



Comparative Study on Demographic Traits and Knowledge Levels of Farmers, Input Dealers and Spray Men on Health Hazards in Pesticide Handling

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Abstract: The study mainly focuses on comparing the knowledge levels of farmers, input dealers and spray men who are extensively involved in pesticide handling and also the demographic traits contributing to the same. The study was carried out in Theni district of Tamil Nadu by selecting four blocks that are leading in pesticide consumption in the district. 100 farmers were selected proportionately, 30 input dealers and 30 spray men were selected by adopting snowball sampling method. Data has been collected from the selected samples using a well-prepared interview schedule. The investigation infers that very few respondents are having a high level of knowledge, even among them the contribution of farmers and spray men who are directly exposed to pesticides is very low.

Keywords: Knowledge, Health hazards, Pesticides, Farmers, Input dealers, Spray men

Pesticides became a crucial aspect of modern farming and play a key role in enhancing agricultural productivity. However, the excessive and indiscriminate use of pesticides is one of most serious environmental and public health issues. Pesticides can cause secondary pest outbreaks, biodiversity loss, contamination of soil, water, and air, and residues in primary and derived agricultural products, all of which are hazardous to the environment and human health (Jallow et al 2017). Pesticide poisoning has become more common throughout the world, with an estimated count of 1 to 41 million people suffering health consequences as a result of pesticide exposure annually. World Health Organization (WHO) reported that pesticide poisoning kills around 0.3 million people annually of which 99 per cent of mortalities occur in developing and underdeveloped countries (Okoffo et al 2016). Pesticide exposure can lead to reproductive crisis, birth defects, immune malfunctions, endocrine instabilities, an increase in testicular cancer, dermatitis, behavioural changes, cancers, neurobehavioral disorders, and immunotoxicity (PAN International 2007, Gill and Garg 2014). Even though the pesticides are causing the above-mentioned health hazards, the consumption of chemical pesticides in India has drastically increased from 58,634 MT in 2016-17 to 62,193 MT in 2020-21 (Directorate of Plant Protection, Quarantine, and Storage, 2022). Farmers' exposure to pesticide-related problems is surging due to insufficient knowledge on health hazards due to pesticides, and also proper and safe use of pesticides and personal

protective equipment (Blanco et al 2011, Jallow et al 2017). This study mainly focuses on comparing the knowledge levels of farmers, input dealers and spray men who are extensively involved in pesticide handling and also the demographic traits contributing to the same.

MATERIAL AND METHODS

The study was carried out in Theni district of Tamil Nadu by selecting four blocks that are leading in pesticide consumption in the district namely Aundipatti, Cumbum, Uthamapalayam, and Chinnamanur. The research design adopted was "Ex-post facto Research design". The total sample size for the study was 160 of which the samples are categorized into farmers, input dealers and spray men. A list of farmers has been collected from the office of the Department of Horticulture. With the use of the above gathered secondary data, proportionate random sampling has been followed in consideration with the total number of farmers in that particular village to draw a hundred farmers being selected as samples for the study. Input dealers and spray men were selected by adopting the snowball sampling method throughout the district. Primary data has been collected from the above-mentioned samples with the use of a well-structured interview schedule specially framed by the researcher for the study. The collected data were coded and analyzed using SPSS software.

RESULTS AND DISCUSSION

Knowledge on acute symptoms of health hazards: Most

of the farmers are having sufficient knowledge of the cause of skin irritation, rashes, headache (99%) nausea, vomiting (95%) and dizziness (83%) due to improper pesticide handling practices (Table 1). The findings are similar to Satya Sai et al (2019). More than two-thirds of the farmers knew the cause of eye, nose, throat irritation (72%), breathing trouble (77%), excessive sweating and fever (75%), insomnia (78%), and loss of appetite (79%) due to experience and perception about health risks. Because of their medium level of innovativeness and social participation, more than half of the farmers knew that blurred vision, stinging eyes (52%) stomach aches, and diarrhea (62%) were caused due to improper pesticide handling practices. Nearly one-fourth of the farmers knew the cause of nose bleeding (27%) and muscle weakness (25%). The considerable reason for this may be, that more than half of the farmers were educated at a

lower middle school level. Similar findings have been reported by Jallow et al (2017) and Kumari et al (2018). All the input dealers knew the cause of skin irritation, rashes, Nausea, vomiting, headache, eye, nose, throat irritation, breathing trouble, stomach aches, diarrhea, excessive sweating and fever, dizziness, insomnia, loss of appetite, and the majority of the input dealers knew the cause of nose bleeding (93%) due to improper pesticide handling practices. Because cent per cent of the input dealers are educated with either diploma or collegiate and attended training programs on pesticide handling and their negative impacts. Since the input dealers are not directly involved in pesticide spraying, only half of the input dealers knew the cause of blurred vision, stinging eyes (50%) and muscle weakness (53%). All spray men knew the cause of skin irritation, rashes, nausea, vomiting, and headache, and also majority of the spray men

Table 1. Knowledge levels of farmers, input dealers, and spray men on health hazards

Health hazards	Knowledge level of respondents					
	Farmers		Input dealers		Spray men	
	No.	%	No.	%	No.	%
Acute symptoms						
Skin irritation and rashes	99	99.00	30	100.00	30	100.00
Nausea and vomiting	95	95.00	30	100.00	30	100.00
Headache	99	99.00	30	100.00	30	100.00
Blurred vision and stinging eyes	55	55.00	15	50.00	22	73.33
Eye, Nose, Throat irritation	72	72.00	30	100.00	27	90.00
Breathing trouble	77	77.00	30	100.00	26	86.67
Nose bleeding	27	27.00	28	93.33	6	20.00
Stomach aches and diarrhea	62	62.00	30	100.00	26	86.67
Excessive sweating and fever	75	75.00	30	100.00	24	80.00
Dizziness	83	83.00	30	100.00	25	83.33
Insomnia	78	78.00	30	100.00	24	80.00
Loss of appetite	79	79.00	30	100.00	27	90.00
Muscle weakness	25	25.00	16	53.33	27	90.00
Death due to suicidal poisoning	100	100.00	30	100.00	30	100.00
Chronic symptoms						
Reproductive problems	21	21.00	22	73.33	8	26.67
Birth defects	6	6.00	22	73.33	5	16.67
Respiratory disorders and Asthma	64	64.00	29	96.67	25	83.33
Nervous system problems	16	16.00	23	76.67	11	36.67
Immunotoxicity	26	26.00	16	53.33	11	36.67
Unconsciousness	26	26.00	25	83.33	14	46.67
Kidney failure	13	13.00	18	60.00	7	23.33
Cancer	21	21.00	19	63.33	10	33.33
Death due to residual poisoning	16	16.00	29	96.67	10	33.33

knew the cause of eye, nose, throat irritation, muscle weakness, and loss of appetite (90%), breathing trouble, stomach aches and diarrhea (86%), dizziness (83%), excessive sweating, fever, and insomnia (80%). Nearly three fourth of the spray men knew the cause of blurred vision and stinging eyes (73%). The considerable reason behind the knowledge about these factors is they are directly involved in the spray process and also possess a high level of perception about the health risk. Even though, only 20 per cent of the spray men knew the cause of nose bleeding due to their low educational status. Similar findings have been encountered by (Kumari et al 2018). Since suicidal poisoning is a readily observable phenomenon faced in day-to-day life by every member of the society, cent per cent of the farmers, input dealers, and spray men were aware of this crisis. The findings are similar to Kumari et al (2018).

Knowledge on chronic symptoms of health hazards: The 64 per cent of farmers knew the cause of respiratory disorders and asthma due to improper and long-term exposure to pesticides. This may be due to their own experience and medium to high level of social participation. Since the chronic symptoms are long-term effects in nature, a very few per cent of farmers have noticed it. Namely, immunotoxicity and unconsciousness (26%), reproductive problems and cancer (21%), Nervous system problems and death due to residual poisoning (16%), kidney failure (13%), and birth defects (6%). The findings are in line with Goldsmith (1988). A majority of the input dealers knew the cause of respiratory disorders, asthma, and death due to residual poisoning (96%), and unconsciousness (83%). Nearly three fourth of the input dealers knew the cause of nervous system problems (76%), reproductive problems, and birth defects

(73%). About 63 percent of the input dealers knew that the pesticides can cause cancers followed by kidney failure (60%), and immunotoxicity (53%). All the Input dealers possess a higher education level, innovativeness, and health risk perception. This may be considered as the possible reason behind it. About 83 per cent of the spray men knew the cause of respiratory disorders and asthma due to improper and long-term exposure to the pesticides. This may be due to their daily experiences while spraying pesticides and high levels of perception about the health risk. In the meantime, very few per cent of spray men have noticed the causes of unconsciousness (46%), nervous disorders and immunotoxicity (36%), cancers and deaths due to residual poisoning (33%), reproductive problems (26%), kidney failure (23%), and birth defects (16%). The considerable reasons behind these are, the majority of the spray men lie under lower educational level and social participation and also not attended any trainings. Similar findings have been reported by Goldsmith (1988) and Kim et al (2017).

Knowledge on toxicity colour codes: Majority of the spray men and three fourth of the farmers knew that the toxicity colour codes red (96% and 71%) is known for extremely toxic, and green (96% and 73%) for slightly toxic respectively. Because, red and green colours are universally known for danger and nature and also, medium to high levels of innovativeness may be the reason for remembering those colour codes easily by the spray men and the farmers. But only 66 per cent and 76 per cent of the spray men and 36 per cent and 42 per cent of the farmers knew that yellow is for highly toxic and blue is for moderately toxic respectively. Because most of the spray men and farmers are finding difficulties in contrasting and remembering these two colour

Table 2. Knowledge levels of farmers, input dealers, and spray men on toxicity colour codes

Toxicity colour codes	Farmers		Input dealers		Spray men	
	No.	%	No.	%	No.	%
Red (Extremely toxic)	71	71.00	30	100.00	29	96.67
Yellow (Highly toxic)	36	36.00	30	100.00	20	66.67
Blue (Moderately toxic)	42	42.00	30	100.00	23	76.67
Green (Slightly toxic)	73	73.00	30	100.00	29	96.67

Table 3. Knowledge levels of farmers, input dealers, and spray men on exposure to pesticides in the human body

Exposure to pesticides in the human body	Farmers		Input dealers		Spray men	
	No.	%	No.	%	No.	%
Oral exposure	100	100.00	30	100.00	30	100.00
Dermal exposure	22	22.00	28	93.33	12	40.00
Inhalation exposure	82	82.00	30	100.00	29	96.67
Ocular exposure	47	47.00	29	96.67	16	53.33

codes and also most of them were not attended any training programs regarding safe pesticide handling. Since input dealers are from a well-educated background, cent per cent of them were aware of the toxicity colour codes. The findings are in contradictory with Kumari et al (2018) and Pandher et al (2021).

Knowledge on exposure to pesticides in the human body: The majority of the spray men (96%) and farmers (82%) knew the inhalation exposure and almost half of the spray men (53%) and farmers (47%) knew the ocular exposure of pesticides respectively. But only 40 per cent of the spray men and 22 per cent of the farmers knew the dermal exposure of pesticides in the human body. The probable factors behind this may be their deficient training and educational levels. Because of their high educational status and health risk perception. All the input dealers knew about the inhalation exposure. Majority of them knew ocular

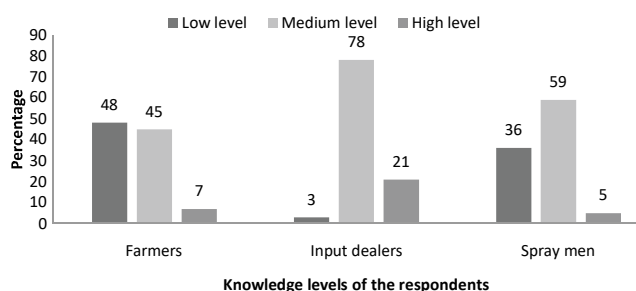


Fig. 1. Overall knowledge levels of farmers, input dealers, and spray men on health hazards in pesticide handling

Table 4. Relationship between the demographic traits and knowledge levels of farmers, input dealers and spray men

Demographic traits	Farmers	Input dealers	Spray men
Age	- 0.177	-0.407*	-0.352
Educational status	0.752**	0.605**	0.372*
Experience	0.465**	0.126	0.478**
Annual income	0.190	-0.069	0.155
Type of family	0.066	0.080	0.028
Source of information	0.236*	0.450*	0.521**
Social participation	0.282**	0.174	0.179
Innovativeness	0.203*	0.411*	0.617**
Decision making pattern	0.156	0.381*	0.429*
Training undergone on safe handling of pesticides	0.530**	0.126	0.394*
Risk orientation	0.553**	0.424*	0.496*
Perception about health risk	0.720**	0.465**	0.524**

**Significant at one percent level, *Significant at five percent level

(96%) and dermal (93%) exposures to pesticides in the human body. Since oral exposure is a readily observable phenomenon faced in day-to-day life by every member of the society, all the farmers, input dealers, and spray men were aware of this factor. Similar results have been earlier researches (Karunamoorthi et al 2011, Okoffo et al 2016, Jallow et al 2017, Kim et al 2017, Adesuyi et al 2018).

Overall knowledge on health hazards in pesticide handling: The 48 per cent of the farmers have low knowledge category followed by medium (45%) knowledge level. A small number of vegetable farmers (7%) alone belong to a high level of knowledge. Similar results have been reported previously by Jallow et al (2017) and Adesuyi et al (2018). Likewise, most of the spray men are having medium knowledge level (59%) followed by low (36%) knowledge level. Only a few spray men are having high (5%) knowledge level. The majority (78%) of the input dealers are lying under the medium knowledge level followed by high (21%) and low (3%) knowledge levels.

Relationship between the demographic traits and knowledge levels of farmers, input dealers, and spray men: Among the demographic traits, age is having an inverse relation with the farmer's knowledge level. The findings are symmetrical to earlier researchers (Blanco et al 2011, Adesuyi et al 2018, Taghdisi et al 2019 and Pandher et al 2021) Whereas, experience, source of information, social participation, innovativeness, training undergone on safe handling of pesticides, risk orientation and perception about health risk are having a significant and positive relation with the knowledge level of farmers. Similar findings have been reported by Adesuyi et al (2018) and Jallow et al (2017). Likewise, among the selected demographic traits, age is having a significant but negative relation with the knowledge level of input dealers. In the meantime, the educational status, source of information, innovativeness, decision-making pattern, risk orientation, and perception about health risk are having a significant and positive relation with the knowledge level of input dealers. The findings are similar to Taghdisi et al (2019). Similarly, among the selected demographic traits, age is having a negative relation with the knowledge level of the spray men. In the meantime, educational status, experience, source of information, innovativeness, decision-making pattern, training undergone on safe handling of pesticides, risk orientation and perception about health risk are having a significant and positive relation with the knowledge level of the spray men. The findings are symmetrical to the findings of Mekonnen et al (2002).

CONCLUSION

The knowledge levels of farmers, input dealers and spray

men indicate that among the selected respondents most of the farmers is low. Most of the input dealers are having a high knowledge level and most of the spray men are having a medium level of knowledge. Very few respondents are having a high level of knowledge, even among them the contribution of farmers and spray men who are directly exposed to pesticides is very low. Suitable measures must be taken into consideration for enhancing the knowledge level of pesticide handling measures among the farmers, input dealers and spray men.

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