QUALITATIVE METHOD FOR ASSESSING DUST EXPOSURE IN SMALL-SCALE WOOD INDUSTRIES IN THE INFORMAL SECTOR

LMB Rongo¹ and B Leon²

Abstract

Health hazards related to wood dust in modern industries have been well documented in developed countries in Western Europe and USA. Exposures are documented using sophisticated equipment. Few studies have been done assessing exposure to wood dust industries qualitatively. This study assessed the extent of occupational exposure, self-protection and perceived respiratory problems among workers exposed to wood dust. Structured questionnaire was administered to 214 workers in 108 small-scale industries in Dar es Salaam. Exposure to wood dust was qualitatively assessed based on each worker’s daily tasks. Heavy exposure to wood dust was noted in 71.5% of the workers. Only a few workers (6.5%) used rather poorly designed cloth masks while the rest were basically unprotected. Nearly 52% of all workers had a respiratory symptom. Prevalence of respiratory symptoms were found to be statistically associated with the degree of exposure to wood dust (p<0.01). Workers in small-scale industries have a high likelihood of increased respiratory symptoms.

Key words: Qualitative methods, wood dust exposure, small-scale wood industries, respiratory symptoms, Tanzania

Introduction

Workers employed in small-scale wood industries (SSWI) are exposed to numerous problems. Among those frequently mentioned are wood dust, high noise levels and high temperatures. Symptoms of respiratory diseases are also experienced by such workers, notably chest pain and cough (1-5).

Tanzania has experienced a rapid growth in her informal sector, particularly so in the city of Dar es Salaam. Wood working activities appear to be chosen by many in a bid to curb unemployment. It is reported that 30% of the economically active labour force in Dar es Salaam is absorbed by the informal sector which grows by about 2.4% per annum. The number of operators in the informal sector also increased by 12% between the years 1991 and 1995. In a survey conducted in 1995, wood working activities absorbed about 6% of the total economically active labour engaged in the informal industrial sector (6).

Dar es Salaam informal sector workforce is young with the mean age of 29 years for males and 31 years for females. The majority (66%) have completed only primary education (7). Being young, these workers may be saved from a potential risk of exposure to hazardous substances if their exposure status is established early and appropriate measures instituted. With regard to vocational training, 92.6% of workers in the informal sector have no formal training. The survey conducted in 1995 revealed that 3.7% were semi-skilled, 2.6% were skilled craftsmen and 0.7% were master craftsmen.

Holders of full technician certificate were close to 0.6% (8). With such little training, it may be expected that safety measures may not be given a priority in their daily operations.

In addition to the lack of formal training and qualifications, the low income these workers earn leave them with the dilemma of bargaining between their health and earnings. The average monthly net profit in a wood working industry was Tshs 39,000/= (US$ 39) per month per average activity in 1995 (8). Although wood working was the most profitable industry in the informal sector, the income is still low.

Improvement of health and safety conditions in small-scale wood industries is an issue that demands particular attention. The amount of money required for this purpose varied from Tshs 10,000 to 50,000 per month in 74% of the activities in 1995. The rest required more Tshs 50,000 (8). This amount is too high compared to the monthly earnings, and thus the dominance of very poor working conditions is far from unexpected.

Occupational health and safety conditions in the informal sector are characterized by poor working conditions and environmental hazards which are determined by industrial type, location of the industry and the educational status of the operators. As far as wood industries are concerned, poor waste disposal and a limited working space are added to the list (8).

Most small scale wood industries are located in streets, along the main roads, and some are on unsafe temporary structures (9). The rate of use of protective gears in work places is alarmingly low, averaging 5% for industrial sectors. Few industrial owners know about the existence of health hazards at their places of work. Only 5% of the workers in the informal industrial sector were aware of health hazards around them in the national survey conducted in 1991 (10).

Workers in wood industries are often exposed to wood dust in various degrees. The extent of exposure which is also known to be related to the extent of respiratory tract damage depends on a number of factors including type of tasks performed by the worker, duration over which the worker is exposed, type of machinery used, presence of gadgets to evacuate the dust from the working area, and use of personal protective equipment among workers (4). In most small-scale industries as the case with Dar es Salaam, most of the woodwork is done manually, and so exposure to wood dust is quite enormous (4).

Important as well is that nothing is known of the standard maximum allowable levels of wood dust exposure among workers in Tanzanian industries (5). There has never been a concise legislation directed purposely towards the small-scale wood industries stating the standard allowable level of dust in terms of both particle size and concentration in milligramme per cubic meter. It is also presumed therefore that even the Central Labour Inspectorate Unit in the Ministry of Labour and Youth Development does not have means to quantify inhalable dust in small-scale wood industries. This study assessed exposure to wood dust, the extent of application...
of personal protective equipment and resultant perceived respiratory problems using qualitative methods.

Methodology

Study design

A cross-sectional study was conducted in small scale wood industries in Dar-es-Salaam.

Study Area

The study involved workers from three districts in the Dar es Salaam city, namely Ilala, Kinondoni and Temeke. Dar es Salaam has a tropical climate with high temperature and two rainy seasons. The study area is an area of high commercial activity. A few people are employed with Government Departments, Parastatals and private companies, but very often they have to supplement their income with some kind of business or enterprise. Dar es Salaam is Tanzania’s commercial city with an estimated population of 2.5 million people based on the 2002 population census (11).

The Gerezani area is located in Kariakoo, less than a kilometer from the city center. It is one of the busiest places in the city, specializing in many types of small businesses which employ a huge number of hawkers, petty traders, manual labourers, and entrepreneurs of small scale industrial establishments, to mention but a few. The small scale industries in Gerezani are truly of a “small scale” in the literal meaning of the phrase. They are housed in simple or semi-finished buildings, with only a small working space. Manual labour dominates most of the processes in these industries. The majority are simple artisanal establishments with the entrepreneurs playing role as the sole operators of the same, and more often than not becoming jacks of all trade. The work load depends on the number of contracts received. Most of the owners of these industries are too poor to afford mass production of their furniture for commercial purposes. They only work according to customers’ orders. Prices of their pieces of furniture are in most cases negotiable.

The operators of the small scale industries work under the auspices of the Dar es salaam Small Scale Industries Cooperative Union (DASICO) which caters for their social security and marketing of their goods. Each operator does his own work, negotiates his own prices but pays a small agreed percentage of his earnings to DASICO which ensures him a working space, security of his working area, and financial assistance during emergencies. DASICO has been in place since early 1980s, and currently it has members engaged in wood work, steel and metal products, and shoe making among others.

There is also a dispensary staffed by a clinical officer and a nursing assistant. The dispensary is basically intended to offer first aid services in case of emergencies and also attend to the workers’ minor health problems. It is stocked mainly with pain killers and wound dressing materials. However the dispensary is still just too small to attend to more than a thousand workers, for it has only 3 rooms, a consultation room, dispensing room, and a small laboratory equipped with only one microscope. The only laboratory investigation performed is blood slide examination for malaria parasites.

The small dispensary is in severe shortage of drugs and equipment. Services in the dispensary are sustained by the contribution that workers pay to DASICO. At the time of this study, plans were under way to improve the dispensary so that it could offer services to other workers outside the DASICO establishment and the general population at a fee.

Cleanliness of the working area is every worker’s duty. The wastes are collected and piled up on an agreed dumping place within the Gerezani complex. It is then collected by a truck from the Dar es Salaam city commission which disposes it at a City Dump.

Target population

The target population was all employees and managers or employers of the selected industries.

Selection of the study area

Three areas known for their large number of small scale industries in Dar es Salaam were identified, namely Gerezani, Keko and Mwenge. The Gerezani area was randomly selected.

Sample selection and sample size

Criterion for selection was all workers in a small scale wood industry who had engaged themselves in wood working activities for at least one month, not necessarily in the same industry. Each industry in the study area was visited prior to the commencement of the study, notifying the management about the nature and purpose of the study. A list of all these industries was constructed in the order of their locations, thus making a sampling frame. Then 108 industries were systematically sampled from this list. A list of all workers in each industry was constructed. Two workers were then randomly picked from each industry’s list. At the end of this exercise, 214 workers were selected. Five workers refused to be interviewed and therefore response rate was 98%.

Research instruments

Two types of structured questionnaire forms were used in collecting the data; one for each employer, and one questionnaire for each employee. Four research assistants assisted in interviewing the employers and the workers.

Definition of exposure status

The extent of exposure to wood dust was qualitatively assessed based on the workers’ daily tasks. Those working on the direct source of wood dust were considered heavily exposed, and these tasks included sanding, carving and sweeping. Those doing sawing, milling and planning were considered moderately exposed, while those doing manual transfer of wood from a workbench to another, assembling, gluing, and other minor tasks were considered mildly exposed. Workers doing entirely paper work or office work, not coming into direct contact with the wood or its dusts were considered not exposed (4).
Data collection procedure

Each industry was visited during the official working hours. Nature and purpose of the study was explained to the industry management/administration. The manager or any one acting in that capacity was requested to allow his workers to participate in the study. The manager was also requested to take part in an interview to fill the industry questionnaire. Every selected employee was interviewed, and the information was filled on a separate questionnaire.

Demographic information (age, sex, residence, literacy level) obtained from respondents was considered sufficient and no verification was required. In order to identify the types of industries, the small scale wood industries were classified according to the tasks that dominated in the running of the industry according to its registration. Industries venturing into making various types of home and office furniture were classified as furniture industries. Sawmills were those industries that produced wood of various sizes from timber, ready for supplying to furniture industries. Those industries which produced doors, windows, shelves, rafters and other construction items were classified as construction carpentry. When an industry fell into more than one of the above categories, it was classified into all the categories in which it fell.

Types of wood used in each industry were recorded in their common names in Kisiwahili language. Classification into hard wood and soft wood was performed later after consulting the Ministry of Agriculture and Forestry. The correct botanical names were obtained from publication by Mbuya et al 1994 (12). Assessment of workers’ awareness regarding the risks associated with exposure to wood dust and personal protection was based on the workers’ questionnaire. Workers were asked whether they knew of any health problems that could result from exposure to wood dust. All those who responded in the affirmative were further asked to mention the consequences which they knew were due to inhalation of wood dust. Workers were also asked to mention means by which effects associated with exposure to wood dust could be minimized.

Regarding personal protection, workers were asked as to whether they protected themselves from inhalation of wood dust, and how they did it. Those who responded that they did not use any protection were asked to give reasons.

A scoring system for awareness was adopted as follows:

Table 1a: Score table

<table>
<thead>
<tr>
<th>Assessment question</th>
<th>Possible answers</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Do you know of any problems caused by exposure to wood dust?</td>
<td>Yes</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>0</td>
</tr>
<tr>
<td>2. Mention the problems that result from inhalation of wood dust (at least two, so maximum 2 points for this question)</td>
<td>Sneezing (allergies)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Nasal obstruction</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Cancers</td>
<td>1</td>
</tr>
<tr>
<td>3. How can the effects in (2) above be minimized?</td>
<td>Protection against inhalation of wood dust</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Frequent medical examination and appropriate advice</td>
<td>1</td>
</tr>
<tr>
<td>4. How to protect oneself against inhalation of wood dust</td>
<td>Wearing face masks</td>
<td>1</td>
</tr>
</tbody>
</table>

Any other response apart from the above listed was given a score of zero for questions 2 to 4 in table 1a. The first two questions (table 1a) were used to assess awareness of risk of exposure. A worker had to score a point each on both questions to be considered aware of the risks. All those who scored a total of at least two points in questions 3 and 4 were considered aware of personal protection.

Data Management

Data were analyzed using Epi Info 6. Prevalence of respiratory symptoms among heavily exposed, moderately exposed and mildly exposed was compared. Chi-squared ($\chi^2$) test was employed to test the associations between variables. Associations were considered significant if p-value was less than 0.05.

Ethical issues

Introductory letters were sent to the managers in advance and verbal consent was obtained. For the avoidance of unpleasant consequences on the part of the workers, each worker’s response was treated as strictly confidential information. Workers and their employers were assured of confidentiality.

Perceived constraints

This study may have been limited by the following factors:
1. Bias

(a) Information bias:
Some proprietors may have attempted to give false information in order to please the researcher. The workers also may have attempted to lie in favour of their bosses. To minimize this bias, the information given was thoroughly counterchecked for consistency.

(b) Recall bias:
Some workers may not have remembered the exact duration over which they have worked in wood industries, or have worked in other areas with more dust. The researcher relied on self-reported estimates of duration of exposure.

2. The extent of exposure to wood dust among workers (in milligrams of dust per cubic metre) was not quantified.

3. Respiratory symptoms reported by workers in this study could not necessarily be linked to a systemic respiratory pathology resulting from exposure to wood dust, since the latter should have been assessed by performing lung function tests and establishing a causal relationship linking wood dust to the disease. However, this was outside the scope of this study.
Results

Distribution of study sample

Table 1b: Age and sex distribution of workers in small-scale industries in Dar es Salaam.

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Male Number (%)</th>
<th>Female Number (%)</th>
<th>Total Number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-25</td>
<td>32(15.2)</td>
<td>2(6.7)</td>
<td>34(15.9)</td>
</tr>
<tr>
<td>25-36</td>
<td>53(25.1)</td>
<td>1(3.3)</td>
<td>54(25.2)</td>
</tr>
<tr>
<td>36-45</td>
<td>21(9.9)</td>
<td>0(0)</td>
<td>21(9.8)</td>
</tr>
<tr>
<td>46-55</td>
<td>42(19.6)</td>
<td>0(0)</td>
<td>42(19.6)</td>
</tr>
<tr>
<td>Above 55</td>
<td>63(29.4)</td>
<td>0(0)</td>
<td>63(29.4)</td>
</tr>
<tr>
<td>Total</td>
<td>211(98.6)</td>
<td>3(1.4)</td>
<td>214(100)</td>
</tr>
</tbody>
</table>

Majority (98.6%) of the workers were males aged between 20 and 78 years. Only about 29.4% of the workers were above 55 years of age.

Type of industries and wood processed

Of the 108 small-scale wood industries visited, 94% were making furniture, 4% were sawmills and 2% were doing construction carpentry. Most of the industries (83%) were processing hardwood. Few industries were processing both soft and hard wood.

Awareness of risks

Most of the workers (88.3%) were aware of the risks and could mention at least one respiratory problem which they thought resulted from exposure to wood dust.

Awareness of PPE and daily tasks in SSI

The majority of the workers (68.7%) were aware of protective gears against inhalation of wood dust. Daily tasks in small-scale wood industries were sanding (51%), sweeping (57%), saving (97%), planing (94%), milling (5.6%), manual loading and offloading wood (48%) and assembling (joinery) (97%). Most of the workers performed several of the tasks listed above. However, many of the same workers also performed sanding and sweeping.

Time spent on wood working per day

The normal time spent at work depends on the regulations of the country. In most cases 7-8 hours are taken as a standard. Out of 214 workers, 5% spent 6 hours at work, 12% spent 7 hours, 42% spent 8 hours, 35% spent 9 hours and 7% more than 9 hours. The total time spent on wood working per day range from 6 to 11 hours, with an 8 hour shift common among 41.6% of the workers.

Exposure levels

The majority (71.5%) of the workers were heavily exposed to wood dust. This category included all workers whose daily tasks included sanding and sweeping. Those workers whose tasks excluded sanding and sweeping constituted 15.95% of the study sample and were regarded moderately exposed to wood dust. Workers whose daily duties were confined solely to assembling (joining) and/or manual loading or offloading formed the minority (12.6%). This group was considered mildly exposed to wood dust.

Table 2: Duration and extent of exposure to wood dust among employees in the studied industries.

<table>
<thead>
<tr>
<th>Duration in years</th>
<th>Mild No (%)</th>
<th>Moderate No (%)</th>
<th>Heavy No (%)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;5</td>
<td>6(8.7)</td>
<td>2(2.9)</td>
<td>61(88.4)</td>
<td>69</td>
</tr>
<tr>
<td>5-9</td>
<td>8(16.3)</td>
<td>3(6.1)</td>
<td>38(77.6)</td>
<td>49</td>
</tr>
<tr>
<td>10-14</td>
<td>9(24.3)</td>
<td>6(16.2)</td>
<td>22(59.5)</td>
<td>37</td>
</tr>
<tr>
<td>15 and more</td>
<td>4(6.8)</td>
<td>23(39.0)</td>
<td>32(54.2)</td>
<td>59</td>
</tr>
<tr>
<td>Total</td>
<td>27(12.6)</td>
<td>34(15.9)</td>
<td>153(71.5)</td>
<td>214(100)</td>
</tr>
</tbody>
</table>

Exposure to wood dust

In table 2, fifty nine workers (27.6%) had worked in small-scale industries for 15 years or more. Among these 32 (54.2%) were heavily exposed to wood dust. Majority of the workers who were heavily exposed to wood dust had practiced woodworking for less than five years. In each category of duration, majority of the workers were heavily exposed to wood dust.

Use of personal protective equipment (PPE)

Distribution of 108 small-scale wood industries according to the types of protective facilities available for use against inhalation of wood dust by workers was as follows: special masks (commercially made) 4.7%; locally made cloth masks 25%; others 11.1% and none 59.3%. When the workers were assessed on utilization of PPE, a different picture was observed. Out of 214 workers, no one was using special masks while 6.5% used locally made cloth masks, handkerchief 14.4%, others 5.6% and none 73.4%. None of the workers used the special masks designed to protect them against inhalation of wood dust although they were available in some industries.

Respiratory symptoms

Out of 214 workers, 9.8% of the workers had nasal obstruction, 19.6% nasal discharge, 9.8% sneezing, 20.1% persistent cough, 29.9% breathlessness and 14% other symptoms. In total, 112 workers (52.3%) had at least one respiratory symptom. Breathlessness was the predominant symptom found in 29.9% of the workers. Several workers had more than one symptom concurrently.

Table 3: The association between the degree of wood dust and presence of respiratory symptoms

<table>
<thead>
<tr>
<th>Degree of exposure</th>
<th>Respiratory symptoms Present No (%)</th>
<th>Respiratory symptoms Absent No (%)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heavy</td>
<td>91(59.5)</td>
<td>62(40.5)</td>
<td>153</td>
</tr>
<tr>
<td>Moderate or mild</td>
<td>21(34.4)</td>
<td>40(65.6)</td>
<td>61</td>
</tr>
<tr>
<td>Total</td>
<td>112(52.3)</td>
<td>102(47.7)</td>
<td>214(100)</td>
</tr>
</tbody>
</table>

Table 3 shows a significant difference between exposure and presence of respiratory symptoms ($\chi^2 = 10.9$, $P < 0.01$).
Table 4. The association between cigarette smoking and presence of respiratory symptoms among workers in SSI in Dar es Salaam.

<table>
<thead>
<tr>
<th>Cigarette smoking (packs/day)</th>
<th>Respiratory symptoms</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Present No (%)</td>
<td>Absent No (%)</td>
</tr>
<tr>
<td>None</td>
<td>66 (51.2)</td>
<td>63 (48.8)</td>
</tr>
<tr>
<td>&lt;1</td>
<td>26 (50.1)</td>
<td>25 (49.9)</td>
</tr>
<tr>
<td>1-2</td>
<td>16 (57.1)</td>
<td>12 (42.9)</td>
</tr>
<tr>
<td>&gt;2</td>
<td>4 (66.7)</td>
<td>2 (33.3)</td>
</tr>
<tr>
<td>Total</td>
<td>112 (52.3)</td>
<td>102 (47.7)</td>
</tr>
</tbody>
</table>

From Table 4, the general trend was that the prevalence of respiratory symptoms increased with increasing numbers of cigarettes workers smoked per day. The observed increase is not statistically significant. The same table shows that respiratory symptoms do not differ among smokers and non-smokers.

Discussion

Small-scale wood industries in Dar es Salaam employed people of different age groups ranging from 20 to 78 years. Most of them (nearly 99%) were males with the age group 26-35 years dominating (25%). About 71% of the wood workers were aged below 55 years of age. The pertinent issues here are the male dominance in wood working processes and a relatively young workforce. While it is culturally accepted that male adults are expected to head their households and play their role as family bread winners, women have also involved themselves in a lot of other economic activities except wood working. Whether this has anything to do with the lots of energy one needs for the work and the many working hours per day, or whether it is a mere lack of interest, it remains a matter of speculation. However, to the women’s advantage, they remain relatively free from occupational exposure to wood dust.

Young people are the ones who can withstand the hardships involved in the whole process and wood working activities. Most of the informal sectors and their operators are characterized by sole entrepreneurship, manual work and very often tremendous endurance. This needs young, strong and active people. In a survey of the city’s informal sector, the mean age of the work force was 29 years for males and 31 years for females (7).

The majority of the small scale wood industries venture into furniture making as the main activity. While about 94% of the wood industries produced furniture, nearly 4% were saw mills and another 11% engaged in construction carpentry. Most of the activities were based on customers’ orders. This implies that in 94% of all wood working activities in Dar es Salaam, such workers are directly exposed to wood dust resulting from the gross and fine processes involved in furniture making. Higher exposures to wood dust have been recorded among furniture workers (13). Furniture industries mainly utilized hard wood whose dust has been documented as one of the agents implicated in the development of sino-nasal cancers (13).

Most of the studied industries used both softwood and hard wood in their daily activities. Use of hardwood dominated in most of the industries (83%). Softwood was used in nearly 7% of all industries. When the IARC classified wood dust as a human carcinogen, it did not categorize which carcinogens come from softwood nor hardwood (13). However, the same agency conducted case control studies in Finland and managed to establish an association between exposure to hardwood dust and sinonasal adenocarcinoma (13).

The seriousness of the occupational hazards that woodworkers are exposed to in relation to the type of wood used in their respective industries stands not to be under estimated.

Responses from 88% of the workers in this study suggested that workers were aware that inhalation of wood dust could be hazardous. Each of these workers could mention at least one respiratory problem which they thought resulted from inhalation of wood dust. Only about 12% of the workers knew nothing in regard to the hazard they were exposed to. However, a good majority of the workers were misled in believing that tuberculosis was a sequela of prolonged inhalation of wood dust. This is probably due to the fact that some workers had chronic respiratory symptoms including chronic cough, which they decided to label “tuberculosis” in their lay perception of illness. Rongo et al reported the same findings (3).

Interestingly, all those workers who knew nothing about health effects of wood dust were still of the opinion that wood dust could be harmful to the body. These workers’ worries must, under no circumstances be renounced as baseless. They inhale wood dust daily and they know pretty well that it is something foreign in their bodies. They don’t know what it does to their bodies, but they are not convinced that it could be completely harmless. This could be a health promoting fear, only if it was followed by appropriate practices. More than two thirds of the workers (69%) were aware of the protective facilities they were supposed to use against inhalation of wood dust. Among the 214 workers interviewed, 31% failed to mention plausible means by which inhalation of wood dust could be minimized.

The author’s attention was also drawn to the fact that nearly all workers believed that a post-exposure dietary prophylaxis could be of help in minimizing the effects of exposure to wood dust. Many of them were of the opinion that drinking fresh milk or soup after every wood working shift would protect them from developing respiratory diseases. This misconception may have resulted from two factors One is the fact that majority of the operators in the small scale industrial sector have received very little or very low levels of formal education, since nearly 66% have completed only primary education or below (7). In addition, the health education programmes conducted through the mass media (radio, television, newspapers) often leave occupational health untouched, concentrating mainly on communicable diseases and deficiency disorders. Secondly, workers may have resorted to post exposure prophylaxis as a desperate attempt to save their lives following lack of any other alternative to do so. In a paper analyzing the response of Tanzania’s occupational health care delivery system to workers’ health it, was argued that small scale employers did not know what to do nor whom to contact in case specialist health advice and services were needed (2).
The assessment of the degree of exposure to wood dust on the basis of workers’ daily tasks revealed that 71.5% of the workers were heavily exposed. Most of the workers performed several tasks all of which exposed them heavily to wood dust. For example, carpentry was regarded by workers as an occupation that included a set of duties such as sanding, sawing, joining, planning and sweeping the work place all of which were often performed by the same person. More than half of the workers were exposed to wood dust for at least eight hours per day. A previous research report has linked the extent of wood dust exposure to the type of wood working process performed (4, 14). The report by Scheepers and Rongo et al identified sanding and carving as activities generating highest exposures to wood dust respectively. In another study, sweeping and cleaning were cited as activities that could raise the concentration of wood dust tremendously (5). With these facts in mind, the presence of nearly 72% of wood workers exposed heavily to wood dust is a matter of public health concern. While it is known that a concentration of soft wood dust exceeding 2mg/m³ increases the risk for both malignant and non-malignant respiratory maladies among wood workers (4, 15). Tanzanian wood workers are inhaling very large amount of wood dust daily (4). Wood workshops in the Netherlands are frequently inspected to ensure that maximum concentration of wood dust does not exceed 5 mg/m³ total dust (15). Rongo et al (2002) reported wood dust exposure in Tanzanian small-scale wood workshops ranging from 1-52 mg/m³ (4). In this study about 54% of the longest serving wood workers were heavily exposed to wood dust for more than 15 years.

Lack of personal protective equipment (PPE) in the visited workplaces was very discouraging. Only about 5% of the industries had special masks. The rest of the industries had either make-shift facilities or none at all. Lack of PPE was also noted in a survey conducted in the Manzese Woodworking Enterprise and in Dar es Salaam, by Kamuzora (1998) and Rongo et al (2002) respectively (2, 4). The Kamuzora’s study quoted the workers as blaming the government for having not ensured the availability of PPE on the Tanzania market. After globalization of trade, different types of PPE are plenty on the market.

One quarter of the surveyed industries in this study provided locally made cloth masks that cover the mouth and nose, to protect against inhalation of wood dust. In previous study, the author referred to such masks as “inferior masks” (2). This study also managed to unveil a discrepancy between having PPE and using it. About 74% of the workers did not use any PPE at all, even when they were performing the most dusty operations like sanding, sweeping and carving. No body used the special masks available in a few industries. The “inferior” cloth masks were used by a mere 6.5% while a whole 14.5% relied on a handkerchief held above the nose and tied loosely behind the neck. Those workers whose employers did not provide them with protective facilities, or those self-employed who did not have such facilities stated that lack of facilities was the reason for working unprotected. However, the few who had such facilities claimed that the masks reduced their efficiency in that they did not allow the workers to breath smoothly. Hence many workers preferred to work unmasked so that they could breath freely, and feel comfortable as they work. They said the masks affected their breathing more than did the wood dust. The whole issue here is lack of the appropriate protective facilities as pointed out earlier.

The proportion of workers with at least one respiratory symptom was 52.3%. Several workers reported to be experiencing more than one symptom at the time of the interview. Breathlessness was the predominant symptom, followed by persistent cough (20%), nasal discharge (19.6%), other complaints (14%), nasal obstruction (9.8%), and sneezing (9.8%). The other complaints (14%) were chest pain, allergies to some specific types of wood and excessive formation of phlegm in the morning. Most of these symptoms have been cited before as manifestations of acute or chronic respiratory ailments emanating from exposure to wood dust. The respiratory symptoms mentioned are generally regarded as an indicator of a pathological condition in the respiratory system. In a study done to determine the normal peak expiratory flow rates in healthy adult male and female subjects, only those subjects who did not have the respiratory symptoms contained in a questionnaire were considered healthy (16). Respiratory symptoms were also used to assess respiratory diseases among Nigerians working in a sugar industry (17). However, Tanimowo compared his findings to a control group derived from the general population and found that the occurrence of cough alone, cough with sputum, morning phlegm, nasal catarrh and chest pain were statistically significant only in the control group contrary to his expectation. Working in a dusty environment was normally expected to predispose to respiratory symptoms. In an attempt to explain this unexpected finding, the author gave his opinion that possibly the subjects who were studied as controls could have wanted to attract the attention of the investigator by responding positively to those symptoms thinking that some medical or financial benefits may accrue to them by such behaviour (17).

Workers in the present study were then categorized into two groups according to their degree of exposure to wood dust. The two groups were compared in terms of presence or absence of respiratory symptoms. The prevalence of respiratory symptoms among those heavily exposed to wood dust was higher (58.5%) than it was among those moderately or mildly exposed (34.4%). The difference was statistically significant. This finding is in agreement with a previously recorded one that respiratory symptoms can be a sequela of exposure to wood dust (15). The finding also differs from that of Tanimowo who found a higher prevalence of respiratory symptoms among the control group derived from the general population. The fact that members of the general population can also be exposed to dusts is of prime importance and should not be underestimated. The authors of the present report are of the opinion that comparisons should have been made according to the exposure status regardless of the population where the subjects come from.

Cigarette smoking was also studied in relation to respiratory symptoms among the workers. Out of the 214 workers interviewed, 85 (40%) were smokers. It was generally observed that the prevalence of respiratory symptoms increased with the number of cigarette sticks a
worker smoked per day. However, when smokers were compared to non smokers, there was no significant association between cigarette smoking and development of respiratory symptoms. Cigarette smoking is known to predispose to cancers of the respiratory tract, the most notorious of which being cancers of the lung and larynx. However, symptoms due to these conditions depend on the number of cigarettes smoked per day and the duration over which one has been a heavy smoker. It is also reported that heavy cigarette smoking over many years predisposes to lung cancer (18).

However, cancer is not the only disease that leads to respiratory symptoms. Many such symptoms may be due to some acute conditions which cigarette smoking may not be linked with (18). The confounding effect of cigarette smoking was assessed by distributing the workers with respiratory symptoms according to their cigarette smoking habits and status of exposure to wood dust. When exposure to wood dust was held constant, the effect of cigarette smoking on the presence of respiratory symptoms was minimized. This finding suggests that the respiratory symptoms are possibly not due to cigarette smoking, but rather due to other agents. Whether these other agents are wood dust, other forms of dust or an infectious process, another research is needed to prove this. It is also not established in this study whether the general population has a similar or different trend of respiratory symptoms. This calls for further research to establish whether there is a causal relationship between wood dust and respiratory disease.

Conclusion

Exposure to wood dust can cause elevated respiratory symptoms. Appropriate measures are required to improve working conditions in small-scale industries.

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References