

community. Based on our finding we conclude that, hearing loss was related to maternal infection, bilateral hearing loss was higher and related to increased number of previous pregnancies, there was significant relation between degree of hearing loss and mode of delivery and number of previous pregnancies.

#### Recommendations:

Detailed hearing assessment is recommended in cases with positive history of maternal risk factors as maternal infections even if passed hearing screening test.

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7% of cases. Seven mothers reported taking medication. 60% of cases were positive for consanguinity and 34% of them had positive family history of hearing loss.

Nagapoomnima et.al. (2007) recorded that out of total eight cases screened with a family story of childhood sensorineural hearing loss two (25%) cases were set up to cause hearing impairment. John et.al. (2009) showed that a family history of hearing loss was present in seven cases out of 500 (1.4%), this high level of hearing loss may be due to deficiency of awareness in our region & less access to health care services. Also, Saunders and his collages, 2007 found that, family history of HL was seen in 24% of children who failed screening exams. Positive family history was more common in patients with HL ( $P < 0.01$ ) and in specific schools ( $P < 0.05$ ).

In another study by Karaca et.al. (2014) out of 18 cases of hearing loss, 94% cases had no family history of significant childhood hearing loss in any sibling of the child. Family history of hearing loss was present in 16 (3.8%) children and out of these only one case had hearing handicap. This shows that although the family history is recognized as an independent risk factor for hearing loss but the neonates who don't have any family history are also prone to have hearing abnormalities hence showing the importance of universal newborn screening of all neonates irrespective of family history of hearing loss.

According to presence of maternal risk factors related to pregnancy in the studied children, only one case reported trauma during pregnancy. Eight cases showed bleeding during pregnancy. Less than half cases (27%) had previous pregnancies for once or twice. In a previous study Diepeveen et.al. (2017) there were, 13% reported Hypertension during pregnancy, 24% Special medication during pregnancy, 14% cases showed bleeding during pregnancy, 13% cases showed Smoking during pregnancy, 1% Alcohol during pregnancy and 1% Drugs during pregnancy.

The present study demonstrated that, Half of children were delivered by vaginal method while the other half were delivered by CS with most of them (90%) were full term and only 10% of them were preterm. PROM was reported in five cases and prolonged labour was found in eight cases.

In the same line Karaca and his collages, 2014 noted that, 2,284 children were admitted to their clinic, as regard birth type there were (54%) delivered by Cesarean section and (46%) by Vaginal birth.

In another study by Diepeveen et.al. (2017) Delivery characteristic showed that, 33% cases Being firstborn, 61% delivered by Cs, 39% by Vaginal birth, Duration of labour was 6.22 (7.01%) h., Expulsion 21.3 (31.4%) min., non- spontaneous birth was reported in 22% cases. Gouri et.al. (2015) noted that, hearing loss was confirmed in 18 (82%) subjects, Vaginal delivery was reported in 10 (55.5%) cases while, 8 (44.4%) were delivered by Cesarean section.

As regard relation between side of hearing loss and different maternal risk factors. It was noticed that bilateral hearing loss was significantly higher and related to increased number of previous pregnancies ( $p$ - value was 0.026). But there was no statistically significant relation between side

of hearing loss and maternal infection, trauma during pregnancy, maternal hypertension, maternal DM and bleeding during pregnancy ( $p$ - value was  $> 0.05$ ). Also, there was no statistically significant relation between side of hearing loss and maternal drugs, mode of labor, term, prom, prolonged labor, consanguinity as well as family history ( $p$ - value was  $> 0.05$ ).

In the results of previous study Ross et.al. (2006) demonstrated that the frequency of hearing loss was not different between children born to mothers with non- primary infection (10%) and those with primary infection (11%), the rate for hearing loss in children born to mothers with a non- primary infection is similar to the rate for children born after primary maternal infection. However, hearing loss is less likely to progress and is less severe in the non- primary maternal infection group compared with those children born to mothers with primary infection.

In another study Oghalai et.al. (2002) observed that, there was a high rate (25%) of reported familial HL in children with HL in these isolated communities. Studies of school- aged children in developed countries generally do not report the rates of familial HL. A study of neonatal screening program in an indigent U.S. population, however, reported familial HL in 4.5% of hearing- impaired infants.

Relation between degree of hearing loss and different maternal risk factors showed that, mild hearing loss was significantly higher and related to maternal infection ( $p$ - value was 0.047). In addition, it was found that there was significant relation between degree of hearing loss and mode of delivery ( $p$ - value was 0.006) and number of previous pregnancies ( $p$ - value was 0.044) this could be due to antenatal care.

On the other hand, there was no statistically significant relation between degree of hearing loss and trauma during pregnancy, maternal hypertension, maternal DM and bleeding during pregnancy ( $p$ - value was  $> 0.05$ ). Also, there was no statistically significant relation between degree of hearing loss and maternal drugs, term, PROM, prolonged labor, consanguinity as well as family history ( $p$ - value was  $> 0.05$ ). In agreement Saunders and his collages (2007) reported that, 33% of children had a history of a maternal infection during pregnancy; the most common type of infection was a kidney or urinary tract infection, there was no significant relationship was found between the risk factor/etiologies (gentamicin exposure, meningitis, neonatal disease, etc. ), maternal drugs and the severity of HL.

In a detailed study of risk factors in Saudi Arabia, Zakzouk et.al. (1997) found a relationship between childhood HL and multiple perinatal factors such as prenatal care, prematurity, and high fever during pregnancy. Also, Kapur et.al. (1996) noted that, Maternal rubella infection is well known to cause congenital HL and has been estimated to account for 5% to 20% of congenital deafness during epidemic year.

### **Conclusion:**

Hearing impairment is a multifaceted condition with medical, social and cultural aspects. Children with hearing impairments follow many different developmental pathways, some growing up to join the Deaf

		Mild HL (N= 7)		Moderate HL (N= 16)		Moderately Severe HL (N= 23)		Severe HL (N= 26)		Profound HL (N= 28)		X <sup>2</sup>	
		N	%	N	%	N	%	N	%	N	%	Test Value	P- Value
PROM	No	7	100.0%	15	93.8%	23	100.0%	24	92.3%	26	92.9%	2.299	0.681
	Yes	0	0.0%	1	6.3%	0	0.0%	2	7.7%	2	7.1%		
Prolonged Labor	No	7	100.0%	16	100.0%	21	91.3%	24	92.3%	24	85.7%	3.522	0.475
	Yes	0	0.0%	0	0.0%	2	8.7%	2	7.7%	4	14.3%		
Consanguinity	No	3	42.9%	5	31.3%	7	30.4%	13	50.0%	12	42.9%	2.590	0.629
	Yes	4	57.1%	11	68.8%	16	69.6%	13	50.0%	16	57.1%		
Family History	No	7	100.0%	11	68.8%	18	78.3%	15	57.7%	15	53.6%	7.928	0.094
	Yes	0	0.0%	5	31.3%	5	21.7%	11	42.3%	13	46.4%		
Number Of Previous Pregnancies	0	5	71.4%	8	50.0%	6	26.1%	9	34.6%	6	21.4%	31.929	0.044*
	1	2	28.6%	3	18.8%	12	52.2%	6	23.1%	4	14.3%		
	2	0	0.0%	2	12.5%	3	13.0%	10	38.5%	12	42.9%		
	3	0	0.0%	3	18.8%	2	8.7%	0	0.0%	4	14.3%		
	4	0	0.0%	0	0.0%	0	0.0%	1	3.8%	1	3.6%		
	5	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1	3.6%		

P value< 0.05 is significant, P value< 0.01 is highly significant., X<sup>2</sup> = Chi- Square test

Table number (4) shows: Relation between degree of (SNHL) hearing loss and different maternal risk factors. It was noticed that mild hearing loss was significantly higher and related to maternal infection (p- value was 0.047). In addition, it was found that there was significant relation between degree of hearing loss and mode of delivery (p- value was 0.006) and number of previous pregnancies (p- value was 0.044).

There was no statistically significant relation between degree of hearing loss and trauma during pregnancy, maternal hypertension, maternal DM and bleeding during pregnancy (p- value was> 0.05). Also, there was no statistically significant relation between degree of hearing loss and maternal drugs, term, PROM, prolonged labor, consanguinity as well as family history (p- value was> 0.05).

**Discussion:**

Infant hearing loss stands out as the most common congenital sensory disorder. Its late detection compromises speech, language and cognitive skills essential for optimal early childhood development. Auditory cortex and neural connections develop with acoustic stimuli (Ohl et.al., 2009). Hearing impairment may affect children’s communication skills, social development, and educational achievement (Yun et.al., 2017). Little is known about the prevalence of hearing impairment among Egyptian children. So, we aimed in this study to identify the correlation between maternal risk factors, pregestation, during pregnancy, prepartum, intrapartum, postpartum and hearing loss.

A cross- sectional study was carried out on 100 children diagnosed with sensorineural hearing loss, cases are collected from private clinic in Cairo during period March to September 2022.

In the current study demographic characteristics of the studied patients showed that, the age of children ranging from 5 to 15 years with mean (±SD) was 9.84 (±3.07) years and median was 10 years, there were 55 (55%) males and 45 (45%) were females with male to female ratio was 1.22:1.

In agreement was a previous study titled "Prevalence and Social Risk Factors for Hearing Impairment in Chinese Children" Yun et.al. (2017)

reported that, there were 1112 children aged (0- 17) years with hearing impairment there were 612 (55.03%) male and 500 (44.96%) were female with male to female ratio was 1.22: 1.

Also, Gouri and his collages. (2015) aimed to assess the incidence of hearing loss and associated risk factors in 167 neonates, the demographic data of the study population showed that, the mean age was 3 months there were 93 (55.6%) male and 74 (44.3%) were female with male to female ratio was 1.27: 1.

In the current study the Distribution of the studied children as regards clinical characteristics of SNHL showed that, 89 children (89%) reported bilateral hearing loss, 8% of them had hearing loss in left side and 3% had hearing loss on the right side. According to degree of hearing loss, most children reported profound hearing loss in 28% children followed by severe SNHL in 26% of studied children, 23% were moderately severe, 16% of them were moderate, 7% of them were mild. Most diseased children were unaided by device for hearing amplification.

In another study Olusanya et.al. (2008) found that, nine children (16.0%) had unilateral hearing loss, while bilateral hearing loss was mild (30-40 dBHL) in 12 (21.4%), moderate (41- 70 dBHL) in 25 (44.6%) and severe (71-90 dBHL) in 10 (17.8%). No child was detected with profound (>90 dBHL) hearing loss.

In similar study by Karaca et.al. (2014) total of 4.568 ears were examined during the period of the study, a total of 157 neonates (6.8%) failed the screening test in both ears while 205 (8.9%) failed the screening test in only one ear. Of those failing the test, 207 of them were males while 155 were females.

Bess et.al. (1998) reported a prevalence of 11.3% for conductive and sensorineural HL and 5.4% for SNHL in a US study of 1218 elementary school children, using thresholds of less than 20 dB for bilateral and less than or equal to 20 dB for unilateral HL.

Regarding general maternal risk factors for hearing loss in the studied children, maternal infection was reported in five cases. Maternal hypertension was found in 6% of cases while maternal DM was found in

hearing loss.

Table (2) Distribution of the studied children as regards presence of maternal risk factors related to pregnancy for hearing loss

Parameters		Studied children (N= 100)	
		N	%
Trauma During Pregnancy	No	99	99%
	Yes	1	1%
Bleeding During Pregnancy	No	92	92%
	Yes	8	8%
Number Of Previous Pregnancies	0	34	34%
	1	27	27%
	2	27	27%
	3	9	9%
	4	2	2%
	5	1	1%
	Median	1	
Range	0- 5		

Table (2) shows: Presence of maternal risk factors related to pregnancy in the studied children. Only one case reported trauma during pregnancy. Eight cases showed bleeding during pregnancy. Less than half cases (27%) had previous pregnancies for once or twice. Half of children were delivered by vaginal method while the other half were delivered by CS with most of them (90%) were full term and only 10% of them were preterm. PROM was reported in five cases and prolonged labour was found in eight cases.

Table (3) Relation between hearing loss and different maternal risk factors

		Unilateral HL (N= 11)		Bilateral HL (N= 89)		X <sup>2</sup> /Fet	
		N	%	N	%	Test Value	P- Value
		Maternal Infection	No	9	81.8%	86	96.6%
	Yes	2	18.2%	3	3.4%		
Trauma During Pregnancy	No	11	100.0%	88	98.9%	0.125	1.00
	Yes	0	0.0%	1	1.1%		
Maternal Hypertension	No	11	100.0%	83	93.3%	0.789	0.374
	Yes	0	0.0%	6	6.7%		
Maternal DM	No	9	81.8%	84	94.4%	2.374	0.123
	Yes	2	18.2%	5	5.6%		

Table (4) Relation between degree of hearing loss and different maternal risk factors

		Mild HL (N= 7)		Moderate HL (N= 16)		Moderately Severe HL (N= 23)		Severe HL (N= 26)		Profound HL (N= 28)		X <sup>2</sup>	
		N	%	N	%	N	%	N	%	N	%	Test Value	P- Value
		Maternal Infection	No	5	71.4%	15	93.8%	23	100.0%	25	96.2%	27	96.4%
	Yes	2	28.6%	1	6.3%	0	0.0%	1	3.8%	1	3.6%		
Trauma During Pregnancy	No	7	100.0%	16	100.0%	22	95.7%	26	100.0%	28	100.0%	3.382	0.496
	Yes	0	0.0%	0	0.0%	1	4.3%	0	0.0%	0	0.0%		
Maternal Hypertension	No	7	100.0%	16	100.0%	20	87.0%	25	96.2%	26	92.9%	3.77	0.438
	Yes	0	0.0%	0	0.0%	3	13.0%	1	3.8%	2	7.1%		
Maternal DM	No	5	71.4%	16	100.0%	21	91.3%	25	96.2%	26	92.9%	6.708	0.152
	Yes	2	28.6%	0	0.0%	2	8.7%	1	3.8%	2	7.1%		
Bleeding During Pregnancy	No	7	100.0%	16	100.0%	20	87.0%	25	96.2%	24	85.7%	4.908	0.297
	Yes	0	0.0%	0	0.0%	3	13.0%	1	3.8%	4	14.3%		
Maternal Drugs	No	7	100.0%	15	93.8%	20	87.0%	25	96.2%	26	92.9%	2.229	0.694
	Yes	0	0.0%	1	6.3%	3	13.0%	1	3.8%	2	7.1%		
Mode Of Labor	Vaginal	4	57.1%	2	12.5%	11	47.8%	13	50.0%	20	71.4%	14.329	0.006*
	CS	3	42.9%	14	87.5%	12	52.2%	13	50.0%	8	28.6%		
Term	Full Term	7	100.0%	15	93.8%	20	87.0%	23	88.5%	25	89.3%	1.349	0.853
	Preterm	0	0.0%	1	6.3%	3	13.0%	3	11.5%	3	10.7%		

		Unilateral HL (N= 11)		Bilateral HL (N= 89)		X <sup>2</sup> /Fet	
		N	%	N	%	Test Value	P- Value
		Bleeding During Pregnancy	No	11	100.0%	81	91.0%
	Yes	0	0.0%	8	9.0%		
Maternal Drugs	No	11	100.0%	82	92.1%	0.930	0.335
	Yes	0	0.0%	7	7.9%		
Mode Of Labor	Vaginal Delivery	5	45.5%	45	50.6%	0.102	0.749
	CS	6	54.5%	44	49.4%		
Term	Full Term	11	100.0%	79	88.8%	1.373	0.241
	Preterm	0	0.0%	10	11.2%		
PROM	No	11	100.0%	84	94.4%	0.651	0.551
	Yes	0	0.0%	5	5.6%		
Prolonged Labor	No	10	90.9%	82	92.1%	0.02	0.620
	Yes	1	9.1%	7	7.9%		
Consanguinity	No	4	36.4%	36	40.4%	0.068	0.794
	Yes	7	63.6%	53	59.6%		
Family History	No	10	90.9%	56	62.9%	3.417	0.065
	Yes	1	9.1%	33	37.1%		
Number Of Previous Pregnancies	0	9	81.8%	25	28.1%	12.73	0.026*
	1	1	9.1%	26	29.2%		
	2	1	9.1%	26	29.2%		
	3	0	0.0%	9	10.1%		
	4	0	0.0%	2	2.2%		
	5	0	0.0%	1	1.1%		

P value< 0.05 is significant, P value< 0.01 is highly significant, X<sup>2</sup>= Chi- Square test, FET: Fisher's Exact Test.

Table (3) shows: Relation between side of hearing loss and different maternal risk factors. It was noticed that bilateral hearing loss was significantly higher, related to increased number of previous pregnancies (p- value was 0.026).

There was no statistically significant relation between side of hearing loss and maternal infection, trauma during pregnancy, maternal hypertension, maternal DM and bleeding during pregnancy (p- value was> 0.05). There was no statistically significant relation between side of hearing loss and maternal drugs, mode of labor, term, prom, prolonged labor, consanguinity as well as family history (p- value was> 0.05).

**Introduction:**

Hearing impairment is described as reduced ability to apprehend sounds (Stedman, 2005). The prevalence of hearing loss, defined as bilateral hearing loss > 60 dB, is estimated at 1 case per 1000 individuals. If the threshold for bilateral hearing loss is considered to be more than 40 dB, the prevalence of this impairment increases to 3 cases per 1000 individuals (Berg et.al., 2011).

There are two types of hearing loss; conductive and sensorineural hearing loss (SNHL) refers to any cause of hearing loss due to a pathology of the cochlea, auditory nerve, or central nervous system. Patients with new-onset hearing loss should be investigated and undergo full audiometric evaluation by a multidisciplinary team, including an otolaryngologist, audiologist, radiologist, and speech/ language therapist. (Tanna et.al., 2022)

Early diagnosis of hearing loss in children and timely treatment can improve infants' health status, their potentials, and cognitive abilities. Moreover, through determining the risk factors for sensorineural hearing loss (SNHL) during the fetal period and at birth, it is possible to eliminate these risk factors and prevent the adverse consequences. (Alaee et.al., 2015)

Postnatal infection/ inflammation, including sepsis and meningitis, can play a role in the pathogenesis of hearing loss in neonates (Mwaniki et.al., 2012). However, it remains unclear whether prenatal exposure to infection/ inflammation may adversely affect ear development and lead to pathological processes implicated in hearing loss in preterm neonates (Kim et.al., 2017). Although, a number of maternal conditions have been reported to be associated with preterm birth (e. g., intrauterine infection and pre-eclampsia), little information is available concerning maternal risk factors for the development of SNHL.

**Aims:**

The aim of study was to evaluate the frequency of risk factors and their influence on- the distribution and manifestation of- hearing loss in infants.

**Subjects & Methods:**

✎ Type of study; Cross- sectional study.

✎ Subjects: The study was carried out on 100 children of SNHL.

Children were recruited from Outpatient Clinic of the center of special needs of the post graduated faculty.

✎ Inclusion Criteria; Children diagnosed with SNHL loss of hearing from (5- 15) years old.

✎ Exclusion Criteria; Cases with infection, tumors, accident, genetic caused and chemotherapy.

**Methods:**

All cases will be subjected to:

1. History: Full history taking with special emphasis on: details of the presenting symptoms, age of onset, developmental history for detection of developmental regression, family history of similar conditions, consanguinity and perinatal history including history of maternal infection, and history of perinatal insult.

2. Clinical assessment: Clinical examination including general examination, Otological examination, Tympanometry, Pure tone audiometry, speech audiometry, Auditory Brain stem Response (ABR) if needed.
3. Limitation of the Study, Refusal of parents of children to participate in the study.

**Ethical Aspect:**

Ethical consideration according to the Research Ethical Committee of Faculty of Postgraduate Childhood Studies and the Research Ethical Committee of National Research Centre. Informed consent was obtained from legal care giver after explaining the aim of the study and its benefits.

**Statistical Analysis:**

The collected data was organized, tabulated and analyzed using the statistical package for the social science SPSS version 12. The level of significance at (p< 0.05) will be used as cut off point for all significant tests.

**Results:**

This cross sectional study was carried out on 100 children diagnosed with sensorineural hearing loss. Age of children ranging from 5 to 15 years with mean (±SD) was 9.84 (±3.07) years and median was 10 years. There were 55 (55%) males and 45 (45%) were females with male to female ratio was 1.22: 1.

Eighty- nine children (89%) reported bilateral hearing loss, 8% of them had hearing loss in left side and 3% had hearing loss on the right side. According to degree of hearing loss, most children reported profound hearing loss in 28% children followed by severe HL in 26% of studied children, 23% were moderately severe, 16% of them were moderate, 7% of them were mild. Most diseased children were unaided by device for hearing amplification.

Table (1) Distribution of the studied children as regards general maternal risk factors for sensorineural hearing loss

Maternal Risk Factors		Studied children (N= 100)	
		N	%
Maternal Infection	No	95	95%
	Yes	5	5%
Maternal Hypertension	No	94	94%
	Yes	6	6%
Maternal DM	No	93	93%
	Yes	7	7%
Maternal Drugs	No	93	93%
	Yes	7	7%
Consanguinity	No	40	40%
	Yes	60	60%
Family History	No	66	66%
	Yes	34	34%

NB: DM diabetic Mother.

Table (1) shows: General maternal risk factors for hearing loss in the studied children. Maternal infection was reported in five cases. Maternal hypertension was found in 6% of cases while maternal DM was found in 7% of cases. Seven mothers reported taking medication. 60% of cases were positive for consanguinity and 34% of them had positive family history of

## Correlation Between Maternal Risk Factors and Of Sensorineural Hearing Loss

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## Summary

**Background:** Children hearing loss stands out as the most common congenital sensory disorder. Its late detection compromises speech, language and cognitive skills essential for optimal early childhood development.

**Aim&Objectives:** To Identify the correlation between maternal risk factors, pregestational, during pregnancy, prepartum, intrapartum, postpartum and immurement of hearing loss.

**Subjects& Methods:** A cross- sectional study was carried out on 100 children diagnosed with sensorineural hearing loss; cases are collected from private clinic in Cairo during period March to September 2022.

**Result:** mild hearing loss was significantly higher and related to maternal infection, 3.8% among severe HL, p value 0.046, and mode of labor, CS, 52.2%, p value was 0.006. In addition, it was found that there was significant relation between degree of hearing loss and number of previous pregnancies, moderate HL, 18.8%, p- value was 0.044).

**Conclusion:** hearing loss was related to maternal infection, bilateral hearing loss was higher and related to increased number of previous pregnancies, there was significant relation between degree of hearing loss and mode of delivery and number of previous pregnancies.

**Keywords:** Hearing Loss Maternal Risk Factors.

## العلاقة بين عوامل الخطر على الأم وفقدان السمع (SNLH)

**مقدمة:** يبرز ضعف سمع الرضيع باعتباره الاضطراب الحسي الخلقي الأكثر شيوعاً. إن اكتشافه المتأخر يضر بالكلام واللغة والمهارات المعرفية الضرورية لنمو الطفولة المبكرة المثلى. يتم إجراء المستوى الأول من فحص السمع خلال أول 2-3 أيام من الحياة، باستخدام قياسات الانبعاث الأذنية السمعية. يتم إحالة الأطفال الذين لا يجتازون اختبار الفحص والرضع الذين يعانون من عوامل خطر عالية لفقدان السمع إلى المستوى الثاني حيث يلتقي الأطفال باختبار استجابة الخلايا الجذعية السمعية المستوى الثالث هو المراكز المنطقية الصوتية المتقدمة، المسؤولة عن العلاج النهائي وإعادة التأهيل للأطفال الذين يعانون من ضعف السمع أو الصمم.

**الاهداف:** الهدف من هذه الدراسة هو تحديد العلاقة بين عوامل الخطر الأمومية، ما قبل الولادة، أثناء الحمل، قبل الولادة، أثناء الولادة، بعد الولادة وفقدان السمع. **المنهجية:** تم إجراء دراسة مقطعية على 100 طفل تم تشخيص إصابتهم بفقدان السمع الحسي العصبي. وتم تجميع الحالات من عيادات خاصة بالقاهرة في المدة من شهر مارس إلى شهر سبتمبر عام 2022.

**النتائج:** أظهرت النتائج الرئيسية للدراسة ما يلي: أبلغ 89 طفلاً 89% عن ضعف سمع في الجانبين، وفقاً لدرجة فقدان السمع، أفاد معظم الأطفال بفقدان سمع عميق في 28% من الأطفال يليه فقدان للسمع شديد في 26% من الأطفال الخاضعين للدراسة، وتم الإبلاغ عن إصابة الأمهات في خمس حالات. تم العثور على ارتفاع ضغط الدم لدى الأمهات في 6% من الحالات بينما تم العثور على داء السكري لدى الأمهات في 7% من الحالات. 60% من الحالات كانت إيجابية لقرابة الأقارب و 34% منهم لديهم تاريخ عائلي إيجابي لفقدان السمع.

**الخلاصة:** لوحظ أن ضعف السمع في الجانبين كان أعلى بشكل ملحوظ ويتعلق بزيادة عدد حالات الحمل السابقة.