

# Epidemiologic survey of respiratory symptoms among workers of small grain mills and others

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**Abstract:** The prevalence of respiratory symptoms was compared in a grain dust exposed group of 57 grain mill workers and grain traders and an unexposed group of 181 civic, shop, snack bar and municipal labor workers in Kola Diba town using standard medical and occupational questionnaire.

The two groups were comparable by age, sex and prevalence of smoking. Symptoms of expectoration and dyspnoea, cough, wheeze, chest tightness, sneezing and rhinorrhoea occurred significantly higher in the exposed than in the unexposed group.

Recognizing Ethiopia's predominant agricultural economy and an unavoidable expansion of small grain grinding mills in rural cooperatives and townships, the paper attempts to indicate the need for documenting the level of grain dust pollution and investigating its occupational health hazard. [*Ethiop. J. Health Dev.* 1998;12(3):213-215]

## Introduction

Flour and seed mill workers are known to be at risk of respiratory diseases from grain dust exposure. Ramazzini must be referring to such small scale grain handlers, farmers and grain traders when he first described the condition as 'disease of sifters and measurers' in 1713 (1). Dust generated during the handling and grinding of grain is composed of organic and inorganic particulate which produce the acute effects of grain asthma and fever (2,3) and other chronic effects (4,5) on human respiratory system.

Many cross-sectional studies, mostly of grain elevator workers (6,7) and farmers (8), have shown a significantly higher prevalence of respiratory symptoms among exposed population groups. The use of a respiratory questionnaire in exploratory studies on large populations has proved to be a powerful tool (9), particularly where X-ray, lung function and challenge tests are not available. Perhaps due to preoccupation with other more common diseases and health problems, there is paucity of information on the level of grain dust exposure and associated respiratory risk in developing areas. This study was, therefore designed to compare the prevalence of respiratory symptoms among grain dust exposed and non-exposed workers.

## Methods

The study was conducted in a rural town of Kola Diba in north-west Ethiopia in May 1994. A sample size of 183 unexposed and 61 exposed (in a 3 to 1 ratio) was determined a priori to get an Odds Ratio of 2.60 at 95% confidence level and 80% power when expected frequency of disease is 20% in unexposed and about 40% in the exposed groups. Of the 62 people currently working

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in grain mill houses and 18 registered grain traders, 57 mill operators, measurers, flour receivers, guards, and grain traders were included by systematic sampling from every stratum (category) proportional to its size. The 181 controls which were from civic institutions, municipal labor

workers, private shops, and snack bars in the town were selected randomly. The selection process was in such a way that all who were available at their work were taken until the number required was obtained.

Three mill workers were excluded from the study because they were less than one year on the job. Both sexes in the age range of 25 to 65 years were considered. We did not ask for history of underlying respiratory or cardiac problems for exclusion in both groups as it was rather very difficult to accurately ascertain diagnosis in our case and for absence of strong evidence to suspect a difference in the occurrence of the diseases between the two groups.

Using a standard medical and occupational questionnaire (10), slightly adjusted to the scope of our investigation, subjects were asked for the usual presence of respiratory symptoms of cough, expectoration, wheeze, shortness of breath, chest tightness, dyspnoea and sneezing. Individuals who gave a positive response to each question on the usual presence of cough and expectoration in the morning, day or night, and dyspnoea while walking on level ground or uphill, and sneezing at or out of work were considered cases for that symptom. Final year medical students of the Gondar College of Medical Sciences conducted the interview after pretesting the Amharic language version of the questionnaire.

Sample size was calculated and data entered and analyzed using the EPI-Info version 5 computer program.

## Results

Most (81.5%) of the study participants were male and 27(11.3) current smokers; their mean age being  $39.6 \pm 11.2$  years. There were no significant differences in age, sex, and prevalence of current smoking between the two groups (Table 1). Duration of work in grain mills ranged from one to 43 years and as grain

Table 1: Characteristics of study population dealt with to investigate respiratory symptoms in grain and non grain workers

Variable	Grain Workers # (%)	Non-Grain Workers # (%)	P-Value
Male	48 (84.2)	146 (80.7)	n.s*
Female	9 (15.8)	35 (19.3)	
Current Smoker	3 (5.3)	4 (13.3)	n.s*
Non-smoker	54 (94.7)	157 (86.7)	
Mean Age Yrs $\pm$ SD	40.3 $\pm$ 10.3	39.4 $\pm$ 11.5	n.s*

\* = Chi-square test \*\* = t-test

Table 2: Association between occupation and respiratory symptom.

Symptom	Occupation # Grain Worker	Non Grain worker	(%)Odds ratio	P-value*
Cough	24 (42.1)	36 (20.0)	2.91	0.002
Expectoration	17 (30.3)	34 (18.9)	1.88	n.s
Dyspnoea	10 (17.5)	48 (26.5)	0.59	n.s
Wheeze	20 (35.7)	36 (19.9)	2.18	0.029
Tightness	20 (35.1)	36 (19.9)	2.18	0.029
Sneezing	37 (64.9)	29 (16.1)	9.63	0.000
Rhinorrhoea	33 (60.0)	22 (12.2)	10.77	0.000

\* = Chi-square test

trader from two to 30 years with a median of 8 and 16 years, respectively.

All respiratory symptoms, except expectoration and dyspnoea, were found to be significantly associated with working in the grain occupations (Table 2).

Stratified analysis by sex, age, and current smoker status using the Mantel Haenszel weighted odds ratio did not show alteration in the magnitude or direction of the crude association between each respiratory symptom and grain dust exposure (Table 3).

Table 3: **Stratified analysis of association of respiratory symptoms by three variables**

Variable	MHWOR*	95% C.I.
1. Cough		
Sex	2.80	1.49 - 5.28
Current smoking	2.99	1.55 - 5.78
Age	2.82	1.58 - 5.31
2. Expectoration		
Sex	1.82	0.92 - 3.61
Current smoking	1.94	0.97 - 3.84
Age	1.83	0.92 - 3.60
3. Dyspnoea		
Sex	0.60	0.28 - 1.27
Current smoking	0.55	0.25 - 1.17
Age	0.60	0.28 - 1.26
4. Wheeze		
Sex	2.17	1.12 - 4.17
Current smoking	2.34	1.20 - 4.56
Age	2.06	1.09 - 3.91
5. Sneezing		
Sex	9.76	4.96 - 19.2
Current smoking	9.19	4.68 - 18.1
Age	8.87	4.54 - 17.4

\* Mantel Haenszel Weighted Odds Ratio

## Discussion

The prevalence of respiratory symptoms, in both occupationally exposed and comparison groups, is within the range of what is reported from similar studies done on grain elevator workers around the world between 1941-1984 (11). Our study reaffirms the fact that working in grain dust environments carries increased respiratory risk.

Unlike the grain elevators of north America and Europe, mill workers and traders in Ethiopia are additionally exposed to non-cereal grains of red pepper, pulses, and other spices, and additives. Although we did not attempt to look at the composition of the dust in the studied grain mills or trade, it is logical to assume that the contribution of these non-cereal grains, which traditionally are known for their respiratory provocative effect, is fairly considerable.

An expected attenuation effect of cigarette smoking on the association of grain dust exposure and respiratory outcome (12) is not observed in this study because of the comparability of the two population groups in current cigarette smoking status.

Further studies should be undertaken to document the level and distribution of grain dust pollution through personal or area sample studies of grain mills and trade houses. In addition, these subjective reports of respiratory symptoms need to be substantiated by measurements of lung function, radiologic and respiratory challenge tests.

### Acknowledgments

We extend our gratitude to the owners and workers of the grain mills, grain traders and all the others who participated in the study.

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