Identifying health priorities among workers from occupational health clinic visit records: Experience from automobile industry in India

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ABSTRACT

Context: Occupational health surveillance in India, focused on notifiable diseases, relies heavily on periodic medical examination, and isolated surveys. The opportunities to identify changes in morbidity patterns utilizing data available in workplace on-site clinics is less explored in India context. Aims: Present paper describes longitudinal assessment of morbidity patterns and trends among employees seeking care in occupation health clinic (OHC). The study also intends to explore associations between work department, clinic visits and morbidity pattern. Materials and Methods: Record-based analysis was undertaken on data available (for the period 2010-2014) from two OHCs in a leading automobile industry in India. The doctor, examining every employee, documented the provisional diagnosis in specific software which in turn provides summary diagnosis based on affected body organ system as per ICD-10 categories. This information was used to assess the morbidity pattern and trend among workers. Chi-square test of significance and Extended Mantel-Haenszel chi square test was used assess the association and its linear trend. Results: Respiratory, musculoskeletal and digestive system related diseases were the top three reasons for employees visit to OHC. The nature of morbidity varied across different departments in the industry. There was a significant increase in proportion of employees visiting OHC during 2010-2014. Conclusion: A clinic visit record, with its own strengths and limitations, provides information on morbidity pattern and its trends among workers. Such information will help plan, implement and evaluate health preventive, promotive, and curative services.

Keywords: Employees, India, morbidity pattern, occupational health centers, trends

Introduction

Industrial workers are at dual risk for exposures present in general population and workplaces. Changing risks in general population may influence morbidity patterns and health priorities in industrial workers.¹,² Similarly changes in work environment determinants can alter morbidity pattern and health priorities of employees. It is in the best interest of employers and employees that industry health policies and programs take cognizance of these expectant changes and identify them at the earliest by efficient surveillance systems.

Occupational health surveillance in India is focused to detect “notifiable diseases” specified in The Indian Factories Act,³,⁴ mostly through periodical medical examination or by isolated surveys for the same. However, opportunities to identify changes in morbidity patterns exist from data available in on-site clinics, health insurance claims and sickness absenteeism...
records. Occupational Health Centres (OHCs), colloquially called as “clinics”, are onsite out-patient health care facilities established in industries as per The Indian Factories Act. The OHC records are maintained regularly and digitally in most large industries. Data from OHC records can help to identify leading health problems, their trends, distribution and understand if they relate more to general population risks or industry related risks. However, evidence regarding their utility is limited from Indian context.

This paper describes a longitudinal assessment of morbidity patterns and trends among employees seeking care in occupation health clinic (OHC) in a leading automobile industry in India, between year 2010 and 2014. The study also intends to explore associations between work department, clinic visits, and morbidity pattern.

Methodology

This study is part of a larger, five-year (2010–2014) health and productivity study conducted in a leading automobile industry in India using multiple health related data sources in the year 2015–2016. This paper is limited to data from OHCs. We analyzed available data of employees visiting two OHCs (clinics), one each in Plant 1 and 2, to identify predominant reasons and trends for seeking care in OHC among employees and its association between type of workers and work department. The 24/7 OHCs provide first aid and basic occupational health services (primary care, emergency care, health surveillance, health promotion, physiotherapy, and record maintenance) and is staffed by doctor, nurses, and physiotherapist (as per norms specified by Indian Factories Act).

Employees visit OHC after prior permission from their work location supervisors. Each visit is registered and details of diagnosis, management, and referral are documented in their “Patient Health Record”. Data is maintained in hard and digital format using company developed software. Data for this current study was extracted from this software for the year 2010–2014 (January–December) in MS excel format.

Every employee visiting the OHC was seen by a doctor, who makes a provisional diagnosis which is entered in the occupational health management software. The software further classifies the provisional diagnosis into a “summary diagnosis based affected body organ system”. This classification was as per broad ICD-10 categories. Example: Provisional diagnosis: Lower Respiratory infection. Summary diagnosis: Respiratory system disease. Employee visiting OHC for non-health related reasons were classified as “Administrative” visits. Visits made to OHC for the sole purpose of Annual Medical examination were excluded from the study.

The following variables were present in the extracted data of OHC visit records (Employee ID, Date of visit, Month, Name of employee, Department, and Diagnosis). Marital status, gender, date of birth, date of joining, and work department information was obtained from master data sheet of employees available with Human Resources (HR) Department. Merging was done using VLOOK UP function in MS Excel using ‘Employee ID’ as unique ID. Data was further checked for consistencies in entry and outliers.

Age of employee as on 31st December 2014 was computed from date of birth. Work experience as on 31st December 2014 was computed from date of joining. Number of employees in each respective year was sourced from master data in HR department.

Statistical Analysis

Number and proportion of OHC visits was calculated and presented year-wise. Worker to visit ratio (Visits per employee per year) was computed as ratio of total number of visits to total number of employees visiting OHC in the same year. Leading health conditions for each year is presented as frequency and percentage (provisional and summary diagnosis). Ranking of top five health conditions is provided for each year.

Association between age group, work departments and leading health conditions was tested using Chi-square test of significance. Extended Mantel-Haenszel chi square test for linear trend was applied to test for significant change in proportion of employees visiting OHCs every year and visits due to particular health condition. Results were considered statistically significant at $P < 0.05$. Pearson’s $r$ was applied to test for association between number of OHC visits and on-roll employees. Analysis was performed using OpenEpi and SPSS. Ethical clearance was obtained from Institutional ethics committee of NIMHANS.

Results

**OHC visit pattern (2010-2014)**

Between years 2010-2014, nearly 141,792 visits to OHC were made by employees. Proportion of on-roll employees visiting OHC (at least once) increased from 71% in year 2010 to 89.9% in year 2014 ($P < 0.001$). Increase in OHC visits correlated significantly with increase in on-roll employees (Pearson’s $r = 0.89, P < 0.01$). Average yearly visits per employee increased from 5.1 to 7.5 between 2010 and 2014 [Table 1].

Amongst employees who sought care in OHC (2010-14), nearly 63–73% were aged between 18 and 29 years and 59–70% were from Plant-1. Proportion of Plant-1 employees visiting OHC decreased from 70% in 2010 to 59% in 2014 whereas proportion of Plant-2 employees visiting OHC increased from 29.6% in year 2010 to 40.6% in year 2014 [Table 2]. Proportion of on-roll employees visiting OHC is higher in Plant-2 in 2014. (Data not shown).

**Work department and OHC visits**

Employees from assembly and weld departments accounted for 46.0–50.0% of all employees visiting OHC between
2010 and 2014, followed by paint (15–16%) and office (11–17%) departments. The OHC visit pattern was similar to employment patterns in the respective departments. We analyzed for association between OHC visits and employees working in production departments (assembly, paint, weld, press) and non-production departments (office, quality, ILCD, Maintainence). Around 3862 (71.2%) of OHC visits were made by production department employees as against 1557, (28.8%) by those in non-production line departments between year 2010-14. A statistically significant association between work department and OHC visits was observed (Chi-square = 62.16, \( P = 0.0002 \) wherein production line departments visited OHC more compared to non-production line departments. In the year 2014, significant proportion (>90.0%) of all on-roll employees in each department, except maintenance and office department visited the OHC (Chi-square = 35.76, \( P = 0.0001 \)). Proportion of employees visiting OHC in 2014 was highest among assembly (95.4%) and weld departments (94.6%) Table 3.

### Table 1: Summary of OHC visit pattern among employees (Year 2010-2014)

| Year       | 2010 | 2011 | 2012 | 2013 | 2014 |
|------------|------|------|------|------|------|
| Employees on-roll | 4005 | 5502 | 5900 | 5992 | 6102 |
| No. of OHC visits | 14270 | 17304 | 34342 | 34589 | 41087 |
| No of employees visiting OHC | 2844 | 4078 | 5224 | 5349 | 5486 |
| Proportion of employees visiting OHC | 71.1% | 74.1% | 88.5% | 89.2% | 89.9% |
| Average monthly visits | 1189 | 1458 | 2861 | 2882 | 3423 |
| Visits per employee per year ** | 5.1 | 4.2 | 6.6 | 6.5 | 7.5 |

Note: = Occupational Health Centre=OHC, \( ^* \)Chi square for linear trend=90.61, \( P <0.0001 \); \( ^{**} \)Visits per employee per year=No of OHC visits in a given year/Number of employees visiting OHC in the same year.

### Morbidity pattern

Respiratory, musculoskeletal, and digestive diseases were the top three reasons for employees visiting the OHC. Respiratory conditions were most common reason ranging from 25.0% to 36.0% of total visits between 2010-14 Table 4, followed by musculoskeletal conditions (18.8-26.6%). Decline in visits due to workplace injuries is observed (5.5% to 3.4%) between 2010 and 2014 Table 4. Department wise distribution of morbidity pattern is presented in Tables 5. Employees seeking care for respiratory, musculoskeletal, digestive, injuries were significantly higher from assembly, office, weld, and paint departments (\( P < 0.05 \)). Health care seeking in OHC for most conditions were higher in production department employees, except infectious diseases, which was higher in office employees [Table 5]. Comparison across departments revealed that nearly 95.0% of the production line employees sought care from OHC as compared to 70.0% among office and maintenance department employees in 2014. (Data not shown).

### Repeat visits

In 2010 it is observed that 388 (13.6%) employees had made >10 visits to the OHC and the same increased to 22% in 2013 and 28.3% in 2014. In year 2014, nearly 1/4th of all visits to OHC were from employees who were frequent visitors (>10 times per year). The predominant conditions for repeat visits were respiratory, digestive and musculoskeletal. Most of employees who repeated more than 10 times per year were from Assembly, weld, and paint sections. (Data not shown).

### Table 2: Age and Plant wise distribution of employees visiting OHC (2010-14)

| Age group | 2010 | 2011 | 2012 | 2013 | 2014 |
|-----------|------|------|------|------|------|
| On-roll employees visiting OHC | 2844 | 4078 | 5224 | 5349 | 5486 |
| Age group | 18-24 yrs | 787 (29.5) | 1795 (46.1) | 2152 (42.7) | 1855 (35.5) | 1346 (24.8) |
| 25-29 yrs | 911 (34.1) | 1139 (29.3) | 1578 (31.3) | 1898 (36.3) | 2300 (42.4) |
| 30-34 yrs | 831 (31.1) | 825 (21.2) | 987 (19.6) | 984 (18.8) | 1034 (19.1) |
| 35 yrs & above | 141 (5.3) | 135 (3.5) | 319 (6.3) | 492 (9.4) | 739 (13.6) |
| Plant | | | | | |
| Plant-1 | 1880 (70.4) | 2289 (58.8) | 2985 (59.3) | 3093 (59.2) | 3219 (59.4) |
| Plant-2 | 790 (29.6) | 1605 (41.2) | 2051 (40.7) | 2136 (40.8) | 2200 (40.6) |

Note: Missing values (Age and Plant 2010=174, 2011=184, 2012=188, 2013=120, 2014=67).

### Table 3: Department wise distribution of employees visiting OHC (2010-2014)

| Department Name | 2010 | 2011 | 2012 | 2013 | 2014 | (%) of on-roll employees in 2014 |
|----------------|------|------|------|------|------|-------------------------------|
| n | 2844 | 4078 | 5224 | 5349 | 5486 | % of on-roll employees |
| Assembly Production | 694 (26.0) | 1111 (28.5) | 1385 (27.5) | 1397 (26.7) | 1419 (26.2) | (95.4) 1487 |
| ILCD Production | 106 (4.0) | 180 (4.6) | 248 (4.9) | 259 (5.0) | 268 (4.9) | (90.8) 295 |
| Maintenance Job | 116 (4.3) | 131 (3.4) | 165 (3.3) | 171 (3.3) | 179 (3.3) | (73.3) 244 |
| Office Employee | 446 (16.7) | 451 (11.6) | 648 (12.9) | 707 (13.5) | 776 (14.3) | (70.5) 1100 |
| Paint Production | 409 (15.3) | 625 (16.1) | 820 (16.3) | 839 (16.0) | 861 (15.9) | (93.6) 919 |
| Press Production | 191 (7.2) | 278 (7.1) | 341 (6.8) | 383 (7.3) | 418 (7.7) | (90.2) 463 |
| Quality | 172 (6.4) | 253 (6.5) | 328 (6.5) | 333 (6.4) | 334 (6.2) | (91.7) 364 |
| Weld Production | 536 (20.1) | 865 (22.2) | 1101 (21.9) | 1140 (21.8) | 1164 (21.5) | (94.6) 1230 |

Note: Missing values (2010=174, 2011=184, 2012=188, 2013=120, 2014=67).
Table 4: Distribution of predominant (ten) conditions for OHC visits among employees in XXX industry (2010-2014)

| Conditions                      | 2010 n (%) | 2011 n (%) | 2012 n (%) | 2013 n (%) | 2014 n (%) |
|---------------------------------|------------|------------|------------|------------|------------|
| n (number of visits)            | 14270      | 17504      | 34342      | 34889      | 41087      |
| Respiratory system              | 3699 (25.9)| 5557 (31.7)| 12444 (35.9)| 11992 (34.7)| 12969 (31.6)|
| Musculoskeletal                 | 2729 (19.1)| 3299 (18.8)| 7085 (20.6)| 7818 (22.6)| 10938 (26.6)|
| Digestive                       | 1333 (9.3) | 2235 (12.8)| 5573 (16.2)| 5728 (16.6)| 7547 (18.4)|
| Infectious diseases             | 987 (6.9)  | 1141 (6.5) | 2097 (6.1) | 974 (2.8)  | 1262 (3.1) |
| Injuries                        | 782 (5.5)  | 728 (4.2)  | 1038 (3.0) | 1344 (3.9) | 1400 (3.4) |
| Nervous system                  | --         | --         | 1862 (5.4) | 3140 (9.1) | 377 (0.9)  |
| Eye and adnexa                  | 544 (3.8)  | 633 (3.6)  | 1429 (4.2) | 1174 (3.4) | 1568 (3.8) |
| Skin                            | 329 (2.3)  | 304 (1.7)  | 706 (2.1)  | 921 (2.7)  | 921 (2.2)  |
| Ear                             | --         | 13 (0.1)   | 327 (1.0)  | 415 (1.2)  | 401 (1.0)  |

Note: Administrative refers to reasons like fitness certificate, insurance claims, advise not included for this analysis. Data not included in analysis: Administrative related visits in year: 2010=3867 visits, 2011=3593, 2012=1355, 2013=1022, 2014=3179

Table 5: Morbidity pattern in OHC by work department: Year (2010-14)

| Department Name                       | Respiratory | Musculoskeletal | Digestive | Infectious disease | Injury |
|---------------------------------------|-------------|-----------------|-----------|--------------------|--------|
| Plant -1 (No of employees with problems –lowest & highest b/w 2010-14)* | 566-1117    | 325-745        | 202-597   | 73-243             | 74-114 |
| Assembly Production                   | 19-23%      | 23.1-29.8%     | 21-24.3%  | 16.4-25%           | 21-30% |
| ILCD Production                      | 3.5-4.6%    | 2.4-3.3%       | 2.4-8%    | 1.6-4.1%           | 2.6-5.2% |
| Maintenance Job                      | 2.9-4.8%    | 2.9-4.6%       | 3.7-5.4%  | 2.5-5.4%           | 2.2-6.6% |
| Office Employee                      | 22-27.7%    | 15.9-24.6%     | 17.6-26.5%| 21.8-37%           | 9.2-25.4% |
| Paint Production                     | 14-17.3%    | 13.5-15.8%     | 15.4-17.3%| 4.1-16.9%          | 13.2-24.3% |
| Press Production                     | 6.1-7.5%    | 3.8-6.7%       | 6.4-10.4% | 3.6-8.2%           | 2.2-9.4% |
| Quality                              | 5.7-6.2%    | 4.6-5.4%       | 4.2-6.9%  | 2.7-7.9%           | 1.4-4.4% |
| Weld Production                      | 14.5-22%    | 18.2-25.6%     | 15.3-20.3%| 18.5-24.7%         | 13.5-26.3% |
| Plant -2 (No of employees with problems –lowest & highest b/w 2010-14)* | 118-463     | 118-463        | 87-356    | 17-48              | 26-106 |
| Assembly Production                  | 30-37.3%    | 31-37.6%       | 21-34.6%  | 23.1-39%           | 30-40.6% |
| ILCD Production                      | 5-7.6%      | 5-7.6%         | 5.8-11.5% | 2.4-6.5%           | 1.4-9.4% |
| Maintenance Job                      | 0.8-1.9%    | 0.8-1.9%       | 2.4-5.7%  | 2.2-5.6%           | 0-7.7% |
| Office Employee                      | --          | --             | 1.5-3.4%  | 0.7-4.6%           | 0-1.9% |
| Paint Production                     | 12.2-18.4%  | 12.2-18.4%     | 14.6-21.4%| 13.9-17.6%         | 11-28.2% |
| Press Production                     | 5.5-9.3%    | 5.5-9.3%       | 5.7-8.7%  | 4.9-16.7%          | 3.8-5.6% |
| Quality                              | 5.9-9.7%    | 5.9-9.7%       | 5.9-11.5% | 3.7-11%            | 5-11.3% |
| Weld Production                      | 25-26.3%    | 25-26%         | 18.3-25.3%| 20.7-29.9%         | 19.2-30% |

Percentage of all visits from respective Plants (lowest and highest %) between 2010-2014

Discussion

The present paper is part of a larger longitudinal study that examined the relationship between health and productivity in a leading automobile industry.[1] Early identification of trends in employee health and morbidity in an industry can be ascertained from periodical medical examination (PME), OH clinic records, independent surveys, and insurance claims records. These sources conceptually differ in profile of employees, type of information derived and its application. PME data comprises of apparently healthy volunteer employees and observations relate to screening for hidden diseases and incident health changes among employees. Its utility is closely associated with compliance to existing laws to identify exposure related occupational diseases. OHC data relates to morbidity pattern of employees seeking out-patient care due to their experience of ill-health whereas insurance data provides information about morbidities necessitating in-patient care or advanced diagnostic evaluation.

Understanding employee morbidity pattern from periodical medical examination records is a common practice, but utility of OHC records to identify morbidity patterns and trends is not well established.[10] Though onsite clinics are proven to be cost-effective,[8] it has not been leveraged for evidence generation in Indian context.[9] This paper discusses inferences drawn from OHC data and its application for ensuring healthier workforce.[11] Number of clinic visits may increase with increase in employees. We observed a significant positive correlation between increase in employee strength and clinic visits. The increase could be a reflection of robust employee wellness initiatives undertaken, presence of pro-active OH staff, increased
health consciousness amongst employees or in worst case, an indication of deteriorating health status of employees. In this study, we could not explore factors influencing care seeking as it was a secondary data-based study.

Observed morbidity pattern in industrial workers is a combination of morbidity pattern in source population and morbidity specific to occupation related exposures.[2,11] The study revealed that morbidity pattern identified from OHCs (2010–2014) is likely to be reflection of patterns in general population, wherein respiratory, digestive, and musculoskeletal-related morbidities dominate out-patient care systems. This is similar to morbidity pattern expected in primary health clinics/centers. The predominant morbidity identified in clinic visit data in present study was respiratory system related morbidities. Surveys in nine countries, in 76 primary health care facilities revealed that proportion of patients with respiratory symptoms ranged from 8.4% to 37.0%. Similarly, studies from India also have identified respiratory and gastrointestinal symptoms/conditions to be most common among primary care facility attenders.[8,13,14] Studies from OH clinics in developed countries also indicated that respiratory and musculoskeletal disorders were predominant reasons for visiting the OH clinics.[3,15] In India too respiratory, digestive, and musculoskeletal system related health conditions were most common among workers of automobile sector.[2,11] Utility of OHC data lies in identification of deviations from such expected patterns over a period of time or in identification of health issues specific to the workplace under consideration.

Compared to respiratory and digestive disorders, musculoskeletal disorders (MSDs) are commonly prevalent in automobile industry, more so among those involved in production line[8,21] attributed to posture and monotonous nature of work involved. Posture assessment for employees in an automobile industry in assembly area using RULA score indicated that it was “at-risk” job for work-related musculo skeletal disorders.[22] Available literature indicates that nearly 59% of industrial workers reported presence of MSDs.[18] Present study also observed higher prevalence of musculoskeletal complaints among production line employees. The four departments—assembly production, office, paint production, and weld production contributed to nearly 80.0% of the total musculoskeletal related visits to OHC. MSDs are amenable to reduction by targeted interventions[13] and OHC record-based surveillance is useful to identify such reductions to quantify effectiveness of interventions.

An increase in digestive disorders is observed between 2010 and 2014, from 9.3% to 18.4% of all OHC visits. Water and food testing and standards are adhered to strictly in the industry. Food sources and eating behavior outside the workplace may have contributed to these visits. The rate of industrial injuries per 1000 persons employed per year (fatal + nonfatal) in India is less than 2 per 1000 persons.[23] Collateral data regarding injury claims from the industry revealed 11.1 injury claims per 1000 employees and all these were non-work-related injuries. OHC data was useful to point out that injuries which necessitated care seeking in clinic were minor in nature, not needing admissions, as against injuries occurring outside workplace setting.

Repeat visits
Somatization, malingering, and repeated absence for work and presentism are issues closely linked with low productivity.[10] Increase in repeat visits may indicate chronic nature of illness, increased vulnerability to specific illness, non-relief from therapy or intentional absence from work location. Data from occupational health primary care in Finland of 3167 frequent attendees revealed that musculoskeletal system disorders, depression and anxiety were reasons for repeat visits to OHC clinics. It also indicated that working in industries is associated with frequent clinic visits.[28] Understanding OHC data is useful to stratify or label “red alert employees” who make more than usually expected number of clinic visits in a year, which in this case was defined as “employees with ≥10 visits per year”.

Benefits of clinic visit data analysis
Though periodical medical examination continues to remain a standard occupational health surveillance strategy, analysis of clinic visit records has its own merits and applications. It enables monitoring of trends in out-patient related illness affecting employees, early detection of exposure-related out-breaks, examining associations between work department and out-patient visits, identify chronic OHC attendees and help to improve productivity. Such information will help to organize health preventive, promotive, and curative measures associated with seasonal changes, process changes, and employee recruitment, all which contribute to decrease in loss of productivity.

Deficiencies in current systems
Medical records systems in the study industry were robust and up to date to facilitate such an analysis. Sadly, not all industries across India have digitalized OHC records hereby posing challenges in compiling large data for analysis. Doctors and nurses attending to the employees in these clinics are not formally trained in Occupational health or basic ergonomics, to understand nuances of data utility to implement evidence-based OH programmes.

Current system of worksite clinics in industries is modeled on basis of The Indian Factories Act, which specifies norms according to employee strength and hazardous nature of industries[24,25] System of periodical reporting of OHC visit patterns to “enforcement authority” or to “health department” is not established, hereby limiting the utility of OHC records. OHC records are maintained usually based on interest and commitment levels of industry managements or their global health policies. There is no standard guideline for disease classification in OHCs hereby limiting cross industry comparison. With overt emphasis on periodical medical examination as health surveillance measure in industries, the role of monitoring clinic visit data is undermined.
Occupational health and primary care
The Basic Occupational Health Services (BOHS) are an application of primary health care principles in the occupational health sector which aims at health promotion and prevention of health problems among workers. In India, organized occupational health services are available for less than 10% of the workers population, since 90% the 500 million odd workers are employed in unorganized sector. In this context, strong and close collaboration between occupational health and primary care is often recommended as strategy for universal occupational health care.²⁰⁻²⁸ It is with this premise that the current primary health care providers in the private and the public health care systems in the country needs to be oriented towards various aspects of occupational health and especially about the importance of maintaining and utilizing clinic visit records for assessing and monitoring morbidities among workers. Furthermore, in many instances even within the organized industrial sector, health services are often outsourced, usually to general practitioners in private sector. Hence, they too need to be oriented about the BOHS and this is being aimed through the present article.

Conclusion
Our study clearly indicated OHC records are a useful source to identify priority health problems affecting employees as well monitor trends over a period of time. Respiratory, musculoskeletal, and gastrointestinal problems are the most common reasons for seeking care in OHC. Working directly in production related departments was associated with increased clinic visits, hereby affecting loss of work-time. Given its utility and inferences that can be drawn, there is a need to strengthen and standardize OHC records across all industries in India. There is much benefit to integrate OHC data with other data sources in industry to provide comprehensive picture of distribution of morbidity pattern including work lost time.

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Conflicts of interest
There are no conflicts of interest.

References
1. Gautham MS, Pradeep BS, Kowshik K, Gururaj G. Health and Work Productivity: A Retrospective Record Analysis in XXX Limited (2010-14). Bangalore: NIMHANS; 2016.
2. Benjamin OA. Fundamental principles of occupational health and safety. Choice Rev Online 2002;39:39-3997-39-3997.
3. The Factories Act 1948. Ministry of Labour and Employment, Government of India [Internet]. [cited 2019 Nov 20]. Available from: https://labour.gov.in/sites/default/files/TheFactoriesAct1948.pdf.
4. The Karnataka Factories Rules, 1969. Published in the Karnataka Gazette, dated 10-4-1969 vide notification number FCC 113 LFB 65, dated 11-3-1969.
5. ICD-10: International Statistical Classification of Diseases and Related Health Problems. Geneva: World Health Organization; 2011.
6. Reho T, Atkins S, Talola N, Sumanen M, Viljamaa M, Uitti J. Comparing occasional and persistent frequent attenders in occupational health primary care - A longitudinal study. BMC Public Health 2018;18:1291.
7. McCaskill SP, Schwartz LA, Derouin AL, Pegram AH. Effectiveness of an on-site health clinic at a self-insured university: A cost-benefit analysis. Workplace Health Saf 2014;62:162-9.
8. Reho TTM, Atkins SA, Talola N, Viljamaa M, Sumanen MPT, Uitti J. Frequent attenders in occupational health primary care: A cross-sectional study. Scand J Public Health 2019;47:28-36.
9. Chenoweth DH, Garrett J. Cost-effectiveness analysis of a worksite clinic: Is it worth the cost? AAOHN J 2006;5:84-91.
10. Agnihotram RV. An overview of occupational health research in India. Indian J Occup Environ Med 2005;9:10.
11. Sukumar GM, Kupatira K, Gururaj G. Feasibility of integrating mental health and noncommunicable disease risk factor screening in periodical medical examination of employees in industries: An exploratory initiative. Indian J Occup Environ Med 2015;19:19-24.
12. Chronic Respiratory Diseases. Global alliance against chronic respiratory diseases, World Health Organization [Internet]. [cited 2016 Apr 01]. Available from: http://www.who.int/gard/publications/chronic_respiratory_diseases.pdf.
13. Salvi S, Apte K, Madas S, Barne M, Chhowa S, Sethi T, et al. Symptoms and medical conditions in 204 912 patients visiting primary health-care practitioners in India: A 1-day point prevalence study (the POSEIDON study). Lancet Glob Health 2015;3:e776-84.
14. Kumar R, Kaur N, Pilania M. Morbidity pattern of patients attending a primary healthcare facility in an urban slum of Chandigarh, India. J Clin Diagn Res 2018;12:L10-3.
15. Smits FT, Brouwer HJ, Riet G ter, Weert HC van. Epidemiology of frequent attenders: A 3-year historic cohort study comparing attendance, morbidity and prescriptions of one-year and persistent frequent attenders. BMC Public Health 2009;9:1-7.
16. Shinde PP, Ghorpade VV, Madhekar NS. “Assessment of prevalence of health problems among automobile workers”. J Evolution Med Dent Sci 2015;4:7828-32.
17. Siddanagoudra SP, Kanyakumari DH, Nataraj SM. Respiratory morbidity in spray paint workers in an automobile sector. Int J Health Allied Sci 2012;1:268-73.
18. Joshi TK, Menon KK, Kishore J. Musculoskeletal disorders in industrial workers of Delhi. Int J Occup Environ Health 2001;7:217-21.
19. Gold JE, d’Errico A, Katz JN, Gore R, Punnett L. Specific
and non-specific upper extremity musculoskeletal disorder syndromes in automobile manufacturing workers. Am J Ind Med 2009;52:124-32.

20. Spallek M, Kuhn W, Uibel S, van Mark A, Quarcoo D. Work-related musculoskeletal disorders in the automotive industry due to repetitive work-implications for rehabilitation. J Occup Med Toxicol Lond Engl 2010;5:6.

21. Kamble MS, Parande MA, Shelke SC, Lakde RN, Tapare VS. Health profile of employees working in automobile industry-A cross sectional study In Int Jour of Current Research and Acad Review 2015;3:56-62.

22. Mohan GM, Pushparaj A. Analysis and improvement of work posture in an automobile industry. [Internet]. [cited 2016 Apr 01]. Available from: https://www.researchgate.net/publication/296479157_Analysis_and_improvement_of_work_postures_in_an_automobile_industry.

23. Chapter 8: Statistics on Status of compliance with statutory provisions based on data collected by DGFASLI. [Internet]. [cited 2016 Apr 01]. Available from: http://dgfasli.nic.in/factories_2011.pdf.

24. Sukumar GM, Rawat S, Vhh S, Gururaj G. Assessment of health systems and services including availability of components for mental health care in industries of Kolar District, India. Int J Occup Environ Med 2016;7:22-32.

25. National Occupational Safety and Health Profile. Prepared by: Directorate General Factory Advice Service and Labour Institutes, Government of India in collaboration with International Labour Organization [Internet]. [cited 2019 Nov 20]. Available from: http://www.dgfasli.nic.in/Nat-OSH-India-Draft.pdf.

26. Pingle S. Basic occupational health services. Indian J Occup Environ Med 2009;13:1-2.

27. Executive Summary, Global Conference “Connecting Health and Labour: What Role for Occupational Health in Primary Health Care”. The Hague, the Netherlands, 29 November - 1 December 2011.

28. Joseph B. Universal occupational health care – The need of the hour. Indian J Occup Environ Med 2019;23:59-60.