	3.15	-3-18	94	2.92	9- 6
			92	3.03	18- 9
			90	3.00	6-15
			90	2.66	9-15
			86	3.00	9- 6
			80	4.00	9- 6
			80	4.00	15-15
			76	3.43	12- 6
			75	3.62	18-15

Read table thus: In Group A, the first individual has an intelligence quotient of 94, a grade average of 3.10, a hearing loss of 9% in the right ear and 3% in the left ear. Read Group B in the same way.

Five, or 27.7% of the children reported as having repeated grades, have a hearing loss in only one ear while there are thirteen, or 72.3%, with hearing loss in both ears. This might mean that students, with a hearing

loss in both ears, are more likely to repeat grades than students with a hearing loss in only one ear.

Before determining that there is a definite relationship existing between hearing loss and grade repeaters, more detailed information about each individual's physical condition, as well as his school history, would be necessary.

## CHAPTER VI

### THE PROGRAM FOR THE HARD OF HEARING CHILDREN IN THE EMPORIA CITY SCHOOLS

#### LIP READING

The history of lip reading in the Emporia city schools was obtained from an interview with Mrs. Frances E. Gwinn<sup>1</sup>, instructor in lip reading.

Lip reading in the Emporia city schools was the outgrowth of an adult lip reading class conducted by Mrs. Gwinn. She had made trips twice a week, for a year and a half, to Emporia from Newton, in order to instruct the adult class. In the spring of 1935, two members of the class, Dean Conrad Vandervele, of the College of Emporia, and Mr. E. K. Lord, an Emporia banker, presented a petition from the adult class in lip reading to the Emporia Board of Education. They asked the members of the school board to find out how many "hard of hearing" children there were in the Emporia city schools and to offer lip reading instruction to those who needed it.

As a result of this petition, the teachers in the Emporia city schools were asked to submit the names of all children who might be hard of hearing to the superintendent of schools. A letter was sent to the parents of eighty-eight children whose names were submitted, asking them to have their children's hearing examined by a specialist. Eighty children reported to the specialists, and forty were found to have impaired hearing. Of the forty examined, seventeen were reported as having impaired hearing

---

<sup>1</sup> Mrs. Frances E. Gwinn, Interview, 901 Constitution Street, Emporia, Kansas, June 28, 1938.

of the type that medical treatments might restore to normal. The other twenty-three were reported as of the "progressive" type and should be given special instruction. At the beginning of the second semester, in January, 1936, a class in lip reading began with Mrs. Frances E. Gwinn as instructor. (Mrs. Gwinn is a graduate of The Los Angeles School of Lip Reading, Los Angeles, California, and has had special work in lip reading at Johns Hopkins University. She is eligible for a special certificate to teach lip reading in Kansas schools.) There were three classes organized; one for children in kindergarten, first, second and third grades; one for grades four, five and six; and one for junior and senior high school students. The classes met once each week at the junior high school building.

Before the semester closed, a letter and questionnaire were sent to the parents of the twenty-three children who were in the lip reading classes. The questionnaire was sent in order to get the parents' reaction toward the lip reading instruction. It was explained to them that in order to acquire skill in lip reading, it would take quite a long time. According to Mrs. Gwinn, the reaction was very favorable in most cases. She said, "The parents were in favor of continuing the classes and in meeting oftener. Many of the parents thought the children were more alert, showed better concentration and had improved in speech." Mrs. Gwinn goes on to say, "The program is recognized as a matter of mental hygiene. The indications were that the program was worthwhile, because it equalized the opportunity for health and education to those otherwise perplexed."

The lip reading classes were continued the second year, 1936-37, very satisfactorily. They were conducted in much the same manner as they were the first semester in which they were organized, except that the classes

met twice each week. It was reasonable to expect that all children with impaired hearing were not located, and that possibly, some were in the classes who did not belong there. Mrs. Gwinn says, "Sometimes, it is very hard to distinguish between a subnormal child and one with impaired hearing."

The students in the lip reading classes the third year, 1937-38, were selected upon a different basis than formerly. A 4-B Audiometer was purchased by the board of education to be used to locate all children from the third grade through high school who might have a hearing loss. Before the audiometer was purchased, some Emporia otologists were asked to meet with the school officials for a demonstration of the 4-B Audiometer. After the demonstration, the otologists were agreed with the school officials that every child in the Emporia city schools should have an audiometer test. The otologists pointed out that every child who had a hearing loss should be found, and those who could be helped by medical treatments should be, or at least their hearing loss should be arrested. Those that could not be helped by medical treatments should be given special educational aid. The otologists also stressed the importance of vocational guidance for the latter group.

Mrs. Gwinn says, "No child should be assigned to lip reading on the basis of the audiometer test alone. He should first go to a specialist for an examination or diagnosis.\* After the specialist's report is returned and examined, and if the specialist advises lip reading, the parents are consulted. Then the lip reading instructor should inquire as to the child's school progress, his behavior, his speech and his social adjustment, before definitely

---

\* Some schools give an individual diagnostic test with a 2-A Audiometer instead of sending them to a specialist.



assigning him to the lip reading class. If there is parental objection, a conference with the lip reading instructor or the school nurse is arranged with the parents.

The audiometer tests were given under the supervision of Miss Klein, the school nurse, with the aid of classroom teachers. The tests were scored by Mrs. Gwinn. Most of the retesting was conducted by Miss Klein. The monthly bulletin for November, 1937, which was sent to each member of the faculty, contained a report of the first audiometer tests. The bulletin also contained some suggestions from the superintendent to the teachers. The report and the suggestions are as follows:

Miss Klein's Report on Audiometer Tests in the Emporia Public Schools.

We began the tests in the third grade and carried it on through the high schools.

The method used in grading the test papers is known as the conservative method. Had we used the new method, it would have increased the number of pupils with hearing losses.

I am convinced we did not make a mistake in using this conservative method, as in this way we did not refer questionable cases to the physician. In every case except one, the ear specialist supported our findings.

If parents had been told upon visiting the physician that the child had but very little difficulty or perhaps that the loss was not definite, it might cause other parents later to disregard our findings or take them less seriously. The cooperation of the parents in getting the pupils to the physician for their examination was fine. I would hardly have expected them to be so interested.

I listed as normal hearing all scores up to a 6% loss in either or both ears. A child with a 6% loss in one or both ears was classed as beginning loss. All above a 6% loss were listed as a definite loss. The last group were referred to the ear specialist for examination and advice. The doctor after examining the child, referred to the lip reading class the cases whose hearing losses were serious and others whose prognosis, he considered not good. All pupils who were classed as having a serious loss or a definite hearing loss were given two tests each.

The tests in junior high showed a greater number of children who had a 6% loss. This should be explained why this is higher than the other schools. Junior high was the first school tested, and we did not select as quiet a room as we did in the other buildings. I feel sure this number of 115 would be cut if these were retested. We did retest the worst papers of course in order to decide on those who seemed to have definite losses. This group I think is quite accurate.

	Total No. tested	No. having definite loss (more than 6%)	No. having a 6% loss
Senior High	703	25	51
Junior High	688	32	115
Walnut	158	6	20
Maynard	144	11	10
Kansas Avenue	101	10	13
Union	116	7	7
Century	85	8	2
Mary Herbert	107	1	19
Riverside	14	1	2
	<u>2,116</u>	<u>111</u>	<u>239</u>

It is too early now to try to make a report on the cases referred. As junior high was the first school tested, their report would be more nearly complete. It is as follows:

- 32 cases were referred to ear specialists.
- 19 cases to my knowledge have had ear examinations and
- 7 others report they are going soon,
- 6 others need to be checked again.

Of these 19 cases for whom I have the doctor's report, four were recommended to have tonsilectomies. One has already been done. Five cases are being treated for such conditions as nasal infections, fungi in ear canals or growths in nose, etc. Four pupils were recommended for lip reading class. One other pupil was already in lip reading class, and in one other pupil the physician did not find any trouble although the boy made very poor tests both times. Four other junior high pupils who had not been to the doctor for examination but whose tests were very poor and were doing poor school work were put in lip reading class until some change later may be indicated.

The test has brought out some cases of hearing loss which had not been discovered by the teacher nor myself. This is especially true in children who had no useful hearing in one ear but the other ear was normal. This would be hard to detect in such a child as sometimes he would hear and perhaps the next time when in a different position he would not hear.

It is a bit hard to decide in a child who seems to be slow mentally whether his hearing loss causes his difficulty or whether being below par mentally causes him to seem to have hearing loss. One boy in 5th grade who had not been suspected of having any hearing trouble made a very poor test. Since his teachers have said all through the grades that his work was poor, I thought perhaps the test was too hard for him, so gave him an individual oral test where he repeated the two digits he heard instead of writing them. In this he made a poor score also, and I arranged to have him examined. The doctor reported nerve deafness and recommended lip reading.

I am sure all cases would not turn out this way but it makes us less sure of the cause of retardation in some of these children.

The results of the tests gave surprises both ways. Some children whom we thought had poor hearing made normal scores. No doubt their trouble is due to poor listening habits.

We had splendid cooperation from teachers, and they were very interested. The children enjoyed the testing, and all of us were amazed to see how they applied themselves to the tests.

It took a lot of time, but I think much as been accomplished.

Stella E. Klein

Superintendent W. M. Richards commented as follows:

The above report contains much significant information. It is not fair to assume that all the responsibility for helping students with hearing losses make satisfactory adjustments rests upon Mrs. Gwinn and Miss Klein. Every teacher has a responsibility in this matter.

Below are a few suggestions for helping these pupils. No doubt you can think of others:

1. Secure a list of the names of the pupils who have hearing losses. Each time new pupils are enrolled in your class, check to ascertain if a pupil with hearing loss has been assigned to your class.
2. If there are pupils in your class who have known hearing losses, seat them advantageously so that they may see both yourself and their associates.
3. Enunciate clearly and speak only when those with hearing loss may see your lip movements.
4. Watch when others are speaking to ascertain if pupils understand what is being said.
5. Encourage all pupils to speak distinctly.

6. On the junior and the senior high school levels, attention should be given to educational and vocational guidance of the pupils with distinct hearing losses. Read "Hearing with Eyes" in Readers Digest for November. This article will be helpful to you in advising these pupils.
7. Do not embarrass these pupils by constant reference to the fact that they have a handicap.

#### SOME ADVANTAGES OF THE 4-B AUDIOMETER

One of the very important advantages derived from using the audiometer is that the school authorities are reasonably sure that every child with a hearing loss was located.

Each teacher, upon being informed that there is a child in his or her room who has imperfect hearing, undoubtedly should have become more sympathetic with the child. Many children who are classed as mentally slow or subnormal probably will become adjusted socially as well as mentally by a sympathetic understanding of their condition by the teachers.

Another important benefit, if not the most important benefit, is that children with a beginning loss are discovered and that by immediate medical attention some of them may have their hearing restored to normal or at least arrested. For instance, after the audiometer tests were given in September, 1937, five cases of bad tonsils and adenoids were reported to have received immediate surgical attention. Two of the children were re-tested and their hearing was found to be normal. It is reasonable to believe that the other three would have had normal hearing or at least have had their hearing improved. Several other children were known to have had tonsilectomies, as a result of the medical examinations following the audiometer tests, but were not reported. The reports show that fourteen children have received medical attention and that eight of them have had their hearing

restored to normal or have improved in hearing. This would lead one to infer that the conservation of hearing is one of the most important, if not the most important, part of the audiometer tests.

There is an economic benefit derived from a program for the children who are found to have a hearing loss. In a pamphlet, prepared by Baker Bonnell<sup>2</sup> are shown some conclusions from National Research on the economics of treating hard of hearing children. They are presented as follows:

SOME CONCLUSIONS FROM NATIONAL RESEARCH  
THE ECONOMICS OF TREATING HARD OF HEARING CHILDREN

(Prepared, published and distributed in pamphlet form in April, 1932, by the Department of Lip Reading, of the National Education Association.)

Studies have been made in many school systems to determine whether minor degrees of deafness have any effect on the school progress of children. Figures are available from Minneapolis, Philadelphia, Rochester, New York, and other localities, showing that partially deafened children repeat grades about three times more than all other children.

The Philadelphia studies were done with great care and subjected to a careful statistical analysis. Some of the results are very striking. They found that examinations by means of the audiometer revealed over ten times as many cases of partial deafness as their former routine medical examinations has uncovered.

Pupils with unilateral deafness were found to average one-half year, and those with bilateral deafness, one full year below the average in educational achievement.

In terms of the Stanford Achievement Test poor hearing as shown by the Audiometer was shown to have more effect than uncorrected visual defects. Even slight losses were found to interfere very definitely with achievement.

---

<sup>2</sup> Baker Bonnell, "The Muskogee Program for Elementary School Children with Deficient Hearing." Pamphlet. p. 6-7. Reprinted by Graybar Electric Company.

This fact, in the exact words of the Philadelphia report, "extends the consideration of hearing of school children beyond the purely medical into the rank of a major educational problem."

Averages of data secured from studies in various parts of the country indicate that the deafened school child who finishes the eighth grade will repeat between two and three times, at a total expense to the taxpayer of between one hundred and two hundred dollars.

A recent study made of a school in Massachusetts showed 159 deafened children, 84 of whom had repeated from one to five times. The total was 156 years of retardation. The total cost of the repetitions was about \$9,300.00.

It may appear expensive to buy audiometers, to make careful periodic hearing tests and to follow up the handicapped children and to see that proper medical steps are taken.

But it is even more expensive to handle the repeaters whose impaired hearing may escape notice until it has become severe and chronic.

There are (in different localities) from sixty to one hundred forty partially deafened children per thousand. These children will average two to three repetitions each, going through eight grades.

Therefore, in every thousand children who finish the eighth grade there will be at least sixty, who will each repeat twice; and a possible maximum of one hundred and forty, repeating three times each.

This gives from one hundred and twenty to four hundred and twenty repetitions per thousand, at an average cost of \$7,200 to \$25,200.

We can reasonably hope by medical treatment, lip reading instruction, the use of hearing aids and more favorable seatings, to cut the repetition by at least fifty per cent. If we do this, we save from \$3,600 to \$12,600 per thousand children.

This saving is spread out over an entire grammar school career and may therefore be approximated at \$400 to \$1,500 per year, per thousand children.

This appears to furnish ample economic proof of the necessity.

Two other considerations also enter into the equation. One is the increased adult earning power of those children who are saved by early treatment from becoming severely deafened later in life.

The last consideration is not economic; in fact it is quite intangible, but none the less important. Severe deafness is not only a handicap. It is an affliction, and a most distressing affliction.

The average cost<sup>5</sup> of educating a child for one month in the Emporia city schools is \$8.88 or \$79.72 for one school year. There are eighteen children, with a hearing loss, who have been reported as having been retarded some time during their school history. The total number of grade repetitions, estimated from reports in the superintendent's office, for the eighteen children is twenty-six school years. The repetitions range from one-half year to four years for each child. It is reasonable to believe that some of them might have been retarded as a result of their hearing handicap. If the number of repetitions could have been reduced 50% as is implied above, then the Emporia Board of Education would have saved \$1,036.36 in expenditures.

#### WHERE THE EMPORIA PROGRAM NEEDS STRENGTHENING

From all indications the audiometer testing program is important and necessary in the Emporia city schools. It seems imperative that Miss Klein, the school nurse, should be relieved from supervising the audiometer testing program. In fairness to her, it might be said that she did an excellent job last year considering the fact that she had so many other duties to perform. Some one, possibly a member of the present staff, who has the ability and time should be delegated to the job of school audiometrist. Some of the duties of the school audiometrist might include: Administering all audiometer tests and scoring the record sheets; see that all parents are notified of their children's condition; keep an accurate record of all responses; do all follow-up work and see that there is a

---

<sup>2</sup> The League of Kansas Municipalities, "Table 6." "City School District Tax Rate Bulletin for Schools of Cities of the First Class." Kansas Governmental Journal. Vol. XXIV, No. 1, p. 30, (January, 1938).

response from the parents; make arrangements for medical attention where the parents are financially unable to do so; prepare and distribute educational helps for parents in caring for children during infectious childhood diseases and consequent ear infections; and, give individual audiometer tests to children in kindergarten, first and second grades. There are probably many other duties that could be included in the above list, and if a most effective program is carried out, the audiometrist will be a busy person.

One of the outstanding needs of the program for hard of hearing children in the Emporia city schools is a better understanding of the problems faced by hard of hearing children by the teachers. Some things that the teachers should consider are as follows: Lip reading skill can not be acquired over night. Clear and correct enunciation is necessary at all times by every one in the classroom. Every child with hearing loss is naturally sensitive, suspicious, and rebellious. The teacher doesn't always try to understand.

Special credit should be given children upon completing the lip reading classes. If special credits are allowed for band, glee clubs, posture correction, and physical education, why not for lip reading? In some schools attendance in lip reading classes is required, and in some schools it is optional. It is the opinion of many that schools that require attendance and give credit for satisfactory work, have a stronger lip reading department than schools that have optional attendance and allow no special credit.



The lip reading students love to see their accomplishments as well as normal hearing students. Achievement tests should be provided for each beginning student and another test when the work is completed. This not only gives the student a great deal of satisfaction in noting his own progress, but the tests will provide some tangible data for future studies about the hard of hearing children who have attended lip reading classes in the Emporia city schools.

Finally, but not least, the teachers in the Emporia city schools should be required to take the audiometer tests along with the children. There are many questions that might be raised about the hard of hearing teacher. For obvious reasons, they will not be discussed at this time. Dr. Horace Newhart, (M. D.),<sup>4</sup> headed a discussion at the Fourteenth Annual Meeting of the American Federation of Organizations for Hard of Hearing, Incorporated, about the hard of hearing teacher in which he said,

The problem of the hard of hearing school teacher is one of large importance. Compared with the problem of the hard of hearing school child, now fairly well recognized in many enlightened communities, the problem of the hard of hearing school teacher has received very little attention. It affects with serious possibilities the professional careers and happiness of thousands of our most valuable citizens--our teachers. At a conservative estimate, at least four per cent of the 680,000 public school teachers in the United States, or between 25,000 and 30,000, have a hearing loss sufficient to impair, in varying degree, their efficiency in the class room. The problem is also one of real concern to the parent, the educational administrator and the taxpayer. But above all others it vitally affects the highest welfare of the school child.

---

<sup>4</sup> Horace Newhart, M. D. "The Hard of Hearing School Teacher", Proceedings of the Fourteenth Annual Meeting of the American Federation of Organizations for the Hard of Hearing, Incorporated. p. 16, Washington, D. C., (June, 1933).

## CHAPTER VII

### SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

#### SUMMARY

In making a study of the program for hard of hearing children in the Emporia city schools, many facts were disclosed. Some of them are summarized as follows:

1. Of the 2126 children examined, 3.85% were found with deficient hearing.
2. A difference in the prevalence of children with deficient hearing for the various schools was disclosed.
3. A high per cent of the hearing loss cases are of the Junior high school age.
4. More boys than girls were found with deficient hearing.
5. The greater per cent of children with deficient hearing came from the lower social level.
6. Many children with deficient hearing were found to be beyond relief by medical attention, while many responded to medical treatments.
7. Complete parental cooperation is lacking.
8. There is little, if any, relationship between deficient hearing and defective vision.
9. No relationship was found between dental defects and deficient hearing.
10. There is a relationship between speech defects and deficient hearing.
11. The relationship between infection caused by swimming and deficient hearing might be very high.

12. A close relationship between injuries to the ear and deficient hearing was found.
13. There is very little relationship, if any, existing between heredity and deficient hearing.
14. There seems to be some relationship between intelligence quotients and deficient hearing.
15. The highest per cent of children with a hearing loss in both ears are found with intelligence quotients in the lowest quartile.
16. The greatest per cent of grade repeaters are children with a hearing loss in both ears.

#### CONCLUSIONS

1. The per cent of hearing loss in the Emporia city schools is approximately the same as for other schools throughout the country.
2. The difference in the per cent of hearing loss cases for each school might be accounted for by the fact that each school is represented by a different community, socially.
3. There might be sufficient reasons for the high per cent of hearing loss cases for children of the junior high school age.
4. The fact that there are more girls than boys with a hearing loss is not considered as a significant finding.
5. It would be necessary to have a large group represented by each race, before drawing any conclusion as to the per cent of hearing loss for the different races.
6. There is a need for parent education in the matter of conservation of hearing.

7. With proper medical attention many children's hearing can be restored or at least the impairment can be arrested by proper medical attention at the proper time.
8. It is necessary to have further and more detailed information, about a child with impaired tonsils and adenoids, and a hearing loss, before concluding that there is a relationship existing between the two.
9. The probability of impaired hearing is high as a result of an injury to the ear or from infection resulting from swimming.
10. Sufficient evidence is lacking in order to determine that there is a relationship existing between heredity and hearing loss, that is, that poor hearing is inherited.
11. It is necessary to have better and more complete information in order to make any conclusions about the relationship between intelligence and deficient hearing.
12. There is a probability that children with a hearing loss in both ears are more likely to have a low intelligence quotient than children with a hearing loss in one ear only.
13. Children with a hearing loss in both ears are more likely to repeat grades than children with a hearing loss in one ear only.
14. The Emporia city schools have made a very fine start in providing a program for the hard of hearing children.
15. The program can be strengthened in a good many ways.
16. The study warrants further investigation in order to bring out other phases of the problem.

## RECOMMENDATIONS

The following recommendations seem advisable:

1. A provision should be made for testing the hearing of kindergarten, first grade and second grade children.
2. All teachers should be required to take the hearing test.
3. A school audiometrist should be appointed and trained, to carry on the audiometer testing program.
4. There should be more follow-up visits and a more determined effort to see that proper medical attention is provided where it is needed.
5. An accurate and complete medical history record should be kept for each child found to have impaired hearing. A report of the child's school progress should accompany the record.
6. Mental ability and achievement tests should be given to each child with a hearing loss.
7. Credit should be allowed to students upon completion of the lip reading instruction.
8. When classes in swimming are conducted by the school, a course in nasal hygiene should be included.
9. A program for parent education in providing proper medical attention for their children is necessary.

## BIBLIOGRAPHY

- Bonnell, Baker, "Testing the Hearing of Very Small Children," Hygeia, Vol. 15, No. 10, p. 910, (October, 1937).
- Bonnell, Baker, "The Muskogee Program for Elementary School Children with Deficient Hearing," Pamphlet, p. 6-7, Reprinted by Graybar Electric Co.
- Ciocco, Antonio, "Audiometric Studies on School Children," "I. The Consistency and Significance of Tests Made With the 4-A Audiometer," Reprint No. 1776, p. 2, from the Public Health Reports, Washington, D. C., Vol. 51, No. 41, p. 1402-1416, (October 9, 1936).
- Cotton, J. C., "Do We Hear With Our Eyes?" Scientific American, Vol. 153, No. 5, p. 255, (November, 1935).
- Dunn, Margaret, "Lend Me Your Ears," Mimeographed Report, Public Schools, Port Washington, New York, 1937.
- E. P. F., "Swimming and the Ear," Hearing News, Vol. 5, No. 8, p. 1, (August, 1937).
- Gardner, Warren H., "Testing Kindergarten Children With the 4-A Audiometer," Volta Review, Vol. 39, No. 4, p. 229, (April, 1937).
- Gardner, Warren H., "Audiometer Testing in Iowa Schools," Reprint No. 461, Volta Bureau, Washington, D. C.
- Gardner, Warren H., "Hearing Tests in 37 Iowa School Systems," Volta Review, Vol. 39, No. 12, p. 699-701, (December, 1937).
- Gilpatrick, Roy H., "Selling the Phono-Audiometer Idea," The Auditory Outlook, Vol. I, No. 4, p. 162, (July, 1930).
- Granger, W. B., M. D., F.A.C.S., Interview, Office, Emporia, Kansas, June 23, 1938.
- Gwinn, Mrs. Frances E., Interview, 901 Constitution Street, Emporia, Kansas, June 28, 1938.
- Henning, Martha Perhsson, M. D., "Deafness and Its Prevention," Volta Review, Vol. 39, No. 1, p. 6, (January, 1937).
- Hofsommer, Aphrodite J., "Lip Reading and Intelligence Quotient of the Hard of Hearing Child," Journal of American Medical Association, Vol. 107, No. 9, p. 648-650, (August 29, 1936).

- Johnson, Clyde W., "Prevention of Deafness in the Unborn Child," Volta Review, Vol. 39, No. 8, p. 437, (August, 1937).
- League of Kansas Municipalities, "Table 6," "City School District Tax Rate Bulletin for Schools of Cities of the First Class," Kansas Governmental Journal, Vol. XXIV, No. 1, p. 38, (January, 1938).
- Lehman, Rosamond, "Johnny, Are You Deaf?" Hygeia, Vol. 13, No. 11, p. 1056, (November, 1935).
- McClellan, Pauline, "The Problem of the Hard of Hearing Junior," Hearing News, Vol. 4, No. 5, p. 4, (May, 1936).
- Moore, Fredrika, "Summary of the Work Done for Hard of Hearing Children in the Different States," The Auditory Outlook, Vol. I, No. 4, p. 173, (July, 1930).
- Murray, Joseph A., M. D., "Common Sense Means of Conserving Hearing," Hearing News, Vol. 5, No. 4, p. 1, (April, 1937).
- Newhart, Horace, M. D., "The Hard of Hearing School Teacher," Proceedings of the Fourteenth Annual Meeting of the American Federation of Organizations for the Hard of Hearing, Incorporated, p. 16, Washington, D. C., (June, 1938).
- Owen, Russell, "Hearing with Eyes," Condensed from The Forum, August, 1937, Readers Digest, Vol. 31, No. 187, p. 61, (November, 1937).
- Webb, Ruth K., "Mary Ann, A Hard of Hearing Child with a Hearing Loss," Volta Review, Vol. 39, No. 11, p. 645, (November, 1937).
- Wells, Walter A., "You Call Them Deaf," Hygeia, Vol. 15, No. 1, p. 8, (January, 1937).

TABLE XIII

COMPLETE DATA CHART

\* Names of case nos. on file in superintendent's office.

Case No.	Percentage of Hearing Loss	Age	Grade	Sex	Race	Grade Index	Grades Repeated	Intelligence Quotient	Social Level	Eye Defect	Dental Defect	Speech Defect	Scarlet Fever	Measles	Whooping Cough	Common Colds	Asthma and Hay Fever	Tonsils and Adenoids	Mastoid	Injuries	Draining Ear	Relatives with hearing loss	Remarks	
SENIOR HIGH																								
1	15-9	16	12B	F	W	3.04		104	U	No	No			Yes	Yes	Yes		No					No medical examination	
2	15-6	16	11A	F	W	2.64		89	U	Yes-G	No			No	Yes	Yes		Yes				F	Tonsilectomy advised	
3	18-3	17	11B	F	C	3.32		106	L	No	No				Yes	Yes		Out					No medical examination	
4	3-12	18	12A	F	W	3.17		103	U	No	No			Yes	Yes	Yes-C		No			Yes-B		No recommendation	
5	3-12	15	10A	F	W	1.88		110	U	No	No			Yes	Yes			Out			Yes-L		Inner ear damaged in infancy	
6	21-6	15	10B	F	W	3.17		105	U	No	Yes							Yes					Tonsilectomy advised	
7	21-3	16	10B	F	M	3.23	1	88	L	Yes	No		Yes			Yes		No					Treatments received	
8	9-12	16	11B	F	W	2.15		116	U	No	No							No					No medical examination	
9	9-6	15	10B	M	W	3.05		105	U	Yes-G	No							Out					No recommendation	
10	3-15	15	10B	F	W	3.04		92	U	No	No							No					Treatments received	
11	3-9	16	11B	F	W	1.51		107	U	No	No				Yes	Yes-C		No			Yes-L		No recommendation	
12	9-15	17	11B	F	W	2.66	1	90	L	No	No			Yes	Yes	Yes-C		Out			Yes-B		No recommendation	
13	27-6	18	12A	F	W	2.90	1	104	L	No	No		Yes-C	Yes	Yes	Yes		Out					No recommendation	
14	18-5	16	12B	M	W	2.86		107	U	Yes-G	No			Yes				Out				M	Nerve deafness	
15	3-12	17	12B	M	W	2.30		104	U	No	No							Yes					Pneumonia in infancy	
16	30-6	16	11B	M	W	2.68		107	L	No	No	Yes						Yes	Yes				Tonsilectomy advised	
17	3-24	15	10A	M	W	2.15		107	U	No	No	Yes						Out	Yes				No recommendation	
18	12-3	15	11B	F	W	1.52		122	L	No	No		Yes-C		Yes	Yes		Out	Yes		Yes-R		No recommendation	
19	9-6	16	11B	F	W	2.65		105	U	No	No												No recommendation	
20	12-3	14	10B	F	W	1.66		116	U	Yes-G	No			Yes		Yes		Out					No medical examination	
21	9-15	15	10B	M	W	2.94		121	L	No	No							Out					Treatments received	
22	6-9	15	10B	F	W	2.25		108	L	Yes	Yes		Yes-	Yes	Yes			Yes					No recommendation	
JUNIOR HIGH																								
23	3-15	15	9A	F	W	2.50		108	L	No	No			Yes	Yes	Yes		Out			Yes		Blood test advised	
24	12-6	13	8A	F	W	1.52		130	U	No	No							Yes					Attention received--improved	
25	9-15	13	8A	M	W	2.21		105	U	No	No	Yes	Yes					Out					Very sensitive about condition	
26	9-12	13	8B	M	W	2.00		113	U	No	No			Yes	Yes	Yes-C		Out			Yes-B		No recommendation	
27	18-3	15	9B	M	W	2.26		106	L	No	Yes							Out					No medical examination	
28	12-0	13	9B	M	W	1.92		118	U	No	No			Yes	Yes		Yes	Yes					No medical examination	
29	18-0	13	7B	F	W	2.14		102	U	No	No							Yes					Ear damaged possibly in infancy	
30	3-18	12	7B	F	W	2.90		109	U	No	No			Yes	Yes			Out					Encephalitis at 9 years	
31	18-3	16	7B	M	W	3.50	4	81	L	No	Yes			Yes	Yes	Yes-C		Out	Yes		Yes-R		Mastoid	
32	18-15	18	9B	M	W	3.62	5	75	L	No	Yes			Yes	Yes			Yes	Yes				No medical examination	
33	9-6	15	9A	M	W	2.00		104	U	No	No							Out					No medical examination	
34	9-6	14	8A	F	W	2.95		93	L	No	Yes	Yes	Yes	Yes	Yes			Out					No medical examination	
35	6-9	11	7B	M	W	2.00		112	L	No	Yes							Out					Tonsilectomy--no improvement	
36	9-12	13	7A	F	W	2.43		106	L	No	Yes			Yes	Yes	Yes-C		Out					No medical examination	
37	0-18	14	9B	F	W	2.61		111	L	No	Yes			Yes	Yes	Yes-C		Out	Yes		Yes-L		Treatments had--no improvement	
38	3-9	15	9B	F	W	2.08		102	L	Yes	Yes			Yes			Yes-C	Yes					No medical examination	
39	3-9	14	9B	F	W	2.50		114	U	Yes	No			Yes	Yes	Yes		No					No medical examination	
40	9-3	14	9B	F	W	3.25		117	U	No	Yes			Yes	Yes			No					No medical examination	
41	3-9	15	9A	M	W	3.48	1/2	90	L	Yes	Yes			Yes	Yes			No					Swimming injury--no examination	
42	9-6	12	7A	F	W	2.00		110	L	Yes-G	Yes							Yes					No medical examination	
43	30-30	12	7A	M	W	1.80		137	L	No	No							Out					Receiving treatments	
44	15-12	15	9B	M	W	3.43		105	L	No	Yes							Yes					Ill--no further examination	
45	18-9	15	9B	F	W	3.02	1/2	92	L	No	No							Out					No medical examination	
46	9-15	16	9B	F	W	3.40		73	U	No	Yes							Yes					No medical examination	
47	15-18	13	7A	F	W	2.64		95	U	Yes-G	No			Yes	Yes	Yes		No					Progressive	
48	15-15	14	9B	F	W	3.20		96	U	Yes	No			Yes	Yes	Yes		Yes		Yes-R			General health attention advised	
49	21-6	12	7B	F	W	3.00		109	L	No	Yes	Yes-C	Yes	Yes	Yes-C	Yes-C		Yes		Yes-R			Treatments received--improving	
50	9-12	13	8B	F	W	2.50		95	U	Yes-G	No			Yes-C	Yes	Yes-C		Out		Yes-B			No medical examination	
51	30-3	15	9A	F	W	2.74		95	L	No	No			Yes	Yes			Out					Tonsilectomy advised	
52	12-6	16	9A	M	W	2.45	1	105	L	No	No			Yes	Yes	Yes-C		Yes		Yes-R			Tonsilectomy advised	
53	21-9	14	8A	M	W	3.46		97	L	No	No							Yes					Tonsilectomy advised	
54	9-6	14	7B	M	M	4.00	2	80	L	No	No							No					No recommendation	
55	15-15	13	7B	M	W	4.00	2	80	L	No	No							No					No recommendation	
WALNUT																								
56	18-3	9	5B	M	W	2.54		113	U	No	No	Yes	Yes	Yes	Yes	Yes		Out						Treatments advised--not had
57	9-6	11	6B	M	W	2.92	1	94	L	Yes	No							Out						No medical examination
58	3-12	9	5B	F	W	2.80		137	U	No	No							Yes						Tonsilectomy advised
59	18-18	9	4B	M	W	3.22		92	U	Yes-G	No	Yes			Yes	Yes		Out	Yes					Injury at birth--convulsions
CENTURY																								
60	3-12	10	5A	F	W	3.10		112	U	No	No			Yes	Yes	Yes-C		Out			2gp			Tonsilectomy advised; was had
61	3-12	8	3B	M	W	3.14		105	L	No	Yes	Yes	Yes	Yes	Yes	Yes		Yes			F			Tonsilectomy advised
62	9-3	10	5B	F	C	3.12		105	L	No	No	Yes	Yes	Yes	Yes	Yes		Yes			FS			Progressive--tonsilectomy adv.
63	6-15	9	3A	F	W	2.97	1/2	116	L	No	Yes							Yes			S			Tonsilectomy advised
MAYNARD																								
64	9-6	15	6B	M	W	3.00	2	86	L	No	Yes	Yes		Yes-C	Yes	Yes-C		Out	Yes		M <sup>2</sup> GP			Struck with ball; no reom.
65	21-12	11	6B	F	W	2.54		119	U	No	No			Yes-C	Yes	Yes	Yes	Out	Yes		U			Struck with bat; treatments
66	3-12	11	6A	M	W	3.00		118	L	No	No			Yes-C	Yes	Yes-C		No		Yes-B				No medical examination
67	3-18	8	3B	F	W	2.33		108	L	No	No			Yes-C	Yes	Yes		No		Yes-B M				No medical examination
68	6-9	11	5B	M	W	3.00		102	L	Yes	No			Yes	Yes	Yes-C	Yes	Out						No medical attention
69	6-12	8	4B	M	W	2.77		133	L	No	No			Yes	Yes	Yes	Yes	Out						No medical examination
70	12-15	8	3A	M	W	3.00		88	L	No	No	Yes	Yes	Yes	Yes	Yes		Out		Yes				Tonsilectomy advised