



# Comparative prevalence of otitis media in children living in urban slums, non-slum urban and rural areas of Delhi



Shelly K. Chadha\*, Kriti Gulati, Suneela Garg, Arun K. Agarwal

Maulana Azad Medical College, Bahadur Shah Zafar Marg, Delhi 110002, India

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## ABSTRACT

**Purpose:** The study aimed to determine the prevalence and profile of otitis media in different parts of a city, i.e. non-slum urban areas, urban slums and rural areas.

**Methodology:** A door to door survey was conducted in identified areas of Delhi. A total of 3000 children (0–15 years) were randomly selected and examined for presence of otitis media. These children were equally distributed in the three areas under consideration. Data was analyzed to establish the prevalence of different types of otitis media. Chi-square test was then applied to compare disease prevalence among the three areas.

**Results:** 7.1% of the study population was identified with otitis media, which includes CSOM (4.26%), OME (2.5%) and ASOM (0.4%). In the non-slum urban parts of the city, 4.6% children had otitis media. This was significantly lower compared to 7% children in rural parts of Delhi and 9.9% in urban slums of the city. The prevalence of CSOM was considerably higher in slum areas (7.2%) as compared with rural (3%) and non-slum urban areas (2.6%).

**Conclusion:** Ear infections are significantly more common in urban slums as compared to non-slum city areas and rural parts of Delhi.

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## 1. Introduction

Diseases of the middle ear impose a significant burden on the health system and account for a large proportion of visits made to pediatricians in the first five years of life. Teel et al. estimated that one-third of all visits made to a pediatric clinic resulted in a diagnosis of middle ear disease [1]. Occurrence of otitis media in childhood has been correlated with a number of risk factors including gender, race, breastfeeding, parental smoking, maternal education, overcrowding and socioeconomic status among others [2–5]. Significant differences in otitis media between urban and rural populations have been established [5–7]. Over the last few decades, there has been a rapid increase in populations living in slum areas within cities across the world. These areas are marked by a unique set of characteristics which are different from the traditional urban and rural habitations [8]. Overall, one billion people are estimated to inhabit slum dwellings and face lack of sanitation and health care [8].

As per the definition adopted by state governments in India, a slum is a cluster of dilapidated or infirm structures, suffering from

lack of basic amenities, inadequate drainage and waste disposal. Slum habitations have been categorized into three types by the Census of India, 2001 [9]. These are: notified; recognized and identified types of slum areas. The first two (notified and recognized) refer to those slum areas which have a legal entity, as per the State Slum Act. [9] Identified slums, on the other hand, are areas with a population of 300 or more persons or 60–70 households of poorly built, congested tenements lacking basic infrastructure and facilities [9]. These habitations are neither notified nor recognized as slums by the local authorities.

Besides the overall social and demographic variations between slum areas and other parts of the city, persons living in such areas also face a higher burden of infectious and chronic diseases, as well as unrealistic and inappropriate allocation of health resources [10,11]. The present study was conducted with the aim of comparing the prevalence of different forms of otitis media in the three main types of settlements, i.e. urban slums, non-slum urban and rural areas, which are inhabited by people living in Delhi.

## 2. Materials and methods

The research work was carried out from 2010 to 2011 in urban slums, non-slum urban areas and rural areas across two districts of Delhi. The study was granted ethical clearance by the institutional

\* Corresponding author. Present address: World Health Organization, Avenue Appia 20, 1211 Geneva 27, Switzerland. Tel.: +41 794755463.

E-mail addresses: [shellychadha@gmail.com](mailto:shellychadha@gmail.com) (S.K. Chadha), [gulati.kriti@gmail.com](mailto:gulati.kriti@gmail.com) (K. Gulati), [gargsuneela@gmail.com](mailto:gargsuneela@gmail.com) (S. Garg), [arunmam@gmail.com](mailto:arunmam@gmail.com) (A.K. Agarwal).

ethical committee of Maulana Azad Medical College. In each district, 2 localities of each type (urban slums, non-slum urban, rural) were selected. All types of slum areas, i.e. notified, recognized and identified slums were included for the purpose of selection. However, the study did not attempt to include equal representation of all types of slum areas. Within each locality, houses were allocated numbers and sampling done using the random number table. Fifteen hundred children from each district were included in the study, equally divided between the three types of areas.

Of the 1000 children from 4 urban slums, 386 children (belonging to two urban slum areas) were from identified type of slums, while other areas covered were those which had been notified (331) or recognized (283) by the State Government of Delhi.

A total sample of 3000 children was thus studied, across the two districts of Delhi. The research work was participatory, cross sectional and included assessment of the prevalence and profile of otitis media in children aged 0–15 years. The assessment was undertaken through door to door survey within the identified areas, after seeking informed consent from parents of participating children.

The examination protocol included:

- o History of ear disease or hearing loss.
- o Examination of external ear.
- o Otoloscopic examination of the ear using a 3.5 V otoscope.
- o Impedance audiometry to assess the status of the middle ear, using a portable tympanometer.

All examinations were undertaken by persons trained in ear examination and diagnoses were verified by an ENT specialist. In those cases where wax or foreign body was obstructing the canal it was removed by an ENT specialist, where possible. In case it was not possible to remove the wax at the time of the first examination, it was treated with wax softeners and the child was re-examined after wax removal had been carried out. The following criteria for diagnoses were established before the start of the study.

- **Chronic suppurative otitis media (CSOM):** history of ear discharge, lasting for more than 2 weeks and presence of a central perforation were criteria for diagnosis of chronic suppurative otitis media of the tubotympanic type. History of ear discharge, with evidence of cholesteatoma, marginal or attic perforation or evidence of retraction pocket were features indicating diagnosis of atticointral type of CSOM.
- **Otitis media with effusion (OME):** clinical signs of OME on otoscopy (tympanic membrane retraction, reduced mobility of TM, evidence of fluid in middle ear), along with type B tympanogram were considered as positive for OME. Children with Type C tympanogram were advised regarding treatment and follow-up. However, such cases were not included in the analysis as OME.
- **Acute suppurative otitis media (ASOM):** diagnosis of ASOM was made on the basis of congestion, bulging or acute discharging

perforation of the tympanic membrane, mostly with a history of acute ear pain.

Cross checking of diagnoses was carried out periodically for verification and validation. A sample of subjects diagnosed with otitis media as well as those considered free of disease was re-examined (by the lead researcher, who was different from the examining ENT specialist) in order to verify the diagnosis.

All children, who were identified with otitis media or other ear morbidities during the examination, were provided treatment at the time of examination, if possible. Others were referred to a secondary or tertiary level center for further management, as required.

One thousand children were examined in each type of the three areas under consideration, i.e. non-slum urban areas, urban slums and rural areas.

Data from home visits was checked and analyzed using the IBM SPSS Statistics for Windows, version 16.0. The frequency of otitis media was estimated and compared across the different areas. Chi-square tests were applied and *P* values computed. Where the *P*-value was less than 0.05, it was considered significant.

### 3. Results

Three thousand children, across two districts of Delhi were included in the study group. The age of the survey sample ranged from 18 days to 15 years, with a mean age of 7 years. The sample had 53.8% (1614) males as compared to 46.2% (1386) females. Two hundred and fifteen children of the three thousand (7.1%) were identified with otitis media.

The frequency of otitis media and its types was estimated in the three types of areas covered. This was as follows (Table 1):

The overall the prevalence of ASOM and CSOM was considerably higher in the urban slums (0.5% and 7.2%), as compared to other parts of the city. OME was most common in the rural parts of the city (3.6%), as compared to urban areas.

CSOM, identified in 128 children, was also studied with respect to the type of pathology, i.e. tubotympanic or atticointral. The differentiation was done on the basis of clinical features. The results are as shown below (Table 2).

The frequency of otitis media was compared across the three types of areas:

#### 3.1. Rural vs non-slum urban areas

The overall prevalence of otitis media was significantly higher in rural areas as compared to urban (non-slum) areas studied (*p* value: 0.01). The prevalence of CSOM, OME and ASOM in rural and non-slum urban parts of the city was compared through application of the Chi-square test. Though all types of otitis media were more commonly identified in the sample from rural parts of the city, application of Chi-square test revealed that there was a significant difference in the frequency of OME in the 2 areas considered (*p*-value: 0.008). There was no significant difference as

**Table 1**  
Distribution of otitis media in urban slums, non-slum urban and rural areas.

Type of area	No. of children with CSOM (%)	No. of children with OME (%)	No. of children with ASOM (%)	Total cases of OM (%)	Children without evidence of otitis media (%)
Urban slum ( <i>n</i> = 1000)	<b>72 (7.2)</b>	22 (2.2)	<b>5 (0.5)</b>	99 (9.9)	901 (90.1)
Non-slum urban area ( <i>n</i> = 1000)	26 (2.6)	17 (1.7)	3 (0.3)	46 (4.6)	954 (95.4)
Rural area ( <i>n</i> = 1000)	30 (3)	<b>36 (3.6)</b>	4 (0.4)	70 (7)	930 (93)
Total ( <i>n</i> = 3000)	128 (4.26)	75 (2.5)	12 (0.4)	215 (7.1)	2785 (92.9)

Bold indicates the highest prevalence.

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