

REGIONAL  
OCCUPATIONAL  
HEALTH CENTRE

(Eastern)

Kolkata

# National environmental health profile and comparative health risk assessment

(Sponsored by WHO and MoE&F)

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In the study of environmental health profile and comparative health risk assessment in the Kolkata city, the project work carried out during March – July, 2005 has been incorporated in the present report. Indoor and immediate outdoor levels of Volatile organic compounds (VOCs) carried out in three areas of Kolkata, questionnaire based epidemiological study of total 1322 subjects and the study of PFT of 216 subjects in two areas, Central (C) and South (E) Kolkata have been reported.

The indoor and immediate outdoor levels of VOCs, like Benzene, Toluene, Et-Benzene and o- & m- Xylenes in selected households of N, S and Central Kolkata were estimated gas chromatographically. The questionnaire comprised information on socio-economic, environmental and dwelling conditions and medical history regarding types health complications of respiratory, cardio-vascular, gastrointestinal system,

vector borne diseases, eye, skin, dental problems, cancer etc were asked. In the PFT study, Vital capacity (VC) and Forced Vital Capacity (FVC) was recorded by Spirovit SP-10 and Peak Expiratory Flow Rate by Wrights Peak Flow meter.

VOCs in indoor air found higher than the immediate outside air. Toluene found maximum of 1148.59  $\mu\text{g}/\text{m}^3$  in indoor air followed by benzene (615.43  $\mu\text{g}/\text{m}^3$ ) and xylenes. The highest VOCs levels in indoor air observed in Central Kolkata (area C) followed by that in South. As per the questionnaire study, females are mostly housewives. Maximum of males reported exposed to dust and chemicals at work. Majority in both the areas reported bad or moderate ventilation in houses. Morbidity pattern of adult showed respiratory problems, 21.4% in site C and 36.9 % in site E; gastrointestinal problems, 14.6 % at area C and 34.2 % at E. In children, respiratory problems were, 20.2 % and 24.0 % at areas C and E and gastrointestinal problems, 7.0 % and 20.2 % respectively. Other common problems were eye, dental and skin.

In the PFT study, lung volumes and flow rates of male and female found within the normal range. PFT values of male were higher than female of two areas and there are significant differences. There was a gradual trend of decrement of lung volumes and the flow rates with increased duration of stay in both male and female. The respiratory function impairments in total population of areas, C and E were 13.82% and 7.37% respectively. Males were having more impairment compared to the females. The restrictive, obstructive and combined types of impairments of male and female were, in Central, 9.57%, 3.19% & 1.06% and in South, 2.45%, 2.45%, 2.45%, respectively. Each type of impairments was found less among female subjects.

# Assessment of health status of the workers exposed to storage grain dust - Follow up study

(Sponsored by DST, Govt. of West-Bengal)

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The workers in the grain storages workers suffer from different types of respiratory problems after getting the exposure to storage grain dust, which is a complex mixture of pesticides, fungi, silica, bacteria, spores, storage mites, animal hairs, pollens etc. The earlier study was carried out on assessment of environmental conditions, health status assessment, assessment of pulmonary function tests, fungal spore concentration and associated respiratory symptoms as well as the work efficiency etc. The details of the report was published in the previous years annul report of the centre. The present study report is based on the results of the follow up study carried out among the same workers those who have studied earlier. Out of 304 workers investigated in the initial study, 109 workers were participated in the follow up study after one year to see their changes due to the exposure. The workers were categorically divided according to their caste as it was done in the earlier study. In the follow up study 29.35% of workers are belonged to scheduled caste category and 70.65% general caste category. Like the earlier study all investigations were made in the follow up study by the same standard procedure with same instruments and even with the same technicians.

The different allergic manifestations were found higher among the workers in the follow up study. The exposure of different concentrations of fungal spores might be the possible reasons for the development of these symptoms. The percentage prevalence of higher blood pressure in

most of the categories of workers showed an upward trend. The increase prevalence of higher blood pressure of all categories of workers showed an increase value in the follow up study. The pulmonary function test (PFT) results found higher in load handling workers compared to the other categories. The PFT results showed decrement of values in higher age groups and among the smokers compared to the non-smokers. In each case follow up study showed lower values. The pulmonary function impairment among the workers are restrictive, obstructive and combined type. In different categories of workers the percentage of respiratory impairment is more in the follow up study. The obstructive type of impairments found higher among the scheduled caste and general caste workers in the follow up study compared to the 1<sup>st</sup> study. In haematological and immunological study the same parameters was repeated like the total leucocyte count, eosinophil count and blood IgE level etc. In all categories of both castes of workers showed lowered total leucocyte count at the follow up study. But in most of the cases blood eosinophil level showed higher during the follow up study among the workers similarly the blood IgE level also found higher. Lowered PFT values were noticed in those who had high blood eosinophil and IgE level. The concentration of fungal spores in some of the godowns was found higher in 1<sup>st</sup> study and some in the follow up study. The concentration of *Aspergillus* was found higher in the follow up study and it is the main dominating fungal spore of the grain storage godowns, its concentration is much higher in both the studies compared to the other fungal spores.

Respiratory impairments found higher in the follow up study, the occurrence rate of the respiratory function impairment can be evaluated more correctly by increasing the number of workers in each category of works. The report of the study may help in formulating plans to control the hazards at the working place as well as to take the preventive measures about the exposure and to know the occurrence rate of the respiratory diseases among the workers, all will help in better productivity and better utilization of the work force.

# Clinico-epidemiological study of Arsenic exposed population in West Bengal (Sponsored by World Health Organisation)

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Chronic arsenic toxicity caused by drinking arsenic-contaminated water affected nine districts of West Bengal. Saha in 1984 first reported the incidence of chronic arsenic toxicity from a village of 24 Parganas in West Bengal, India. Some other studies by different workers particularly Guha Majumdar et al showed multisystem involvement due to Arsenic exposure in West Bengal. The project was undertaken with the objectives of measurement of the arsenic content of drinking water and other biological samples from the subjects and health evaluation of the population exposed to arsenic.

The study was undertaken in Katlamari Gram Panchayat I under Raninagar Block -2 of Murshidabad district adjoining Bangladesh border. Based on the Arsenic concentration of drinking water 3 categories have been made e.g; a) Arsenic concentration  $\leq 50 \mu\text{g/L}$ ; b) Arsenic concentration between  $>50\mu\text{g/L}$  &  $\leq 150 \mu\text{g/L}$  and c) Arsenic concentration  $>150$

$\mu\text{g/L}$ . It has been found that out of 79 drinking water samples 32.9% showed arsenic levels  $>150\mu\text{g/L}$ . Whereas 24% showed the values within  $>50-<=150\mu\text{g/L}$  range. The health evaluation covered 112 randomly selected subjects (male - 53 and female -59).

The average age of male subjects was  $42.87 \pm 15.08$  years and that of the females was  $35.20 \pm 14.12$  years. The average duration of consumption of water was  $6.99 \pm 6.35$  years. Majority of the male subjects were smoker. Usually females are not smoking. Alcoholism was not a problem. The prevalence of weakness was more in higher arsenic exposed category in male subjects; the arsenic exposed category  $>50\mu\text{g/L}$  and  $\leq 150 \mu\text{g/L}$  significantly higher than arsenic exposed category  $\leq 50 \mu\text{g/L}$  ( $p<0.05$ ). In females the prevalence rates of weakness were also high. Chronic diarrhoea showed higher trend in prevalence rate in male with increase of exposure. Higher figures were also noted in case of dyspepsia with out any definite pattern. The prevalence rates of breathlessness and chronic bronchitis were high. Cough with sputum revealed higher prevalence rates with the increase of exposure in male subjects only. Feeling of muscular cramp was noticed more in higher exposed categories; male subjects showed higher prevalence rates than the females. Substantial number of subjects were complaining of joint pain, mainly the bigger joints like knee, elbow etc. The prevalence rates of joint pain usually followed a definite pattern of increase with increase of exposure to arsenic. It may be noted that significantly high prevalence of joint pain of male subjects of arsenic exposed category  $>150\mu\text{g/L}$  was observed compared to the arsenic exposed category ( $\leq 50 \mu\text{g/L}$  ( $p<0.05$ )). The symptoms related to neuropathy showed very high figures in all the arsenic exposure categories.

The significantly high prevalence rate of anaemia of males of arsenic exposed category  $>150\mu\text{g/L}$  was observed compared to that of arsenic exposed category  $\leq 50 \mu\text{g/L}$  ( $p<0.01$ ). The females were showing high prevalence rate of anaemia irrespective of any group. Angular stomatitis and glossitis showed high figures in all the arsenic exposed categories.

Enlargement of liver was showing a trend of higher prevalence rates as the exposure to arsenic was increased from lower to higher category, significantly high in male of arsenic exposed category  $>150\mu\text{g/L}$  compared to that of arsenic exposed category  $\leq 50\mu\text{g/L}$ . Dermatological examination revealed that the skin pigmentation was found in 7.3%, 18.9% and 29.4% subjects of arsenic exposed categories  $\leq 50\mu\text{g/L}$ ,  $>50\mu\text{g/L}$  &  $\leq 150\mu\text{g/L}$  and  $>150\mu\text{g/L}$  respectively. The corresponding figures for keratosis were 7.3%, 16.2% and 20.6%. Mainly the male subjects were victims of pigmentation and keratosis. A definite pattern of skin pigmentation and keratosis was observed with the increase of present exposure to arsenic in male subjects from low to high. Definite arsenicosis (as per WHO criteria) was noted in 1 male subject of arsenic exposed category  $>50\mu\text{g/L}$  &  $\leq 150\mu\text{g/L}$  and 4 cases (3 male & 1 female) of Arsenic exposure  $>150\mu\text{g/L}$ .

It was found that respiratory function impairments of the male exposed group of Arsenic exposed category  $\leq 50\mu\text{g/L}$ ,  $>50-\leq 150\mu\text{g/L}$  and  $>150\mu\text{g/L}$  were 21.05% (15.79% restrictive, 5.26% obstructive), 47.05% (29.41% restrictive, 11.76% obstructive and 5.88% combined type) and 52.94% (35.29% restrictive and 17.65% combined) respectively. In female only restrictive type of impairment was seen and the prevalence rates according to exposure category  $\leq 50\mu\text{g/L}$ ,  $>50-\leq 150\mu\text{g/L}$  and  $>150\mu\text{g/L}$  were 63.64%, 70.00% and 94.12% respectively.

So, the study revealed higher rates of weakness, chronic diarrhoea, dyspepsia, cough with sputum, breathlessness, chronic bronchitis, joint pain, neuropathy, anaemia, skin pigmentation (hypo or hyper) and keratosis usually more in male and followed a trend with exposure. Mainly restrictive type of PFT impairment was present in the subjects.