



Health and Injury Outcomes among Agricultural Workers of India

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Mini Review

Volume 7 Issue 4

Received Date: November 18, 2024

Published Date: December 16, 2024

DOI: 10.23880/aphot-16000275

Abstract

The traditional occupation of India is agriculture with 66% of the total population engaged with agriculture and is the backbone of the country's economy. Agriculture is one of the most hazardous occupations, with many workers experiencing occupational accidents and ill health. Strenuous long hours work under open field conditions, stress due to climate variations, global warming and use of toxic substances affects the physical, mental, and social wellbeing of the agricultural workers. Health outcomes associated with these hazards range from simple conditions like skin problems to the complex disease like cancer. Occupational problems include accidents (machine injuries, snake and insect bites), toxic hazards (chemical exposures and insecticide poisoning), physical hazards (extreme temperature conditions like sun stroke, solar radiation leading to cancers, skin conditions), and respiratory problems (farmer's lung, occupational asthma), psychological disorders (depression, suicidal tendency), chronic conditions (multiple joint arthritis, kidney disease). Overall accidents incident rate in agriculture is 334 per lacs out of which fatal accidents are 5.6 % whereas non-fatal accidents are 94.4%. Agriculture workers do not have proper knowledge and attitude towards the safety and program to overcome the diseases they face. An awareness through health education programmes and utilization of advance technologies can work for reduction of disease impact or can prevent the occurrence of disease leading to minimizing its burden on the health care cost.

Keywords: Agricultural workers; Occupational Health; Occupational Problems; Physical hazards

Introduction

Alma Ata declaration at the World Health Organization in 1978 mentioned that primary healthcare is vital, and it is identified as the key to the attainment of the goal of "Health for All". Primary Health care should be based on possible, scientifically sound, and socially acceptable methods. Primary Health Care gave priority to health promotion, emphasizing on the anticipatory and preventive character of health action and the de-medicalization of public health. It should be brought nearby where individuals live and work. Agriculture, which comes under the purview of the informal sector, represents the face of Indian rural people. The informal sector is that sector of the economy in agriculture or in other occupations, which does not have organization or

registration or acceptance or support of any government or private body for its recognition [1].

According to the 2011 census, 68.8% of India's population resides in rural areas, with two-thirds of these individuals relying on agriculture as their primary source of income. Agricultural workers are those who work on the land of others for wages [2]. Most of the farmers operate on a small or marginal scale. A significant portion of the female workforce is engaged in agriculture, and over half of all women in this sector work as unpaid family labourers. Farmers and agricultural workers are one of the few occupational groups that live and work primarily in rural areas. This makes it essential to consider the characteristics of rural regions when examining health and healthcare in these communities.

Agriculture is a key contributor to the economies of many countries including India and the livelihoods of local communities, offering stable employment and income to numerous families. Agriculture is one of the most hazardous occupations, with many workers experience occupational accidents and ill health. They face various health risks due to their job, including exposure to ultraviolet radiation, toxic fumes, organic dust from spores and minerals when handling feed, microorganisms like viruses, bacteria, and parasites, along with their harmful by-products. Additionally, pesticides, environmental factors, and use of machinery in the farm also poses significant threats to the health of these workers. These occupational health hazards have a direct impact on the physical and mental health of agricultural workers [3]. Yet there is lack of awareness among these people leading to economic stress. Hence this review paper examines the health and injury outcomes amongst agricultural workers and farmers as well as what potential interventions may deal to resolve or minimise these issues.

Methodology

In this article, the authors have directly observed various health issues developed by agricultural workers and its impacts on them.

Health Hazards for Agricultural Workers

Farmers and agricultural workers face numerous hazards that can lead to various health issues and diseases. The overall incidence rate of these incidents is 1.25 per 1,000 workers per year, with approximately 9.2% resulting in fatalities. Among the fatal incidents, 42.9% were caused by tractor accidents and another 42.9% by snakebites. Farm machinery was responsible for 77.6% of all incidents, while hand tools accounted for 11.8%, and the remaining 10.6% were attributed to other sources like snakebites, wells, and similar hazards [4]. In Madhya Pradesh, the annual monetary loss due to fatalities from agricultural incidents was estimated around 170 crore Rs. Beyond the financial loss from deaths, the economic impact of these incidents is substantial, leading to significant losses for workers due to time away from work [5].

The hazards mostly prone for injuries and economic loss includes 1) Use of farm machinery, 2) Biological hazards 3) Psychosocial stress and 4) Exposure to toxic chemicals.

Use of Farm Machinery

Accidents involving farming equipment are the primary cause of injury and death among farmers and farm workers. Modern agricultural machinery is highly powerful, efficient, and versatile, including tractors, tillage and planting tools, harvesting machinery, specialized equipment, and

livestock handling gear. However, all agricultural equipment carries inherent hazards that can result in serious injuries if not identified and addressed in time. Common causes of equipment-related accidents include tractor rollovers, workers being run over by tractors, getting caught in running machinery, equipment collisions, being struck by falling machinery parts, and contact with power lines.

Agricultural injury related to tractors found mainly due to rollovers, power take offs, falls from tractors, hitching equipment, tractor operations, and towing [6]. These agricultural injury occurs due to tractor overturned as there is lack of Rollover Protective Structure (ROPS). A study conducted in Poland was reported that almost 27.5% deaths occurred by traffic accidents followed by hit, crushed by falling objects and materials [7]. An Italian study compared fatality occurred due to tractor rollover accidents were 43.7% according to Surveillance System and 10.6% according to Operational Archives records [8]. A study conducted in Punjab reported that injuries related to thresher are 73%, 13% and 14%, contributes due to several factors such as human, machine and others factors respectively [9]. In a study by Kumar et al., it was found that most injuries in agricultural work occurred to the foot and legs, often caused by tools slipping from the hand or striking hard surfaces [10]. A major factor contributing to agricultural incidents is the improper design of the operator's workspace and tools or equipment. Other key causes include a lack of knowledge or training, carelessness, fatigue, and general unawareness of safety measures [11].

Biologic Hazards

Farming is such an occupation which has many potential physical, chemical, and biological hazards. Physical and biological hazards include noise, temperature extremes, UV exposures, pressurized hydraulic fluids, grain storage facilities, hand and power tools, standing for long hours, repetitive motion, vibration, exposure to pollen grains and dusts, gases, and infectious agents.

Noise from farm tools and machinery can lead to permanent hearing loss. Initially, the hearing loss may be temporary, but repeated exposure to high noise levels can result in irreversible damage. This damage often occurs gradually over several years, going unnoticed until it is too late. Certain sounds, such as gunshots, are so loud that they can cause immediate, permanent hearing damage. The permissible noise exposure limit for an eight-hour workday is 90 dB(A), while the exposure limit for peak noise, such as a gunshot, is 140 dB. In a study conducted by Choochouy N, et al. found that there is a high prevalence of clinical hearing loss (threshold > 25 dB HL), affecting 50-55% of workers in the high-frequency range (3-6 kHz) [12]. Other studies reports have also found that agricultural workers are at risk of hearing loss [13].

Heat stress occurs when the body accumulates more heat than it can manage, a condition heightened by factors such as high temperatures, humidity, sunlight, and intense physical labour. Farmers, in particular, are at a greater risk of heat stress due to prolonged outdoor exposure. While global research on the exact amount of UV exposure, farmers experience is limited, existing studies show that farmers are exposed to at least three times more UV radiation than indoor workers, with some estimates suggesting it could be six to eight times higher. A study in Austria asked farmers to wear UV-measuring devices on their foreheads throughout an entire European summer. The study found that UV exposure peaked between 12 and 4 p.m., particularly when farmers worked in an upright position in open fields, such as while mustering cattle or repairing fences. This supports the “Sun Smart” advice to avoid outdoor work during midday when UV levels are at their highest [14].

The prevalence of cataracts is significantly higher among outdoor workers compared to indoor workers, with studies showing a 1.3 times greater risk for outdoor workers, including farmers and fishers [15]. This increased risk is attributed to prolonged exposure to ultraviolet (UV) light. Specifically, overexposure to UV radiation not only raises the likelihood of cataract formation but also impacts productivity among farmers. Research indicates that farmer productivity varies during working hours, with higher productivity observed between 6–9 am and 12–3 pm compared to 9 am–12 pm [16]. Additionally, agricultural workers face unique health risks compared to the general population. They have an elevated risk of developing specific cancers, such as prostate cancer, multiple myeloma in females, and melanoma of the skin in females, but a reduced risk of various other cancers [17]. These occupational health patterns underline the importance of targeted health interventions and protective measures for outdoor workers to mitigate UV exposure and associated health risks.

Agricultural workers frequently suffer from musculoskeletal disorders, such as pain in the back, upper limbs, and lower limbs. These issues arise from repetitive movements, awkward or overstretched postures, and prolonged standing during farm work. In India, the prevalence of musculoskeletal disorders is particularly high, with 52% of farmers reporting experiencing low back pain [18]. A study done in Thailand reported that about 70% of the participants said MSDs in at least one part of their body, Knee/calf, lower back, and shoulder pain were the most frequently reported [19].

Respiratory disorders, including cough, wheezing, rhinitis, obstructive cardiovascular conditions, and tachycardia, are common among agricultural workers. In India, the prevalence of these disorders is around 3.59%, a trend observed globally. In a study, nearly 22% of agricultural

workers were symptomatic, with conditions such as chronic bronchitis (7%), cough (7%), bronchial asthma (3%), postnasal drip (2%), chest tightness (2%), and dyspnoea (1%). Interestingly, respiratory symptoms were more frequent among non-smokers (55.6%) compared to smokers (44.3%). Combined types of farming work were most strongly linked to respiratory symptoms, followed by grain cutting. Pulmonary function parameters were lower in smokers compared to non-smokers and in symptomatic workers compared to those without symptoms [20].

Farmer’s lungs is a hypersensitivity pneumonitis, which is associated with intense or repeated exposure to inhaled biologic dusts was found to be higher in Asian countries as compared to European countries [21].

Psychosocial Stresses

The mental health issues faced by farmers in India are influenced by several compounding factors, including shifts in lifestyle, fluctuating income, crop failures, natural disasters such as droughts and floods, economic crises, unemployment, limited social support, and growing insecurity [22]. Other stressors reported by farmers included work-life balance, physical health and disconnect from non-farming populations. Farmers described feeling misperceived by those outside of their community and feeling a distinct lack of control due to external factors. All the farmers identified alcohol use as a primary coping strategy to deal with stressors [23].

Farmer’s mental health, specifically farmer suicides, is a matter of socio-political and policy importance [24]. In the two decades from 1995 to 2018, approximately 48 farmers committed suicide every day, accounting for over 0.4 million deaths [25]. Farmers were also reported to have poor mental health status than the general population [26,27]. Mental disorders are reported to be a key risk factor for suicidal ideation and attempts among farmers [28].

The high prevalence (22.8%) of mild to moderate depressive disorders calls for focused efforts [29]. Mental illness among farmers is likely to increase the risk of injury, accidental death and suicide (WHO, 2010). A study conducted by Bomble and Lhungdim [22] concluded that more than half (58%) of farmers have reported distress of mental health and 41.7% farmers were reported no distress of mental health in last two weeks. The most commonly reported symptoms of mental health relate to anxiety and insomnia, with 55% of farmers suffering from these symptoms. The second highest ranking prevalence of symptoms is somatic problems (34.7%) [22].

Exposure to Toxic Chemicals

Pesticides being used in agricultural tracts are released into the environment and come into human contact directly or indirectly. Humans are exposed to pesticides found in

environmental media (soil, water, air, and food) by different routes of exposure such as inhalation, ingestion, and dermal contact. Exposure to pesticides results in acute and chronic health problems, ranging from temporary acute effects such as irritation of the eyes and excessive salivation to chronic diseases such as cancer and reproductive and developmental disorders [30]. A study conducted in south India found that excessive sweating (36.5%), burning/stinging/itching of eyes (35.7%), dry/sore throat (25.5%), and excessive salivation (14.1%), all more prevalent among sprayers farmers [31]. A study done by Anjana and Bant [32] found that the most common health problem faced by the farmers was the musculoskeletal problems (65.1%), followed by respiratory problems (38.9%), about 11.4% of the farmers experienced problems after pesticide exposure [32].

Other problems faced by farmers and agricultural workers are many. Hypertension and other cardiovascular disorders occur more frequently among farmers in comparison to non-farmers [33]. Also there was a distinct pattern of specific disease prevalence, namely unintentional fatal injuries, certain types of cancer, chronic respiratory diseases, liver diseases and cognitive and emotional disorders as reflected by their higher suicides rates [34,35]. Also it has been observed that inadequate dietary intake, especially hidden hunger and Chronic Energy Deficiency was prevalent among rural women [36].

Preventive Measures to be taken to Minimise Health Issues in Agricultural Workers

Health promotion is recognized as a dynamic strategy for improving health and managing symptoms. According to the World Health Organization (WHO, 2019), health promotion encourages individuals to adopt and maintain healthy lifestyles while creating environments that support overall well-being. This approach involves engaging in positive activities that enhance individual well-being and help people realize their full health potential. By promoting healthy behaviours and fostering supportive living conditions, health promotion operates at both individual and community levels to improve public health outcomes.

One key aspect of health promotion is health education, a profession dedicated to teaching people about health. In this teaching-learning process, health education aims to improve wellness by providing individuals with the knowledge, skills, and tools needed to live healthier lives. Health education can be delivered in various settings, such as schools, communities, and institutions, benefiting people of all ages and backgrounds.

One of the prevention efforts that can be done is health promotion regarding farmers' knowledge about UV light on eye health in anticipating the dangers of excessive UV light

and increasing farmer awareness about the sources and dangers of UV light for eye health. Health workers, especially nurses, can provide health services through supportive therapy to overcome physical and psychological problems in cataract patients and helps anticipate the dangers of UV rays at work [37]. Health awareness, another crucial element of health promotion, can be enhanced through activities like annual health check-ups. Health awareness campaigns often include strategies like door-to-door visits by healthcare workers, pamphlet distribution, cultural events featuring skits, and speeches by healthcare teams. While these interventions effectively raise community awareness about different diseases, changing attitudes typically requires more time.

Health care cost can be reduced by developing a health care system that emphasizes prevention rather than disease management and to achieve this, health care providers must encourage more physicians to be adult generalists and must insure that all physicians have cost-effective practice patterns that avoid unnecessary tests and procedures and that all citizens adopt living wills [38]. As a results of agricultural accidents, families of agricultural workers suffered economic loss in the form of loss of daily wedges, expenses to get treatments after injuries and most dreaded one was loss of premature life. Agricultural accidents responsible for fatal and non-fatal injuries which results in financial loss not only to the family of victims but also to community, state or country [4]. It has been observed by a study that a percentage increase in healthy days' increases output by 56% indicating importance of health in enhancing productivity.

There is a need to evaluate an awareness among Indian farmers and agricultural workers about their own health and the attitude to reduce the occupational related diseases. Also further research can be conducted to assess the impact of health education on such diseases.

References

1. Tabibi R, Tarahomi S, Ebrahimi SM, Valipour AS, Kalkhajeh SG, et al. (2018) Basic occupational health services for agricultural workers in the South of Iran. *Ann Glob Health* 84: 465-469.
2. Padhi K (2007) Agricultural labour in India - A close look.
3. Meenakshi JR, Panneer S (2020) Occupational health of agricultural women workers in India. *Indian J Community Med* 45(4): 546-549.
4. Tiwari PS, Gite LP, Dubey AK, Kot LS (2002) Agricultural injuries in Central India: nature, magnitude, and economic impact. *J Agric Saf Health* 8(1): 95-111.

5. Khadatkar A, Kot LS (2022) Risk Estimates of Agricultural Injuries and Fatalities in Central India. *Ann Work Expo Health* 66(2): 216-223.
6. Abubakar MS, Ahmad D, Akande FB (2010) A review of farm tractor overturning accidents and safety. *Pertanika J Sci Technol* 18(2): 377-385.
7. Cole H, Myers M, Westneat S (2016) Chores at times of fatal or serious injuries associated with tractor Overturns with and without rollover protection. *Safety* 2(3): 18.
8. Rondelli V, Casazza C, Martelli R (2018) Tractor rollover fatalities, analyzing accident scenario. *J Safety Res* 67: 99-106.
9. Verma SR, Rawal GS, Bhatia BS (1978) A study of human injuries in Wheat threshers *Journal of Agricultural Engineering* 15(1): 19-23.
10. Kumar A, Singh JK, Mohan D, Varghese M (2007) Farm hand tools injuries: A case study from northern India. *Safety Science* 46: 54-65.
11. Kot LS, Patidar AK, Sharma V, Jain A, Gupta M (2023) Pattern of agricultural injuries and their economic impact on the affected families in Ratlam districts, Central India; *Journal of Cardiovascular Disease Research* 14(03): 200-211.
12. Choochouy N, Kongtip P, Chantanakul S, Nankongnab N, Sujirarat D, et al. (2019) Hearing Loss in Agricultural Workers Exposed to Pesticides and Noise. *Ann Work Expo Health* 63(7): 707-718.
13. Gomez MI, Hwang SA, Sobotova L, Stark AD, May JJ (2001) A comparison of self-reported hearing loss and audiometry in a cohort of New York farmers. *J Speech Lang Hear Res* 44(6): 1201-1208.
14. Ragan KR, Lunsford BN, Thomas CC, Tai EW, Sussell A, (2019). Skin Cancer Prevention Behaviors Among Agricultural and Construction Workers in the United States, 2015. *Prev Chronic Dis* 16: 180446.
15. Sudrajat A, Munawir A, Supangat S (2021) Pengaruh Faktor Risiko Terjadinya Katarak Terhadap Katarak Senil Pada Petani di Wilayah Kerja Puskesmas Tempurejo Kabupaten Jember. *Multidisciplinary Journal* 4(2): 39-46.
16. Kurniyawan EH, Junanda AI, Putri HM, Cayani MKD, Afandi AT, et al. (2023) Ultraviolet Lights Effect on Farmer Health and Productivity: Literature Review. *Nursing and Health Science Journal* 3(1): 24-31.
17. Togawa K, Leon ME, Lebailly P, Freeman LEB, Nordby KC, et al. (2021) Cancer incidence in agricultural workers: Findings from an international consortium of agricultural cohort studies (AGRICOH). *Environ Int* 157: 106825.
18. Shin DS, Jeong BY (2022) Older Female Farmers and Modeling of Occupational Hazards, Wellbeing, and Sleep-Related Problems on Musculoskeletal Pains. *Int J Environ Res Public Health* 19(12): 7274.
19. Poochada W, Chaiklieng S, Andajani S (2022) Musculoskeletal Disorders among Agricultural Workers of Various Cultivation Activities in Upper Northeastern Thailand. *Safety* 8(3): 61.
20. Behera D, Dharam P, Gupta D (2005) Respiratory Symptoms among Farmers in the Vicinity of a North Indian City. *Lung India* 22(2): 45-49.
21. Liu S, Chen D, Fu S, Ren Y, Wang L, et al. (2015) Prevalence and risk factors for farmer's lung in greenhouse farmers: an epidemiological study of 5,880 farmers from Northeast China. *Cell Biochem Biophys* 71(2): 1051-1057.
22. Bomble P, Lhungdim H (2020) Mental health status of Farmers in Maharashtra, India: A study from farmer suicide prone area of Vidarbha region. *Clinical epidemiology and global health* 8(3): 684-688.
23. Proctor C, Hopkins N (2023) Stressors and Coping Strategies in Rural Farmers: A Qualitative Study. *J Agromedicine* 28(3): 415-424.
24. Bhattacharyya S, Venkatesh P, KS A, Burman RR (2020) The macro and micro point of view of farmer suicides in India. *Natl Acad Sci Lett* 43: 489-495.
25. Kannuri NK, Jadhav S (2021) Cultivating distress: Cotton, caste and farmer suicides in India. *Anthropol Med* 28(4): 558-575.
26. Stallones L, Beseler C (2004) Safety practices and depression among farm residents. *Ann Epidemiol* 14(8): 571-578.
27. Syson Nibbs L, Saul C, Cox P (2006) Tideswell health survey: A population survey of the health needs and service utilization of a farming community. *Public Health* 120(3): 221-228.
28. Liu BP, Qin P, Liu YY, Yuan L, Gu LX, et al. (2018) Mental disorders and suicide attempt in rural China. *Psychiatry Res* 261: 190-196.
29. Ubbla SR, Kodali PB, Thankappan KR (2023) Depressive disorders and associated factors among farmers in

- Andhra Pradesh: Results from a cross sectional study. *Indian J Occup Environ Med* 27(3): 235-240.
30. Yassi A, Kjellstrom T, Kok TK, Gudotli TL (2001) *Basic Environmental Health*, World Health Organization. London, UK, Oxford University Press.
 31. Chitra GA, Muraleedharan VR, Swaminathan T, Veeraraghavan D (2006) Use of pesticides and its impact on health of farmers in South India. *Int J Occup Environ Health* 12(3): 228-233.
 32. Joshi AR, Bant DD (2020) Occupational Health Problems among the Farmers of Rural Field Practice Area of Department of Community Medicine, KIMS, Hubballi: A Cross-Sectional Study. *Indian Journal of Public Health Research & Development* 11(7): 60-65.
 33. Demos K, Sazakli E, Jelastopulu E, Charokopos N, Ellul J, et al. (2013) Does farming have an effect on health status? A comparison study in west Greece. *Int J Environ Res Public Health* 10(3): 776-792.
 34. Lee WJ, Cha ES, Moon EK (2010) Disease prevalence and mortality among agricultural workers in Korea. *J Korean Med Sci* 25: 112-118.
 35. Waggoner JK, Kullman GJ, Henneberger PK, Umbach DM, Blair A (2011) Mortality in the agricultural health study, 1993-2007. *Am J Epidemiol* 173(1): 71-83.
 36. Kurniyawan EH, Junanda AI, Putri HM, Cayani MKD, Afandi AT, et al. (2023) Ultraviolet Lights Effect on Farmer Health and Productivity: Literature Review. *Nursing and Health Science Journal* 3(1): 24-31.
 37. Joshi P, Sharma JP, Sharma N, Singh BK, Ahmad N, et al. (2018) Health and nutrition status of farm women in rural India: Case of Indo-Gangetic plains. *The Indian Journal of Agricultural Sciences* 88(6): 978-984.
 38. Dalen JE (2010) We can reduce US Health Care Costs. *The American Journal of Medicine* 123(3): 193-194.