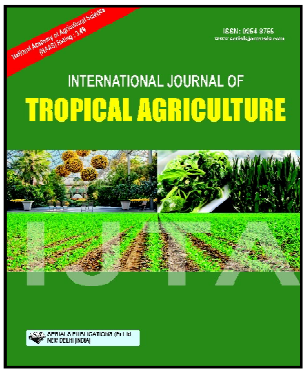

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Impact of Health Hazards on Farmers and Farm Workers in Agricultural Operations

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Abstract: According to the International Labour Organization (ILO), the agricultural sector is one of the most hazardous to health worldwide. Agricultural work possesses several characteristics that are risky for health: exposure to the weather, close contact with animals and plants, extensive use of chemical and biological products, difficult working postures and lengthy hours, and use of hazardous agricultural tools and machinery. The study was conducted purposively in Sawai Madhopur district of Rajasthan. The sample size for the study was 120 farm workers. Most of the farm workers (44.17%) were frequently occurring in health hazards in operation of agricultural activities. Out of fourteen independent variables eleven variables were found negative and significant relationship with health hazards and only age was found positive and significant relationship with health hazards while family background and size of family were not significant relationship with health hazards. Majority (72.00%) farm workers suggested that medical facilities should be available at village level.

Key words: Health hazards; Agricultural activities; Farm workers; Multivariate effect;

Perhaps more than any other occupational group, agricultural workers are exposed to a tremendous variety of environmental hazards that are potentially harmful to their health and well-being. Farmers and farm workers suffer from increased rates of respiratory diseases, noise-induced hearing loss, skin disorders, certain cancers, chemical toxicity, and heat-related illnesses. The table summarizes the many occupational health hazards of agriculture. Health outcomes associated with these hazards range from relatively simple conditions like heat exhaustion to complex diseases like cancer. Exact data on levels of exposure and associated disease prevalence (or health effects) in the developing world are limited.

Pesticide-related illnesses, for example, go largely underreported, though it is estimated that 2 to 5 million people every year suffer acute poisonings and that 40,000 die. Millions of injuries are known to occur, with at least 170,000 of these being fatal for agricultural workers each year. Unsafe equipment and conditions, inadequate training, and limited availability and use of personal protective equipment all contribute. Health and injury burdens depend on the type of farming activity, the type of worker, and the geographic location. Research in India suggests that agricultural workers using powered machinery are most at risk from fatal accidents, but that injuries are actually more common in less mechanized villages, probably owing to lower adherence to safety standards. Basic hazards like sharp tools and snake bites can also cause debilitating wounds and fatalities. Different forms of animal husbandry expose workers to different zoonotic diseases. In Malaysia, an outbreak of Nipah virus in 1998 disproportionately affected pig farmers. Workers with dairy cows and sheep in parts of Asia, Africa, and Latin America are at high risk from brucellosis, and animal herdsmen in Africa from Rift Valley Fever. There are also important

Exposure	*Health Effect*	*Specificity to Agriculture*
Weather, climate	Dehydration, heat cramps, heat exhaustion, heat stroke, skin cancer	Most agricultural operations are performed outdoors
Snakes, insects	Fatal or injurious bites and stings	Close proximity results in high incidence
Sharp tools, farm equipment	Injuries ranging from cuts to fatalities; hearing impairment from loud machinery	Most farm situations require a wide variety of skill levels for which workers have little formal training, and there are few hazard controls on tools and equipment
Physical labor, carrying loads	Numerous types of (largely unreported) musculoskeletal disorders, particularly soft-tissue disorders, e.g., back pain	Agricultural work involves awkward and uncomfortable conditions and sustained carrying of excessive loads
Pesticides	Acute poisonings, chronic effects such as neurotoxicity, reproductive effects, and cancer	More hazardous products are used in developing countries with minimal personal protective equipment (PPE)
Dusts, fumes, gases, particulates	Irritation of the eyes and respiratory tract, allergic reactions, respiratory diseases such as asthma, chronic obstructive pulmonary disease, and hypersensitivity pneumonitis	Agricultural workers are exposed to a wide range of dusts and gases from decomposition of organic materials in environments with few exposure controls and limited use of PPE use in hot Climates.
Biological agents and vectors of disease	• Skin diseases such as fungal infections, allergic reactions, and dermatoses	• Workers are in direct contact with environmental pathogens, fungi, infected animals, and allergenic plants
	• Parasitic diseases such as schistosomiasis, malaria, sleeping sickness, leishmaniasis,ascariasis, and hookworm	• Workers have intimate contact with parasites in soil, wastewater/sewage, dirty tools, and Rudimentary housing
	• Animal-related diseases or zoonoses such as anthrax, bovine tuberculosis, and rabies (at least 40 of the 250 zoonoses are occupational diseases in agriculture)	• Workers have ongoing, close contact with animals through raising, sheltering, and slaughtering
	• Cancers, such as bladder cancer caused by urinary bilharzia contracted through working in flooded areas in North and Sub-Saharan Africa	• Agricultural workers are exposed to a mix of biological agents, pesticides, and diesel fumes, all linked with cancer

differences between developed and developing countries: according to the World Health Organization (WHO), although developing countries accounted for only 20 percent of all pesticide use in the early 1990s, they accounted for more than 99 percent of poisonings, because more toxic products were used under more rudimentary conditions.

Ill health arising from agricultural work has negative implications for agricultural productivity. A study of women farmers in mixed cropping systems, by the University of Benin (Nigeria), found that the vast majority suffered from intense muscular fatigue, heat exhaustion, and skin disorders, forcing them to take days off from attending to crops. In Madhya Pradesh, India, in 2000, the value of human life lost to fatal injuries in agriculture, plus the cost of nonfatal injuries, was estimated at US$27 million. The economic costs arising from the occupational health hazards of agriculture often arise because of the economic incentives of agricultural work. A study in Carchi, Ecuador—the country's most important potato-growing zone—by a group of international scientists and the International Potato Center found that pesticides bring income gains, but overall they result in lower economic productivity owing to their health costs. Therefore, the study was conducted with the following objects:

(i) To study the extent of health hazards among the farm workers in different agricultural activities.

(ii) To explore the relationship between extent of health hazards among the farm workers in operation different agricultural activities and their selected attributes.

(iii) To suggest the strategies for reducing the health hazards among the farm workers in operation of different agricultural activities.

METHODOLOGY

The study was conducted purposively in Sawai Madhopur block of Sawai Madhopur district of Rajasthan. There are 155 villages in this block, for present study 10 villages were selected purposively and then 12 farm workers from each village were selected randomly as respondents. Thus, the total sample was consisted of 120 farm workers. The data were collected through a well structured and pre-tested interview schedule. The statistical tests and procedures were used for analyzing the data, included percentage, mean, Karl Pearson's coefficient of correlation and multiple regressions.

RESULTS AND DISCUSSION

Opinion of the respondents regarding occurrence of health hazards: In order to explore the extent of health hazards, opinion of the respondents regarding their occurrence in different operations has been taken in terms of frequently, sometimes and rarely. Results clearly indicated that (Table 1) majority of the farmers opined that skin irritation and allergies were frequently occurring during seed treatment (50.83%), manual threshing and cleaning grains (48..33%) and loading and unloading of straw (51.67%), poisoning (53.33%) mostly occurred during pesticide application; cuts, wounds and injuries occurred frequently during weeding & harvesting (57.50%), threshing (26.67%) and chaffing (23.33%). The fourth health problem identified were chest congestion and breathing problem which occurred frequently during threshing, winnowing & cleaning grains (54.17%) operations. Majority of the respondents confirmed frequent occurrence of swollen and sore hands and feet during irrigation (25.83%), digging, weeding & harvesting (52.50%), operations. Body ache was another common problem found to occur frequently after performing hard operations like digging, sowing & weeding (51.17%), harvesting & post harvesting work (52.50%), cleaning shed & making dung cake (59.17%) and Marketing of milk & Milk product (54.17%). Eye irritation was found to be frequently occurring due to the smoke of traditional chullha (58.33%). The last and highly prevalent problem was

identified as bite of insects and poisonous animals frequently in various cases of weeding, irrigation& harvesting (50.00%). The findings of *Pandey et al (2010)* and *Arthur et al (2004)* were in the same line of the present finding.

Table 1
Farm workers's opinion about occurrence of health hazards in different operationsn of agricultural activities

Types of Health Hazards and Operations	*Extent of Occurrence*		
	Frequent	*Some-times*	*Rarely*
Skin Irritation & Allergy			
Seed treatment	61(50.83)	34(28.33)	25(20.84)
Threshing & Cleaning grains	58(48.33)	30(25.00)	32(26.67)
Loading unloading of straw	62(51.67)	28(23.33)	30(25.00)
Poisoning			
Pesticide Application.	64(53.33)	36(30.00)	20(16.67)
Storage	27(22.50)	72(60.00)	21(17.50)
Cut, Wounds & Injuries			
Land Preparation	30(25.00)	64(53.33)	26(21.67)
Weeding & Harvesting	69(57.50)	27(22.50)	24(20.00)
Threshing (mech.)	32(26.67)	65(54.17)	23(19.17)
Chaffing (manual)	28(23.33)	59(49.17)	33(27.50)
Congestion & Breathing			
Threshing & Winnowing	65(54.17)	28(23.33)	27(22.50)
Cleaning of grains			
Swollen & sore hands & feets			
Irrigation	31(25.83)	63(52.50)	26(21.67)
Digging, weeding & harvesting	63(52.50)	34(28.33)	23(19.17)
Body Ache & Physical tiredness			
Household work	31(25.83)	58(48.33)	31(25.83)
Digging, Sowing, weeding	62(51.17)	28(23.33)	30(25.00)
Harvesting & post	63(52.50)	37(30.83)	20(16.67)
harvest work cleaning shed & making dung	71(59.17)	28(23.33)	21(17.50)
Marketing of milk & Milk product	65(54.17)	29(24.17)	26(21.67)
Eye Irritation			
Cooking	70(58.33)	27(22.50)	23(19.17)
Harvesting	32(26.67)	64(53.33)	24(20.00)
Threshing & Winnowing	59(49.17)	26(21.67)	35(29.17)
Biting			
Weeding, irrigation, & harvesting	60(50.00)	35(29.17)	25(20.83)

contd. table 1

Table 2
Overall occurrence about Health Hazards in operation of agricultural activities among the farm workers

Category	*No.*	*%*
Frequently	53	44.17
Sometimes	41	34.17
Rarely	26	21.66
Total	120	100

Overall occurrence about health hazards in operation of agricultural activities among the farm workers: In order to explore Overall occurrence of health hazards, opinion of the respondents regarding their occurrence in different operations has been taken in terms of frequently, sometimes and rarely. Results clearly indicated that (Table 2) most of the farm workers (44.17%) were frequently occurring in health hazards in operation of agricultural activities and 34.17 per cent of the respondents were in sometimes occurred in health hazards in operation of agricultural activities followed by 21.66 per cent of the respondents in rarely. Similar findings were also reported by *Cordes and Foster(1988)* and *Aktar et al (2009)*. ***Correlation analysis of independent variables and health hazards in operations of different Agricultural Activities*:** To determine the relationship of selected

independent variables with health hazards in operations of different agricultural activities, the correlation analysis was worked out and results are present Table 3. The results reveals that the variables age (X_1) was found positively and significant correlated with health hazards in operations of different agricultural activities at one per cent level of significant, while family background (X_2) and family size (X_4) where found non-significant relationship with health hazards in operations of different agricultural activities.

Table 3
Coefficient of correlation between independent variables and health hazards-

Independent variables	*'r' value*	*'t' value*
X_1 Age	0.361**	4.21
X_2 Family background	-0.108NS	-1.18
X_3 Education	-0.741**	-11.99
X_4 Size of family	-0.064NS	-0.069
X_5 Social participation	-0.673**	-9.88
X_6 size of land holding	-0.370**	-4.33
X_7 annual income	-0.507**	-6.39
X_8 irrigation availability	-0.636**	-8.98
X_9 Credit availability	-0.542**	-7.01
X_{10} Innovativeness	-0.573**	-7.58
X_{11} Agricultural belief	-0.647**	-9.22
X_{12} source of information	-0.730**	-11.60
X_{13} Extension contact	-0.741**	-11.99
X_{14} Knowledge	-0.839**	-16.75

However, the education (X_3) was found significant and negatively correlated with the health hazards in operations of different agricultural activities at one per cent level of significance and rest of ten independent variables were also negatively and significant correlation with health hazards in operations of different agricultural activities at one per cent level of significance. This finding clearly indicates that most of the selected independent variables had significant relationship with health hazards in operations of different agricultural activities.

Multiple regression analysis of independent variables and health hazards: A multiple regression analysis was done to find out the extent of the effect of independent variables on health hazards in operations of different agricultural activities. The perusal of data in Table 5 shows that the "b" value of each independent variables along with their "f" values of significance related with the health hazards in operations of different agricultural activities as shown in the Table 4, reveals that the Age (X_1), family background (X_2), Education (X_3), Social participation (X_5), irrigation availability (X_8), Credit availability (X_9), source of information (X_{12}), and knowledge (X_{14}) had significant contribution to the health hazards in operations of different agricultural activities at the one per cent level of significance. While family size (X_4) had significant contribution to the health hazards in operations of different agricultural activities at the five per cent level of significance.

Multivariate effect of independent variables on health hazards: A backward multiple regression analysis was worked-out to find the best set of the independent variables of health hazards in operations of different agricultural activities, from this analysis it was found that fourteen models, in which the first model contained all the 14 independent variables second had 13, third had 12 and so on till the remaining most significant variables in the model. This was the shorting process of variables in the model. This shorting of variables from each model were done on the basis of their predication ability to health hazards in operations of different agricultural activities, from each model one least important variable was deleted. The entire fourteen models are explained in the Table 5. Model – I consisted all the 14 independent variables which had 0.8123 R^2 value with 5 non significant and 9

significant independent variables. The second model had 13 variables, this set of independent variables had 0.8062 R^2 value at 106 degree of freedom similarly the succeeding IIIrd to XIVth model had 0.8057, 0.8054, 0.8053, 0.8052, 0.8040, 0.8014, 0.7993, 0.7500, 0.6935, 0.6704, 0.5565, and 0.5486 R^2 value respectively.

Strategies for reducing the health hazards among the farm workers in operation of different agricultural activities: Rigorous evaluations of the health benefits associated with interventions to improve agricultural practices are few. Still, there are a range of opportunities for technologies and policies to substantially reduce the health-related burdens of working in agriculture. Different hazards require different solutions. In general, if occupational health hazards are to be addressed, greater organization and empowerment of the agricultural workforce and small farmers is needed. The International Federation of Plantation and Agricultural Workers advocates for better working and living conditions for agricultural wage workers, while numerous nongovernmental organizations and some national governments work with small farmers to reduce risks. Giving workers a voice in determining working conditions can make a difference. For example, community monitoring convinced donors to stop providing toxic pesticides to World Bank–funded projects in the Philippines. Regulations and codes of conduct that do exist also need to be enforced, such as the ILO and WHO guidelines for reducing hazards in agricultural work and providing occupational health services to agricultural workers. To effect change, the agriculture and health sectors should work together more closely. The agricultural sector should develop and build on ways of working

Table 4
Multiple regression analysis of independent variables with health hazards

Independent variables	*"b" Value*	*"f" Value*
X_1 Age	1.154	72.86**
X_2 Family background	0.587	8.53**
X_3 Education	-2.494	230.53**
X_4 Size of family	-1.150	5.39*
X_5 Social participation	-1.847	37.62**
X_6 size of land holding	2.394	0.01^{NS}
X_7 annual income	-0.804	0.67^{NS}
X_8 irrigation availability	-2.925	40.15**
X_9 Credit availability	-1.282	8.05**
X_{10} Innovativeness	-0.261	2.59^{NS}
X_{11} Agricultural belief	-0.261	3.70^{NS}
X_{12} source of information	-3.646	21.62**
X_{13} Extension contact	-1.016	1.47^{NS}
X_{14} Knowledge	-9.855	21.00**

** Significant at 1 % level *Significant at 5% level, NS Non-significant, R^2 = 0.812, "F" calculated = 32.471 ** (1,120-14-1 = 105 d. f.)

Table 5
Multiple effects of independent variables on health hazards

Model	*Variable included in model*	*R^2 value*	*"F" value*
I	$X_1X_2X_3X_4X_5X_6X_7X_8X_9X_{10}$ $^{X}11^{X}12^{X}13^{X}14$	0.8123	32.4712**
II	$X_1X_2X_3X_4X_5X_6X_7X_8X_9X_{10}$ $^{X}11^{X}12^{X}13$	0.8062	33.9283**
III	$X_1X_2X_3X_4X_5X_6X_7X_8X_9X_{10}$ $^{X}11^{X}12$	0.8057	36.9849**
IV	$^{X}1^{X}2^{X}3^{X}4^{X}5^{X}6^{X}7^{X}8^{X}9^{X}10^{X}11$	0.8054	40.6498**
V	$^{X}1^{X}2^{X}3^{X}4^{X}5^{X}6^{X}7^{X}8^{X}9^{X}10$	0.8053	45.1283**
VI	$^{X}1^{X}2^{X}3^{X}4^{X}5^{X}6^{X}7^{X}8^{X}9$	0.8052	50.5731**
VII	$X_1X_2X_3X_4X_5X_6X_7X_8$	0.8040	56.9206**
VIII	$^{X}1^{X}2^{X}3^{X}4^{X}5^{X}6^{X}7$	0.8014	64.6010**
IX	$X_1X_2X_3X_4X_5X_6$	0.7993	75.0489**
X	$X_1X_2X_3X_4X_5$	0.7500	68.4174**
XI	$^{X}1^{X}2^{X}3^{X}4$	0.6935	65.0572**
XII	$^{X}1^{X}2^{X}3$	0.6704	78.6790**
XIII	$^{X}1^{X}2$	0.5565	73.4148**
XIV	$^{X}1$	0.5486	143.4257**

(Based on step down multiple regression analysis)

with farmers to grow crops that promote healthier cultivation practices and reduce exposure to hazards. Health-sector staff, meanwhile, should document health problems and identify the greatest hazards, help explain the health reasons for such changes, and monitor changes in health with improved production methods.

The data shows in Table 6, majority (72.00%) of farm workers needed medical facilities for better treatment of health hazards at village level.

Table 6
Strategies for reducing the health hazards among the farm workers in operation of different agricultural activities

Strategies for Reducing the health hazards	*%*	*Rank*
Credit should be available on time	66.66%	II
Literature related to health hazards and their solution should be available in villages	27.50%	V
Awareness camps should be organized on health hazards	50.00%	IV
Medical facilities should be available at village level	72.00%	I
Demonstration and training should be organized on improved agricultural technologies	54.16%	III

Out of 120 tribal farm women, 66.66 per cent respondents suggested that credit should be timely available. Majority (54.16%) tribal farm women needed demonstration and training on improved agriculture technologies followed half of the total tribal women suggested awareness camp should be organized on health hazards in operation of different agricultural activities and only 27.50 per cent of tribal farm women suggested literature related to health hazards and their solution should be available in villages.

CONCLUSION

This study concluded that the various health hazards involved in different operations were viz. skin irritation and allergies, poisoning, cuts, wounds, injuries, congestion, breathing problems, swollen and sore hands and feet, sun stroke, body ache, physical tiredness, Eye irritation and bites of various poisonous animals and insects. Most of the operations having many of these health hazards were found to be mainly performed by women farmers. Most of the farm workers (44.17%) were frequently occurring in health hazards in operation of agricultural activities. Out of fourteen independent variables eleven variables were found negative and significant relationship with health hazards and only age was found positive and significant relationship with health hazards while family background and size of family were not significant relationship with health hazards.

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