

Application of ergonomic interventions in the informal sectors of India

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ABSTRACT

A large proportion of the labor force in India (90%) is directly employed in the informal sector, which is notably higher than in other countries. Most employees work on a contract or temporary basis. Labor laws are generally not applicable to informal sectors. Among them, there is a lack of awareness of occupational safety and health, which includes less attention to industrial hygiene, poor housekeeping, and poor employee protection. In 2001, the problem of integrating the informal economy with the formal economy was widely discussed at the International Labor Conference. We need to include one more issue: work comfort applications in the informal sectors. Many of these workers suffer from various types of work-related disorders. It is noted that through the use of low-cost measures, their conditions can be improved. Several interventions have been developed and applied across various informal sectors in India through an ergonomics-involved approach. A detailed study was conducted to determine the effectiveness of these interventions. It is necessary and important to apply precise interventions and find out the behavioral approaches of users to the use of interventions. As the informal sector grows steadily in various developing countries, ensuring the comfort of workers is becoming a challenge in these parts of the world. Surprisingly, low-cost health interventions can increase the productivity of the informal sector by up to 30%. Work-related musculoskeletal disease (WMSD) is also prevented. Proper implementation of ergonomic interventions can ultimately improve the occupational health of informal workers as well as the nation's economy.

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INTRODUCTION

The informal sector refers to economic activities not regulated by the state and not included in official statistics or official accounting systems. Examples of informal sector activities include street vendors, cottage businesses, and small-scale agriculture.

Ergonomic interventions refer to changes made to the work environment and processes to improve workers' health and well-being and increase productivity and efficiency. Ergonomic interventions may include changes to the physical workspace, tools and equipment, and work processes.

In the informal sector, ergonomic interventions are particularly important as workers often lack access to basic safety and health measures and may work in hazardous or physically demanding environments. These interventions may include modifications to the physical workspace, such as improved lighting or ventilation, provision of protective equipment, and modification of tools and equipment to reduce physical stress.¹

Other examples of ergonomic interventions in the informal sector may include training workers in safe lifting techniques, providing breaks to reduce fatigue and increase productivity, and improving work organization and planning to reduce stress and improve overall well-being.²

Implementing ergonomic interventions in the informal sector can be challenging as these workers often lack access to resources, support and management. However, such interventions are critical to improving the health and

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well-being of informal sector workers and can also lead to increased productivity and economic growth.³

Low-cost ergonomic measures in the informal sector are imperative for several reasons.

Improving working conditions: Ergonomic measures can help decrease the physical strain and discomfort associated with many types of work in the informal sector. This can lead to improved working conditions and improved overall health and well-being of workers.

Increased Productivity: Workers who feel more comfortable and less tired can often work more efficiently and productively. This benefits both the workers themselves and the businesses they work for.

Cost reduction: Low-cost ergonomic interventions can be made available to small businesses in the informal sector, giving them a practical way to improve working conditions at a low cost.

Increased security: Ergonomic measures also help reduce the risk of injury and accidents in the workplace. This can help protect informal workers from injury and reduce the liability of businesses.

Overall, low-cost ergonomic interventions can help create a safer, more comfortable, and more productive work environment in the informal sector.

This article was aimed at discussing the application of ergonomic interventions in India's informal sectors. Few case studies are assigned to achieve the purpose of this article.

Case Study 1

Implementation of the ergonomic interventions at sand core sector

India is a developing country, and work process improvement in any sector can be effectively implemented through low-cost changes to the existing work process and workplace design. The process of making sand cores is done manually, in which workers most often work in uncomfortable positions and suffer from various diseases of the musculoskeletal system, primarily affecting the lower back. Existing rod manufacturing processes included some unnecessary steps, which reduced work speed and increased inefficient time. The modified process involves eliminating these steps and thus reorganizing work and improving productivity. In the process of making the sand core, the workers had to repeatedly deliver the mixed sand from far away. A new workstation was designed and implemented, where an additional storage area for mixed sand was selected next to the chemical rod manufacturing site. Thanks to the research of the modified method and the development of a new workstation, the total time spent on the manufacture of one rod was reduced by 56 seconds from 237 to 181 seconds. Since the workers performed 50 cores per day, the total time saved was 2800 seconds. Because each core manufacturing process took around 181 seconds, an additional 15 cores could be made daily, for 30% of the productivity will be increased.⁴

Case Study 2

Implementation of the ergonomic interventions at gold smith sector

Another study involved the work of jewelers, where muscle fatigue and respiratory stress were assessed. A large number of jewelers have complained about respiratory symptoms in this industry. One of the main occupations of jewelers is blowing pipes to heat gold beads. This continuous blowing of air out of the lungs causes some discomfort in the lungs. This work habit also increases the fatigue of the facial muscles (*buccinator, orbicularis orris*) at the end of the day.⁵

Case Study 3

Implementation of ergonomic interventions at the carpentry sector

Hand tools should be designed according to preference based on user convenience. The shape of the instruments should eliminate wrist deflection, allowing the hand and forearm to remain straight during a strong grip. Nine different hands saw handles have been developed from this concept.

Among these saws, the M7 handle was shaped like a pistol grip, which helps avoid wrist deflection and can reduce hand muscle fatigue. This handle also has a guard to protect the fingers from touching the saw blade. M7 can improve the health of the carpenter and reduce injuries during work, which can be seen as an increase in carpenters' productivity, safety and health.⁶

Case Study 4

An Intervention Study to Reduce Work-Related MSDs Among Preadolescent Farmers

This research aimed to introduce a new ergonomic aid to improve work procedures, increase productivity, and improve the health and safety of early teenage farmers. One hundred male and 100 preteen female farmers were randomly selected from the villages of Tarakeshwar, West Bengal, India, to assess and reduce work-related musculoskeletal disorders and physiological stress. Modified Scandinavian questionnaires, the Body Parts Discomfort Scale (BPD), and hand grip strength were assessed before and after the use of the ergonomic aid. The study results showed a significant change (decrease) in discomfort in the lower back, wrists, shoulder and arms among farmers in their early teens using a newly developed ergonomic aid.⁷ Improved grip strength and decreased physiological stress can be observed after implementing the interventions in adolescent farmers in the previous situation. Agricultural productivity was boosted by reducing absenteeism using ergonomic aid. This study concludes that agricultural productivity has increased due to the reduction in absenteeism, and discomfort has been markedly reduced through the use of ergonomic aids.⁸

Case Study 5

Manual street workers at Calcutta in India

Manual material handling (MMH) involves workers assuming various awkward postures, leading to the development of musculoskeletal disease (MSD). To study heavy lifting postures and incidence of MSD among MMH workers in Kolkata, India. The authors conducted a cross-sectional study with 100 MMH workers. MSD frequency was assessed using the standardized Nordic questionnaire. Working postural risks were assessed using the Ovako Working Posture Assessment System (OWAS). Authors used logistic regression to predict risk factors for MSD. Approximately 95% of workers have reported MSD in at least one body part in the past 12 months. According to OWAS results, 83% of analyzed work postures require immediate corrective action to keep workers safe. The most injurious posture was carrying a heavy load over the head. Carrying greater than 120 kg increased the likelihood of lower back and neck pain by 4.53 and 4.56, respectively. In this study, there was a high frequency of reports of MSD, which is probably associated with physiologically intense professional activities, repeated 30 to 40 times a day on average. Ergonomic measures such as the use of handcarts and occupational training are essential.⁹

DISCUSSION

Particularly in developing nations like India, the informal sector contributes significantly to many economies. Low salaries, subpar working conditions, and restricted access to resources and social safeguards frequently characterize it. Workers in the unorganized sector are frequently exposed to environmental and physical risks, which can result in accidents, diseases, and long-term health issues.¹⁰ Designing different ergonomic interventions is even more crucial to improving the safety, health, and well-being of workers in the informal sector.¹¹

Lack of knowledge or comprehension of the significance of workplace safety and health is one possible barrier to adopting ergonomic treatments in the informal sector. Many workers in the informal sector might not be aware of the risks connected to their jobs, or they could lack access to resources or training for reducing those risks. Interventions may therefore need to be customized to the unique requirements and circumstances of the informal sector, notably by offering fundamental safety and health instruction and ensuring that they are both accessible and practical given the limitations of informal sector employment.¹

The expense of implementing ergonomic solutions in the informal sector is another limitation. Due to their low-profit margins, many enterprises in the informal sector might not have the funds to invest in safety and health precautions. Making ergonomic treatments available to workers in the unorganized sector may call for creative financing methods, such as microfinance or government subsidies. Hence, implementing low-cost modifications can play an important role in improving the informal workers' productivity, health and safety.¹²

Despite these challenges, implementing ergonomic interventions in the informal sector has the potential to improve worker safety and health, increase productivity, and ultimately contribute to economic growth. It is essential to develop tailored approaches that take into account the unique needs and characteristics of informal sector workers and to work collaboratively with informal sector workers and employers to identify and implement effective interventions.

CONCLUSION

Five distinct case studies' findings were evaluated, and it was determined that workers in the informal and agricultural sectors are required to put in the most physical effort while maintaining the lowest level of safety.¹³ As a result, they engage in strenuous physical labor for extended periods of time and experience musculoskeletal conditions that affect numerous body parts. For them, ergonomic measures are the greatest way to avoid work-related musculoskeletal problems. Until now, the main causes for worry are that most interventions are not properly developed, and the most significant factor that must be highlighted is the absence of maintenance.¹⁴ Despite the restrictions, unorganized or informal sector workers of India, mostly involved in cores

out of the sand, goldsmith carpentry, agriculture and manual material handling can benefit greatly from ergonomic interventions such as modified work stations and new tools.

CONFLICT OF INTEREST

Nil

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