A Study
on
The Impact of Pesticides Used in Crops on SC/ ST Communities in Kerala

Conducted by

Dr. Ambedkar Chair in Social Justice
Indian Institute of Public Administration (IIPA)
I. P. Estate, Ring Road
New Delhi-110002

Sponsored by

सत्यमेव जयते

Dr. Ambedkar Foundation
Ministry of Social Justice & Empowerment
Government of India

Report
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C. Sheela Reddy
Chair Professor
Dr. Ambedkar Chair in Social Justice

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ABOUT THE CHAIR

The Scheme of "Dr. Ambedkar Chair" under the aegis of Dr. Ambedkar Foundation, Ministry of Social Justice & Empowerment, Government of India was started in 1993 in different Universities and Institutions all over the country to pay tribute and constructive homage to the memory of Dr. B. R. Ambedkar. Dr. B.R. Ambedkar Chair in Social Justice was set up at Indian Institute of Public Administration (IIPA) in 2004 to translate Dr. Ambedkar's ideas into practical propositions and policy instruments.

Since its inception, the Chair has been conducting research and capacity building workshops, lectures and seminars on the theme of social justice and the philosophy of Dr. B.R Ambedkar, focussing on issues such as social exclusion, inclusion and marginalisation, highlighting the plight of the disadvantaged. The Chair has produced quality publications and organised inter-chair dialogues to enrich studies on weaker sections, minorities, backward classes with the hope of weaving poverty-alleviation better into public policy.

In the past four years or so the Ambedkar chair has had the privilege to host eminent scholars to deliver Ambedkar memorial lectures. Among others, Prof. Sukhdev Thorat spoke on 'Social Justice in the Private Sector'; Dr. Narendra Jadhav delivered a memorial lecture on 'Dr. Babasaheb Ambedkar: Intellectual Colossus and National Leader; Prof. Ashok Modak spoke on 'Dr. Ambedkar's Vision and Mission', all within the scope of what Dr. Ambedkar struggled for.

Besides disseminating the ideas and thoughts of Dr. B. R. Ambedkar to students and scholars through seminars, workshops, dialogues and discussions, the Chair undertakes research and prepares course module/ curriculum in the line of Dr. Ambedkar philosophy and thought for sensitizing trainees at IIPA. It also sensitizes people of nearby locality and areas about the relevance of Dr. Ambedkar's ideas for the betterment of the poor and vulnerable sections of society. The Chair identifies and recognizes the contribution of activist/writers, those who made significant contribution for mobilization of marginalized sections of society and provides platform for sharing their ideas and experiences. The Chair has organized awareness camps to propagate the thoughts and writings of Dr. B. R. Ambedkar among masses.

The project entitled "The Impact of Pesticides Used in Crops on SC/ST Communities in Kerala" has been undertaken by the Chair as part of the activities for the year 2016-17. The present report is the outcome of the study.

Chapter 1

INTRODUCTION

Indian 'Green Revolution', touted as one of the greatest success stories in the world, with dramatic impact on the food security, was based on principles of intensive agriculture. Farming community have started using chemical fertilizers and pesticides since the advent of green revolution. The dominant pest control strategy over a period in the agriculture sector is the application of chemical pesticides. Pesticides are used to control insect pests, disease causing agents such as fungus or bacteria and weeds in farm fields. Today there is a worldwide awareness about the ill effects of farming that uses agrochemical inputs including chemical pesticides and fertilisers.[1]

The International Code of Conduct on Pesticides Management[2] defines pesticide as 'any substance, or mixture of substances of chemical or biological ingredients intended for repelling, destroying or controlling any pest, or regulating plant growth'. Most pesticides are chemical substances, which may be extracted from plants or may be 'synthetic'. The term pesticide covers larger chemical groups such as *insecticides* used to kill or control insects, *fungicides* used to kill or control fungi, *herbicides* or *weedicides* used to kill or control weeds, *rodenticides* used to kill or control rodents.

It is a fact that agrochemicals have contributed to short-term benefits in the agriculture sector during the initial periods of green revolution. But, they have also caused plenty of disastrous implications in agriculture, ecosystems, biodiversity, communities, and socio-economic sector. Among the various agrochemicals, which came into the farming sector, pesticides are the most dangerous ones. However, farming community has been using them as 'medicines' for crops. Based on the plenty of available scientific literature, it has been realized that chemical pesticides are dangerous and hazardous substances, with inherent potential to induce serious ill effects.[3, 4, 5]

Public health and environmental problems created by chemical pest control are receiving serious attention everywhere[6]. Pesticides are inherently toxic to living organisms, and therefore they are more likely to affect health of human beings[7]**.** Modern agricultural practices rely on huge agrochemical inputs for farm management. This results in the discharge of pesticides and chemicals, directly or indirectly, into the soil and water, contaminating them[8]. Persistence of certain pesticides and detection of residues of chemicals in the environment as well as in biological substances has become a global

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[1]Vijayalakshmi, K., T. D. Nirmala, Subhashini Sridhar and Arumugasami. 2007. Organic Paddy Cultivation, CIKS (Center for Indian Knowledge Systems), Chennai, pp: 1-64.

[2] FAO & WHO 2014. International Code of Conduct on pesticides Management

[3]Altieri M. A., C. I. Nicholls.2001. Ecological impacts of modern agriculture in the United States and Latin America. In: O. Solbrig et al (eds.) Globalization and the rural environment. Harvard Univ. Press, Cambridge, Mass,pp: 121-132.

[4] McLaughlin, Alison and Pierre Mineau. 1995. "The Impact of Agricultural Practices on Biodiversity." Agriculture, Ecosystems and Environment. 55: 201-212.

[5]Pimentel, David, Paul Hepperly, James Hanson, David Douds, and Rita Seidel. 2005. "Environmental, Energetic and Economic Comparisons of Organic and Conventional Farming Systems." BioScience. 55(7): 573-582.

[6]NasrineMoazami. 2008. Biotechnology – Biopesticide Production. Encyclopedia of Life Support Systems (EOLSS). UNESCO, pp: 1-3, 47-48

[7]World Health Organization & United Nations Environment Programme. (1990). Public health impact of pesticides used in agriculture. Geneva: World Health Organization. http://www.who.int/iris/handle/10665/39772

[8]Raizada R. B. and Diksith. 1992. Pesticides, Development, Toxicity and Safety Industrial Toxicology Research Centre, Luknow, India.

issue. Pesticides have entered the natural food chains, and contaminated ecosystem at all levels. Humans, being on the top of the food chain, are most vulnerable to health risks, as the intake of pesticides is several folds higher through the process of biomagnification (build up of toxins) in the food chain[9]**.** Health impacts on human population is huge, and multiple times.

The SC-ST communities constitute a significant portion of agriculture workforce. According to 2011 census, the total number of cultivators in Kerala is 6.68 lakh, while the total number of agriculture workers is 13.22 lakh. In Wayanad district, the number of cultivators and agriculture workers is 56,837 and 101,630 respectively[10]. A significant proportion of agriculture workers in Wayanad are from tribal communities. This study, particularly explores the impact of pesticides used in agriculture sector on the SC-ST (Scheduled caste – Scheduled Tribe) communities in Kerala.

1.2 Significance of the Study

The scientific literature vindicates that highly chemicalized agriculture and unscientific practices caused severe environmental damage and human health impacts. This is in addition to the vast array of problems including unsustainable farming, diminished productivity, depleting traditional knowledge and practices, farmer suicides, etc. The application of chemical pesticides has severe impacts on human health and environment and thereby affecting the livelihood options. There are several studies on pesticide use, however, those pertaining to the impact of such pesticides on the SC-ST communities are lacking.

The ST communities are various officially designated groups of historically disadvantaged ethnic communities in India. They are the indigenous communities who are traditionally been marginalized and not in the mainstream of the society. They are also known as adivasis, and are victims of social, political and economic exploitation. The indigenous communities are among the poorest, vulnerable and most marginalized groups in our society. Due to various factors like geographical and cultural isolation, low levels of literacy, primitive occupations and extreme levels of poverty, most of the tribal people remain at the lowest stratum of the society[11,12].

The indigenous communities represent significant agricultural workforce, who are often exposed to pesticides in various ways through their everyday life. As farmers, farm labour and residents on the farms and plantations, they use pesticides, inhale pesticide spray drift, eat food that is contaminated by spray drift, and drink water sources contaminated by pesticide sprays and soil runoffs. Studies on these lines are not available to assess the gravity of the issue. In such a scenario, being a vulnerable community, various implications of pesticides among SC-ST communities need to be studied and understood.

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[9]Amith Nair. 2000. Pesticides in India-environment and health source book. Toxics link, P: vii, 2-3, 48-49

[10]Keraral Government. 2013.Facts and Figures of Agriculture in Kerala 2013. http://www.keralaagriculture.gov.in/pdf/fact_figures_25062014.pdf

[11]India Ministry of Tribal Affairs. 2004. The National Tribal Policy: A Policy for the Scheduled Tribes of India. New Delhi: Ministry of Tribal Affairs;

[12]Subramanian SV, Davey Smith G, Subramanyam M. 2006. Indigenous Health and Socioeconomic Status in India. PLoS Med. 3:e421

ST communities constitute a major proportion of agricultural labour, who are invariably involving in spraying pesticides in the field. Wayanad, a northern district in Kerala with large population of ST communities has been selected for the study, where the level of pesticide application is very high. It is extremely important to study the impact of agrochemicals on these communities even as they are struggling to survive stress caused by the low wage and seasonal employment. Specifically, the health of pesticide sprayers is severely affected. Once impacted, they will have to go through expensive medical treatments as they experience serious illness, affecting their ability to work and earn. The expenditure on their health becomes a continuous burden. This causes economic, financial stress on these families, reducing them to miserable conditions.

Chapter 2

OBJECTIVES AND METHODS

2.1 Objectives

The broad objective of this study is to assess the pattern of pesticide use and related implications among SC-ST communities in Kerala. The specific objectives of this study are the following:

- To study the impact of pesticides on the health and economics of SC-ST communities in Wayanad district of Kerala.
- To focus on women and children in assessing such impacts.
- To document pesticidal impacts through various pathways, as also the kind of pesticides.
- To develop an argument for role of state in responding to such impacts.

2.2 Materials and Methods

2.2.1 Secondary Data

Secondary data was gathered from various sources such as Integrated Tribal Development Project (ITDP), Wayanad District, District office of SC Development Department in Wayanad, 2011 Census data, data from Agriculture Department as well as from Health Department. Population dynamics of SC-ST communities are compiled from Census data. Data on major crops grown in the study area as well as pesticides use was gathered from Principal Agriculture Office in Wayanad District, and from various publications of Agriculture Department as well as from Department of Economics and Statistics. An attempt was made to collect information on health status of SC-ST communities from District Medical Office in Wayanad, Community Health Centres as well as Primary Health Centres in the district. Details of pesticide poisoning cases and chronic health effects among SC-ST communities were also sought, but data was rarely available apart from those on cancer cases. Data on ST communities was obtained, but that of SC communities was not available separately as they have been recorded as part of data on general public. Additionally, data on cancer cases, total reported and those for ST communities in Wayanad has been collected from District Cancer Care Unit (DCCU) for the year 2017. Official data on state level pesticide consumption and pesticide poisoning report for Kerala were also utilized. The scientific literature was also explored to have an understanding of previous work on SC-ST communities and pesticide use, though nothing relevant could be obtained.

2.2.2 Primary Data

Prior to framing the field study, study team conducted discussions with officials in SC Development Office Wayanad and ITDP Wayanad to understand involvement of SC/ST communities in agriculture sector. According to them, SC communities constitute only a fraction of population in Wayanad district. Among them, only a small percentage are dependent on agriculture sector for livelihood, majority of them are dependent on other sectors. On the other hand, Waynad district has highest ST population in Kerala, and a great majority of the ST population is dependent on agriculture sector for livelihood, either as farmers or as farm workers. Hence, field data collection for this study is mainly focused on ST communities in Wayanad district.

2.2.3 Pilot Study

A pilot study was done. This study included informal discussions with about 50 individuals from ST communities in a tribal settlement. They were identified for their involvement in agriculture work and to get a picture of their daily life, nature of work, health implications, etc. Questionnaire for the field data collection was framed based on these discussions.

2.2.4 Field Data Collection and Sampling

Field data was collected from ST community settlements in three Gram Panchayts - Kottathara, Kaniyambetta, and Meenangadi in Wayanad district. These panchayats were randomly selected from list of panchayats dominated by ST population. ST settlements were identified after having discussions with agriculture officers and leaders in the Local Self Governments as well as ST promoters in the area. Information was collected from ST households as well as from individual farm workers. Households were selected randomly within a ST settlement. To select workers for data collection, purposive sampling was employed, considering their involvement in agricultural works including pesticide use. Thus, field data was collected from 50 households and 99 farm workers.

2.2.5 Tools of Data Collection

Data was collected through personal interviews with the help of questionnaires developed in Malayalam, the official language in Kerala. Two sets of questionnaires were developed one meant for households and the other for workers. For households, the senior most family member available in the house during survey was interviewed and responses were noted. Both close-ended and open-ended questions were included in questionnaires. The questionnaire for households contained 31 questions including demographic details and farming, involvement in agriculture works, pesticide use and related aspects in the areas close to household and health effects. The workers were interviewed either from their house premises, or from the field where they work. The questionnaire meant for workers contained 34 questions. Apart from demographic details, it contained questions on agriculture work undertaken, use of pesticides, training and awareness on use of pesticides and protective measures, pesticide exposure, and health effects. In addition to this, relevant information and observations noted during field study were also used.

2.2.6 Limitations

Lack of relevant scientific literature, specifically on impact of pesticides on SC-ST communities was the major limitation faced during the study. Beside, data on health status of SC-ST communities was not available, apart from data on cancer cases. Access to ST settlement was another problem, as it consumed considerable time for gathering field data. The language barrier was negligible as almost all the respondents were able to speak and understand Malayalam.

Chapter 3

PROFILE OF STUDY AREA

The area selected for the study is Wayanad district in Kerala. Wayanad is located between north latitudes 11° 26' 28" and 11° 58' 22" and east latitudes 75° 46' 38" and 76° 26' 11". The district came into existence on 1st November 1980. The name 'Wayanad' is derived from 'VayalNadu' which means the land of paddy fields. One of the unique features of Wayanad is that it is situated at a height between 700 meters and 2100 meters above the mean sea level[13]. It is nested among the mountains of the Western Ghats, and is bounded on the north by the Virajpet Taluk of Kodagu district, on the east by Heggadadevankote and Gundlupet Taluks of the Mysore district of Karnataka State and the Gudalur Taluk of Nilgiri district of Tamil Nadu, on the south by the Ernad Taluk of Malappuram district and Kozhikode Taluk of Kozhikode district and on the west by Quilandy and

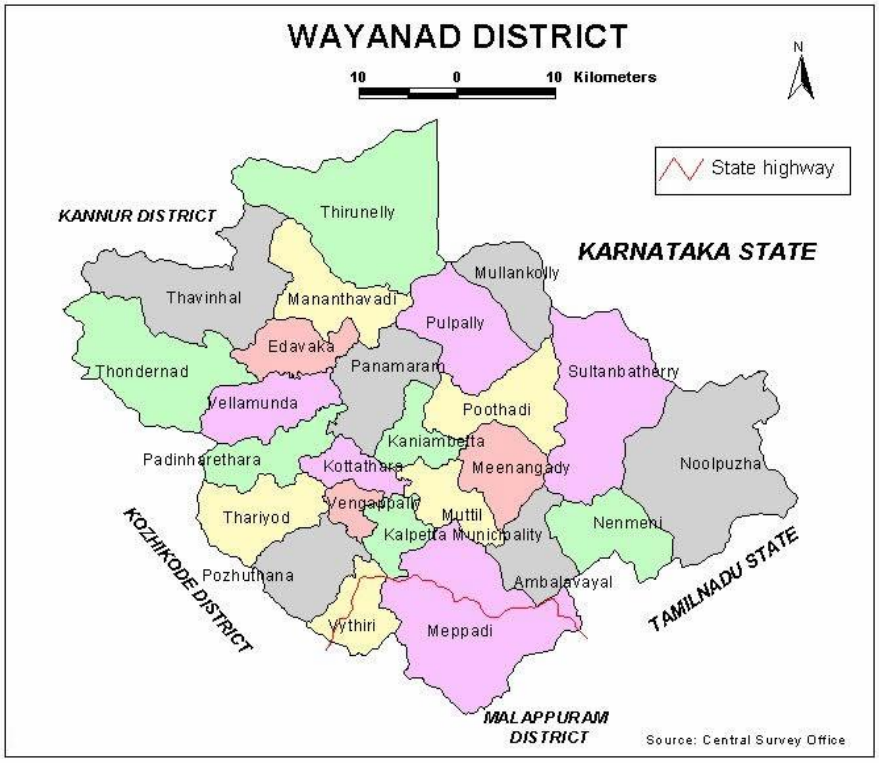


Figure 1: Map of Wayanad District, with Panchayat Boundaries

Badagara Taluks of Kozhikode district and Tellicherry Taluk of Kannur district[14]. The landscape is distinct because of its deep valleys, leading to a multitude of climatic and ecological conditions.

3.1 Population

Wayanad is one of the 14 districts in Kerala, with an area of 2131 sq. km. The people of Wayanad belong to Hindu, Christian and Muslim religions. According to the 2011 census, the total population is 817,420 of which male and female were 401,684 and 415,736 respectively. The population density is 384/ sq. km[15]. One important characteristic feature of this district is the

[13]District census hand book, Wayanad. 2011

[14]IIM. 2006. Wayanad Initiative: A Situational Study and Feasibility Report for the Comprehensive Development of Adivasi Communities of Wayanad. Centre of Excellence-Indian Institute of Management, Kozhikode,pp: 24-31

[15]District census hand book, Wayanad. 2011

large adivasi (ethnic communities) population[16]. Paniyas, Kurumas, Adiyars, Kurichyas, Ooralis, Kadans, Kattunaikkans are the different aboriginal tribes of Wayanad. The Kurichyar is the most developed among them. They are small land owners, whereas the members of other tribes are mostly labourers. Wayanad district stands first in adivasi population (about 36%) among other districts in the state. Until 150 years ago, the rich forests were only populated by tribal communities, adivasis. The culture of Wayanad is mainly tribal oriented[17]. But now, Wayanad has a large settler population. There are people from almost all parts of Kerala who migrated to this fertile land for building up their lives. The last few decades have seen the complete marginalisation of the indigenous people[18].

3.2 SC/ST Population in Wayanad

Wayanad district is in the bottom rank in terms of SC population and constitutes highest ST population in Kerala[19]. Tribal communities form 18.53% of total population in the district. According to 2011 Census[20], the population of Scheduled Castes in the District is 32578 (3.99%) consisting of 16406 males and 16172 females. This accounted for 1.07 per cent of Scheduled Caste population in the State. The population of Scheduled Tribes in the District as per 2011 census is 151443 consisting of 74476 males and 76967 females. This accounted for 31.24 per cent of Scheduled Tribe population in the State. Among the Scheduled Tribes in the District, the majority of main workers (60.47 per cent) are agricultural laborers. The ST communities are settled in segregated pockets across the district. They live in groups such as in colonies. Their culture and food habits are entirely different from the mainstream society. They gather various wild food resources from paddy fields, riverbanks, forests, open fields, etc. Apart from this, they also enjoy food supply from Public Distribution System (PDS).

3.3 Agriculture

Wayanad is basically an agrarian economy. More than 85 % of the district population is fully dependent on agriculture. Perhaps, Wayanad district is the single richest agro biodiversity centers of the state with a long history of agricultural and traditional practices. Historically, the agriculture in Wayanad was dominated by paddy, pepper, coffee and tuberous crops. The British introduced cultivation of tea and other cash crops by opening up the plateaus, simultaneously constructing roads across the mountainous profile. This infrastructure allowed settlers to migrate and turn virgin forest into cash crop estates. There has been a recent shift to highly intensive cash crop agriculture that has simplified the heterogeneity of the landscape to a significant extent resulting in the loss of flora and fauna[21]. Pepper, Ginger, coconut, tea, banana, paddy, etc. are the major crops in Wayanad district. Besides these, vegetables are also cultivated to some extent. Majority of the people depend on cultivation for their livelihood[22]. This agriculture-dependent population, as mentioned elsewhere, comprises cultivator and agricultural labour households. For agricultural operations in many parts

[16]Official web site of Wayanadhttp://wayanad.nic.in
[17]ibid
[18]ibid
[19]Gender Statistics 2016-17. Govt. of Kerala
[20]District Census Handbook, Wayanad. 2011
[21]MSSRF (M. S. Swaminathan Research Foundation) 2001. Agrobiodiversity crops: Catalysts of a community agro-biodiversity movement. MSSRF, Chennai.
[22]IIM. 2006. Wayanad Initiative: A Situational Study and Feasibility Report for the Comprehensive Development of Adivasi Communities of Wayanad. Centre of Excellence-Indian Institute of Management, Kozhikode, pp: 24-31

of India, agricultural labourers are drawn mostly from SC and ST groups[23], and Wayanad is no exception. Wayanad holds the first position in the state in the percentage of agriculture labourers to total workers (29.88%)[24].

The adivasi groups in Wayanad were subsisting on hunting, gathering and shifting cultivation[25]. However, the tribal economy has greatly transformed over the years[26]**.** Farming in Wayanad has gradually transformed from subsistence cultivation in 1960s to agriculture intensification until 1990s. Expansion of settled cultivation by immigrants during the mid 20th century forced adivasi communities to settle for sedentary cultivation (agriculture as practiced in one place by a settled farmer in which fields are not rotated) and gradually forced them to become agricultural labourers[27]. Excessive use of chemical pesticides and intensive use of chemical fertilizers started with agriculture intensification in the district.

Wayanad district is characterized by the cultivation of perennial plantation crops and spices, apart from food crops. The major plantation crops include coffee, tea, pepper, cardamom and rubber. Coffee based farming system is a notable feature of Wayanad. Coffee is grown both as pure crop and as mixed crop along with pepper. A variety of crops including annuals and perennials are grown in these smallholdings. The crops include coconut, arecanut, vegetables, tuber crops, drumstick, papaya, etc. and fruit trees like mango and jack.[28]

[23]Kannan 1998 Political Economy Of Labour And Development In Kerala Some Reflections on the Dilemmas of a Socially Transforming Labour Force in a Slow Growing Economy http://www.cds.edu/wp-content/uploads/2012/10/wp284.pdf.

[24]District Census Handbook Wayand. 2011

[25]Logan Williams. 1887. Malbar Manual. VolsI& II. Low Price Publications, New Delhi.

[26]Mahendrakumar M.S. 2016. Transformations of tribal economy in Kerala. Business sciences international research journal : volume 4 issue 1. 166-169.

[27]Suma T. R. 2014. Customary vs State Laws of Land Governance: Adivasi Joint family farmers seek policy support: the Case of Kurichya joint families in Wayanad, Southern India. International Land Coalition.

[28]http://wayanad.nic.in/agri.htm

Chapter 4

RESULTS AND ANALYSIS

4.1 Pesticide use in Kerala and Wayanad

According to official data obtained from Directorate of Agriculture, Kerala, all pesticides registered for use in India, except for those banned in the state and nationally can be used in Kerala. Hence, the same applies to Waynard district. As on June 2017, 279 pesticides are registered[29] for use in India. However, as per the official records of pesticide consumption data for the year 2015-16 in Kerala, obtained from Directorate of Agriculture, 50 chemical pesticides and nine bio/microbial pesticides are used in the state. Pesticide consumption data of major agrochemical categories in Kerala for the year 2015-16 is given in the table below.

Table 1: Pesticides Consumption Data

S No.	Pesticide group	Number of Technical grade products	Consumption (in Metric Tonne technical grade)
1	Insecticides	22	368.662
2	Fungicides	14	524.407
3	Weedicides	7	185.961
4	Rodenticides and Fumigants	2	1.66
5	Plant Growth Regulators	3	42.731
Total			**1123.421**

Source: Pesticide Consumption Data, Directorate of Agriculture, Govt. of Kerala

A 2012 study in Wayanad district showed that eight insecticides [Ekaleks (Quinalphos), Rogor (Dimethoate), Fenval (Dltamthrin), Acetaff (Azaphate), Malathion (Mercaptathion), Karate (Lambda cyhalothrin), Hostathion (Triazaphos), and Tatamida (Imidachloprid)], six weedicides [Bavistin (Carabdazim), Hinosan (Edifenphos), Phytolan(Copper oxychloride), Indofil (Mancozeb), Saaf (Carbendazim&Mancozeb), and Tilt (propiconazole)], and two weedicides [Fernaxan (2,4-D) and Gramoxone (Paraquat dichloride)] were used in paddy cultivation[30]. This study also showed that among these pesticides, 14 were highly hazardous, eight were carcinogens, and 6 were hormone-disrupting pesticides. An unpublished study in 2011 mentioned about 40 trade names of pesticides as used in paddy fields for different crops such as paddy, ginger, banana, etc. and most of them belonged to extremely hazardous, highly hazardous and moderately hazardous classes of World Health Organisation[31]. Several media reports raised concerns over high pesticide use in Wayanad, and it is reported that banned pesticides are also used widely[32].

[29]CIB&RC 2017, registered pesticides in India. www.cibrc.nic.in

[30]Dileep Kumar, C. Jayakumar, Shybu Jacob, P K Prasadan. 2012 Status of Traditional and Other Methods of Pest Management in Paddy Fields of Panamaram Panchayath in Wayanad District.Proceedings of Kerala Environmental Congress, P403.

[31]Anitha George. 2011. Health Implications of Pesticide Use of Paddy Fields in Wayanad and its Gender Perspectives. Thesis of MSc dissertation. Kannur university.

[32]The Hindu. 2013. Alarming rise in use of banned pesticides http://www.thehindu.com/todays-paper/tp-national/tp-kerala/alarming-rise-in-use-of-banned-pesticides/article5155839.ece

4.2 Pesticide Poisoning in Kerala

Pesticide poisoning includes accidental and self-consumption of pesticides. A pesticide poisoning report maintained by Agriculture Department in Kerala shows hundreds of poisonings happening every year. This data includes intentional poisoning (suicidal/homicidal), accidental and occupational poisoning cases. Among the total, the number of suicidal poisoning cases is more. Numbers of poisoning cases reported from 2009 to 2016 in Kerala are provided in the table given below. As this data lacks categorisation of SC/ST communities, to get data on such cases among them is difficult.

Table 2: Pesticide Poisoning Cases

Reporting period	Poisoning cases-survived	Poisoning cases - died
10/2009 - 3/2010	201	11
4/2010 - 9/2010	695	41
7/2011- 9/2011	696	56
4/2012- 9/2012	349	30
10/2012-03/2013	609	27
4/2013- 9/2013	103	1
10/2013-3/2014	233	1
4/2014- 9/2014	183	0
10/2014- 3/2015	276	32
4/2015- 9/2015	197	0
10/2015-3/2016	306	0
4/2016-9/2016	195	0

Source: Pesticide Poisoning Report, Directorate of Agriculture, Govt. of Kerala.

4.3 Health Effects Noted among ST Communities in Wayanad

An attempt was made to gather secondary data on health effects of SC-ST communities in Wayanad District Medical Office (DMO). From the DMO office, research assistants were directed to collect data from Pain and Palliative units in Primary Health Centres (PHC) and Community Health Centres (CHC) across Wayanad. The records show that the data has been recorded with categorisation for general public and for STs, and those on SCs are included in data meant for general. Apart from number of cases reported, especially the data meant for cancer cases and other data has not been availed.

The cancer cases reported in PHC/CHC in Wayanad district from 2011 were obtained, and are presented in the table given below. The data shows that 17.95% of the cancer cases reported was from ST communities.

Besides, cancer data for the year 2017 has been availed from District Cancer Care Unit (DCCU) in Wayanad. This data shows in total 1957 cancer cases have been provided treatment or refereed through the outpatient unit of DCC, in which 778 are from ST communities. This data shows that about 39.75% cases were reported from ST communities. An important point to be noted about the data is that, cancer cases for female population among ST communities are higher (61.83% among total ST cases) than that of total female cases (47.88%).

Further, research assistants for this study interacted with physicians in DCCU Wayanad on the

Table 3: Cancer Cases Reported in PHC/CHC in Wayanad District, Since 2011

Sl. no	PHC/CHC	Total cases Reported			ST total cases		
		Total cancer cases	Live	Death	ST total	Live	Death
1	Edavaka	293	117	176	**45**	**11**	**34**
2	Thonndarnadu	148	50	98	**36**	**8**	**28**
3	Padinjarathara	154	55	99	**56**	**13**	43
4	Kurukkanmoola	196	62	134	**39**	**6**	**33**
5	Vellamunda	118	78	40	**23**	**16**	**7**
6	Perya	217	129	88	**36**	**14**	**22**
7	Valad	221	135	86	**42**	**14**	**28**
8	Panamaram	235	98	137	**66**	**25**	**41**
9	Varadhoor	163	82	81	**57**	**18**	**39**
10	Valal	100	32	68	**15**	**3**	**12**
11	Thekkumthara	84	32	56	**12**	**4**	**8**
12	Thariyode	118	42	76	**21**	**4**	**17**
13	Vythiri	91	30	61	**4**		**4**
14	Pozhuthana	154	70	84	**52**	**23**	**29**
15	Muppainad	158	55	103	**21**	**9**	**12**
16	Kalpetta	252	99	153	**7**	**4**	**3**
17	Vazhavatta	61	25	36	**19**	**5**	**14**
18	Meenangadi	120	32	88	**22**	**8**	**16**
19	Batheri	260	118	142	**24**	**3**	**21**
20	Cheeral	115	29	86	**19**	**6**	**13**
21	Chulliyode	151	55	96	**23**	**7**	**16**
22	Noolpuzha	188	46	142	**57**	**9**	**48**
23	Poothadi	254	101	153	**39**	**8**	**31**
24	Pakkam	166	61	105	**27**	**8**	**19**
25	Mullankolli	172	82	90	**2**	**0**	**2**
26	Meppadi	117	81	36	**9**	**3**	**6**
	Total	4306	1796	2514	773	229	546

Source: Cancer cases reported in PHC/CHC in Wayanad district, since 2011

issue of cancer cases in the district. It has been noted that cancer cases have been mainly attributed to the use of tobacco. An important fact noted from the interaction is that other factors, such as role of carcinogenic agrochemicals was usually undermined.

4.4 Pesticides Reported from Field Study

A total of 23 brands of different pesticides, with nine fungicides, 13 insecticides and one herbicide have been reported from the study area. Nineteen of them contained single active ingredient, while four are combination products that contained two active ingredients in each of them. The total number of active ingredients noted among these brands is 20. The list of pesticides with use type and respective active ingredient are given in Table 4.

An analysis on the toxicity of the active ingredient reveals their potential to trigger a number of serious illnesses (see Table 5). Among the 20 active ingredients, 16 are highly hazardous pesticides as per the criteria set by Pesticide Action Network (PAN) International. Eleven of the 20 active

ingredients are neurotoxins that can damage nervous system and affect behavioural changes, 10 have carcinogenic potential (probable and possible carcinogens) that can trigger the deadly cancer disease, seven are reproductive toxins that can damage reproductive system and process, eight are developmental toxins having the capability to impair growth and development, and 13 are suspected endocrine disruptors having the potential to damage production and functioning of hormonal systems as well as trigger a vide range of health effects among human beings.

Table 4: List of Pesticides (As reported from field study)

S No.	Trade name	Use type*	Pesticide active ingredient
1	Bavistin	F	Carbendazim
2	Contaf	F	Hexaconazol
3	Coragen	I	Chlorantraniliprole
4	Ekalex	I	Quinalphos
5	Emisan	F	Methoxyethyl mercuric chloride
6	Fenval	I	Deltamethrin
7	Furadan	I	Carbofuran
8	Indofil	F	Mancozeb
9	Karate	I	Lambda cyhalothrin
10	Marshal	I	Carbosulfan
11	Neurocombi	I	Chlorpyrifos + Cypermethrin
12	Phytolan	F	Copper oxycloride
13	Radar	I	Bifenthrin
14	Rogar	I	Dimethoate
15	Roundup	H	Glyphosate
16	Saaf	F	Carbendazin+Mancozeb
17	Takumi	I	Flubendiamide
18	Taqat	F	Captan + Hexaconazole
19	Tata biltox	F	Copper oxychloride
20	Tata manic	I	Acetamiprid
21	Tilt	F	Propiconazol
22	Troban	I	Chlorpyrifos
23	Virat	I	Quinalphos + Cypermethrin

* F-Fungicide, I- Insecticide, H-Herbicide

Table 5: Toxicity Details of Pesticides (As Reported from Field Study)

Sl. No.	Pesticide	PAN HHP	Neurotoxin	Carcinogenic Potential	Reproductive toxin	Developmental toxin	Endocrine disruptor
1	Acetamiprid	-	-	-	-	-	-
2	Bifenthrin	x	x	x	x	x	x
3	Captan	-	-	x	-	-	-
4	Carbendazim	x	-	x	-	-	x
5	Carbofuran	x	x	-	-	-	x
6	Carbosulfan	x	x	-	-	-	-
7	Chlorantraniliprole	x	-	-	-	-	-
8	Chlorpyrifos	x	x	-	x	x	x
9	Copper oxycloride	-	-	-	-		x
10	Cypermethrin	x	x	x	x	x	x
11	Deltamethrin	x	x	-	-	-	x
12	Dimethoate	x	x	x	x	x	x
13	Flubendiamide	-	-	-	-	-	-
14	Glyphosate	x	x	x	x	x	-
15	Hexaconazol	x	-	x	-	-	-
16	Lambda cyhalothrin	x	x	-	-	-	x
17	Mancozeb	x	-	x	x	x	x
18	Methoxyethyl mercuric chloride	x	x	x	-	x	x
19	Propiconazol	x	-	x	x	x	x
20	Quinalphos	x	x	-	-	-	x
Total		16	11	10	7	8	13

Source: WHO Classification of Pesticides 2009, PAN Pesticide Database and PAN HHP list, Beyond pesticides, Extension Toxicology Network.

4.5 Observations from Survey Conducted among Households

4.5.1 Demographic Details of Respondents

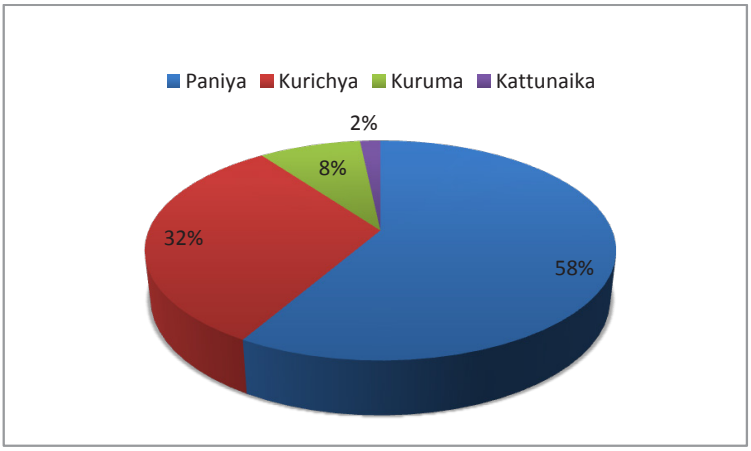
As part of this study, 50 ST households and 99 ST workers were interviewed separately. Demographic details of respondents and workers are presented separately.

In the case of household data, the interview was conducted with the senior-most member available in the household when research assistants visited there. Apart from the individual respondent who provided data, details of other members in the household such as age, education, occupation, etc. were also gathered. The total number of members in the interviewed households was 211.

4.5.2 Details of Households

The 50 households interviewed were distributed among four ST categories, such as the Paniya, Kurichya, Kuruma and Kattunaikka. Percentage wise distribution is given in chart 1.

Chart 1: Respondent Distribution-Category Wise

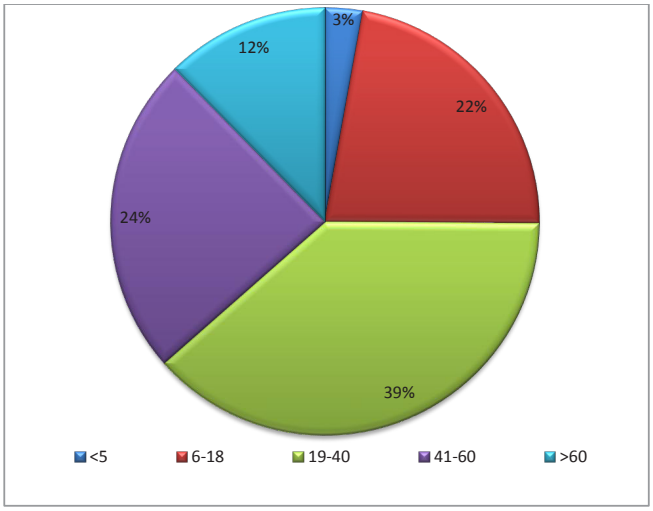


Out of the 50 households interviewed, 76% were belonging to BPL[33] category and the rest 24% belonging to APL[34]. The mean age of respondents is 48.14, with minimum 24 and maximum 79. Male respondents constitute 36% and the rest 64% were women. Average members in the household were four, with minimum one and maximum seven. Majority of the households (52%) own less than half an acre of land, with half of them less than 5 cents. Among the remaining households, 14% own land ranging between half an acre to one acre, and 10 % own more than one acre of land. Majority of the households that have more than half an acre of land were belonging to Kurichya category and were cultivators rather than workers.

4.5.3 Demographic Details of Members in Households

A total of 211 individuals were noted from the 50 households interviewed, with an average of 4 members. Among them, 52.61% were males and the rest were females. The mean age is 35.8, with minimum one and maximum 94. Age group wise distribution is given in chart 2, of them, 31.34% were illiterate. Of the remaining, 30.81% have studied up to V standard, 35.07% studied

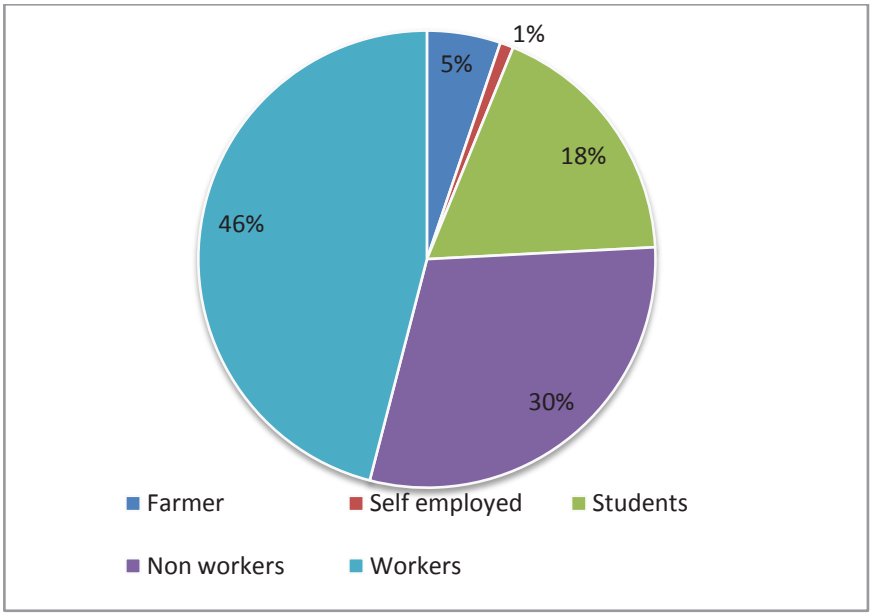
Chart 2: Age Wise Distribution of Individuals in the 50 Households



[33]Below Poverty Line
[34]Above Poverty Line

up to X standard, 6.16% studied up to XII standard, and 4.27% completed higher studies such as graduation or teacher training course. Occupation wise distribution in chart 3 shows that they belong to farmers, workers, non-workers, self-employed and students. Of the workers, 53.13% were men and 46.32% were women.

Chart 3: Distribution of Household Members with Respect to Occupation



4.5.4 Involvement of Workers from Households in Agricultural Work

Most of the workers in the households were daily wage workers. The crops in which workers involved for various farming activities are paddy, ginger, banana, coffee, black pepper and vegetables. Field preparation for planting, seed treatment, planting, inter-cultivation fertilizer and pesticide application, pruning, harvesting are the major works reported by the workers. Among the total households interviewed, 94% reported that one or more of the working family member is involved in various activities of pesticide use, such as mixing, loading, spraying or broad casting.

4.5.5 Food Habit of the Households

Almost all the households reported that they obtain food supply from the PDS[35] shops. Rice, wheat, and sugar are the major supply from PDS. Besides, many of them do cultivate food crops such as rice, banana and vegetables in their available land, which would have supplemented the PDS contribution. Further, they also source some food articles such as pulses, meat or fish, eggs, and vegetables from open market. An important feature noted from the households is that they gather/ forage some wild food articles. It includes wild un-cultivated herbs, often known as uncultivated leafy vegetables, obtained either from farm fields, paddy field, village road sides, river banks, forest, etc. Nearly 20 different varieties of such herbs have been reported in this study, which could have provided a significant part of their nutritional requirement. Additionally, some households, especially those belong to paniya category reported that they collect crabs, and molluscs from paddy fields and areas nearby as well as from marshy areas.

[35]Public distribution system

4.5.6 Availability of Gathered Food Items

Data obtained from the households reveals considerable reduction in availability of gathered food items, especially wild leafy vegetables, molluscs and crabs. All the respondents have pointed the facts that nowadays wild leafy vegetables have reduced greatly both in terms of number and abundance, especially those that used to gather from paddy fields and roadsides. Among the households, 90% reported that pesticide application; especially weedicides are the major reason for diminishing of their food resources. They complained that in the recent years use of weedicides has increased manifold and are applied in paddy field, banana fields, along the roadsides, etc. which immediately kill the 'so called weed'. But, for the adivasi communities many of weeds are part of their daily diet or herbs for home remedy. It is reported that apart from wild leafy vegetables, local fish, edible molluscs or frogs and crabs also have reduced significantly, 68.75% (for fish) and 100% (both for edible mollusc/frog and crab) of the respondents reported low availability and attributed that pesticides are the reason for this.

Many of them recalled that during earlier days when pesticide use was very little, they used to get plenty of such resources to meet their food requirement. About 16% of households reported that recently they stopped gathering of such food resources, due to concerns of contamination of poisonous chemicals and health effects. Two per cent of the household reported ill effects such as headache and vomiting after having consumed wild leafy vegetables a few months back. When asked about further information on from where they gathered it, they recalled that it was from a banana field near to their house. They further added that two days after they collected leaves, they have noted grass in that area was burnt as result of weedicide application, and realized that they might have picked the leaves after the weedicide spray has done.

Table 6: Usage and Availability of Gathered Food Resources

Category of food resource	Percentage of respondents reported usage	Percentage of respondents reported diminished availability	Percentage of respondents (of those reported diminished availability) attributed pesticide use as reason
Wild leafy vegetables	100%	100%	90%
Local fish	62%	62%	68.75%
Edible molluscs / frogs	24%	24%	100%
Crabs	56%	56%	100%

4.5.7 Factors Contributing to Residential Exposure to Pesticides

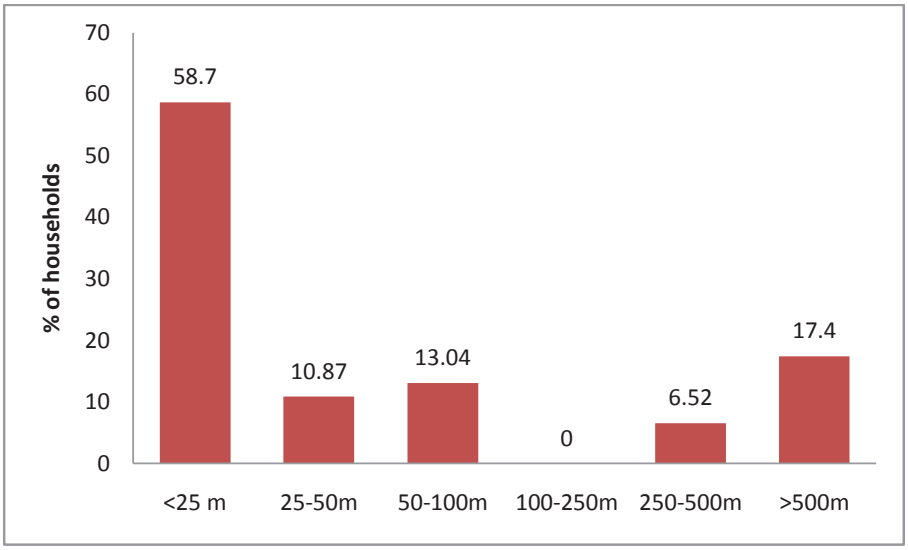
In order to understand the various factors contributing to exposure to pesticides in the household, details on distance between households and nearby agriculture field as well as source of household water usage were explored.

4.5.8 Distance between Households and Agriculture Field

Data collected from households for this study shows that many of the tribal settlements are located very close to or within agriculture fields. Out of 50 households, 92% have provided data on distance between their household and nearly agriculture field where pesticides are applied, and

are presented in chart 4. Majority of households (59.7%) were located very close the agriculture field, within 25 meters, posing highest risk of exposure. While, 10.87% were located between 25 and 50 metres, 13.04% were located between 50 and 100 meters from agriculture field. Further, 6.52% were located between 250 and 500 meters, 17.4% were located more than 500 meters away from agriculture field.

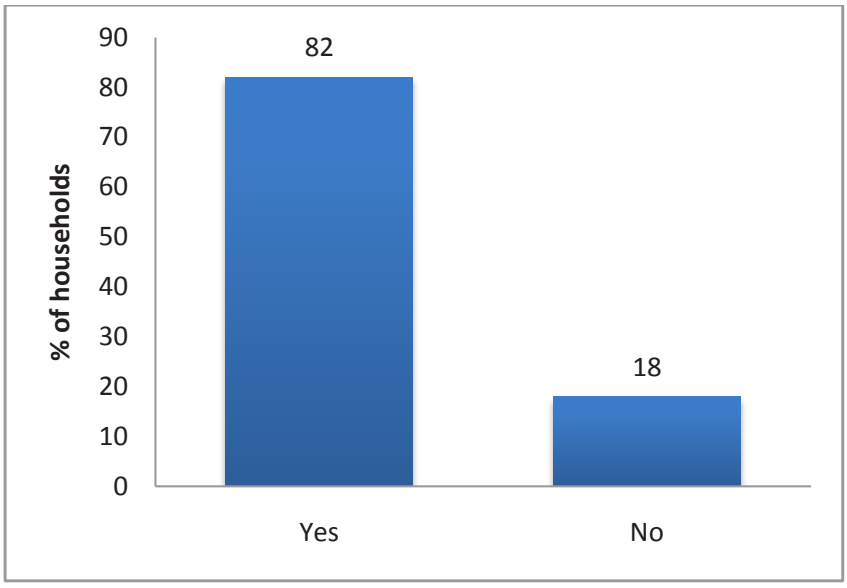
Chart 4: Distance between Households and Agriculture Field



4.5.9 Pesticide Application in Agriculture Field near to Households

Field data shows that pesticides are being applied in agriculture fields close to the ST households. Banana, ginger, paddy, areca nut (a kind of nut/ supari), tapioca and vegetables are the major crops grown near to field close to ST settlements. According to the respondents, pesticides are applied mainly during the period between August and December. Most of the respondents (82%), as shown in chart 5 reported that pesticides such as insecticides, fungicides, and weedicides are widely applied

Chart 5: Pesticide Application in Agriculture Field near to Households



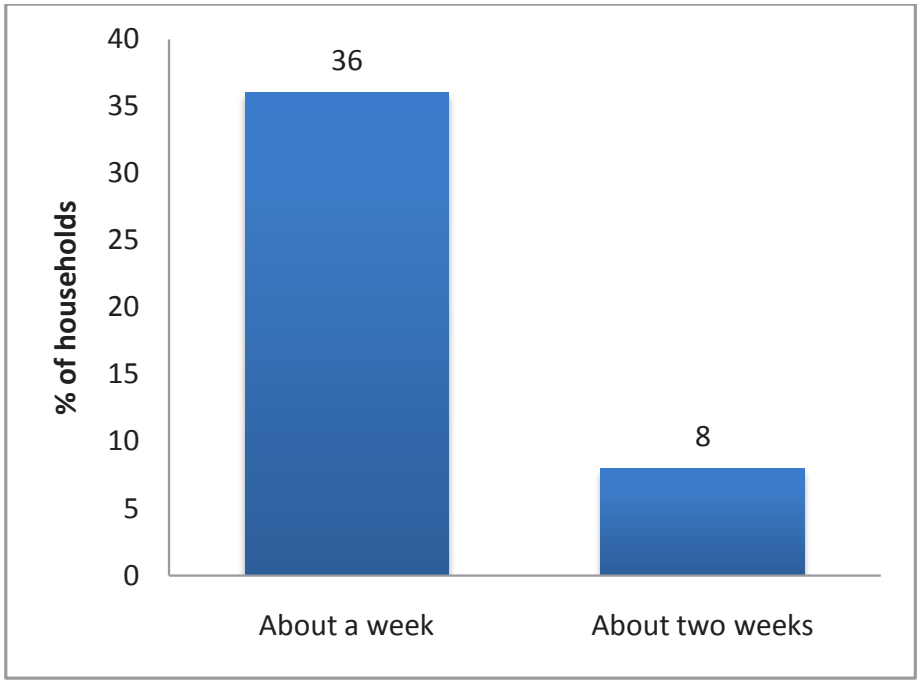
on them. Respondents in 44% of household reported three to five times of pesticide application, 18% reported two times of application and 10% reported pesticides were applied many times in fields nearby their house in the previous year. Many of them are not aware of the name of pesticide being used near to their settlement. A few of the respondents said name of three insecticides (ekalux, rogor and furadan), one each of fungicide (emisan- biochemical compound used to kill parasitic fungi) and weedicide (roundup). An analysis showed that the insecticides belong to organophosphate category that has high neurotoxic effects. The fungicide is a mercuric compound, that too of high toxicity for carcinogenicity and reproductive or developmental toxicity. The weedicide was round up, which recently has been classified as probable carcinogen by the International Agency for Research on Cancer.

4.5.10 Suffering from Foul Odour of Pesticides from Nearby Fields

As many of the pesticides do have foul pungent odour, residents experience the same following the application in nearby fields. Respondents in 48% of households reported foul smell following application of pesticides in the field close to their house. Such odour is reported to have experienced right from the application of pesticides and in the following days. Respondents in 36% households said that such foul odour is experienced for about a week, while 8% said the odour continues for about two weeks as shown in chart 6. Respondents in about 10% of the households reported ill effects such as nausea, vomiting, headache and burning sensation in eyes following pesticide application in fields close to their settlement. Experiencing foul smell, and manifestation of ill effects as mentioned above is a direct indicator of exposure to pesticides.

Residential exposure to pesticides should be a matter of prime concern as household includes individuals of different age groups, ranging from new-borns, children, adolescents, pregnant or breast-feeding women, to senior citizens. Besides, their health status would be varied. The age

Chart 6:Households Reported Experience of Foul Smell of Pesticides



and associated health status makes them vulnerable to exposure risks. Therefore, distance between household and nearby agriculture field is a major factor that could lead to residential exposure to pesticides for household members. In summary, those living close to agriculture field would have higher risk of exposure from pesticide applied in the field. This exposure would mostly be due to unintentional inhalational exposure and wind drift.

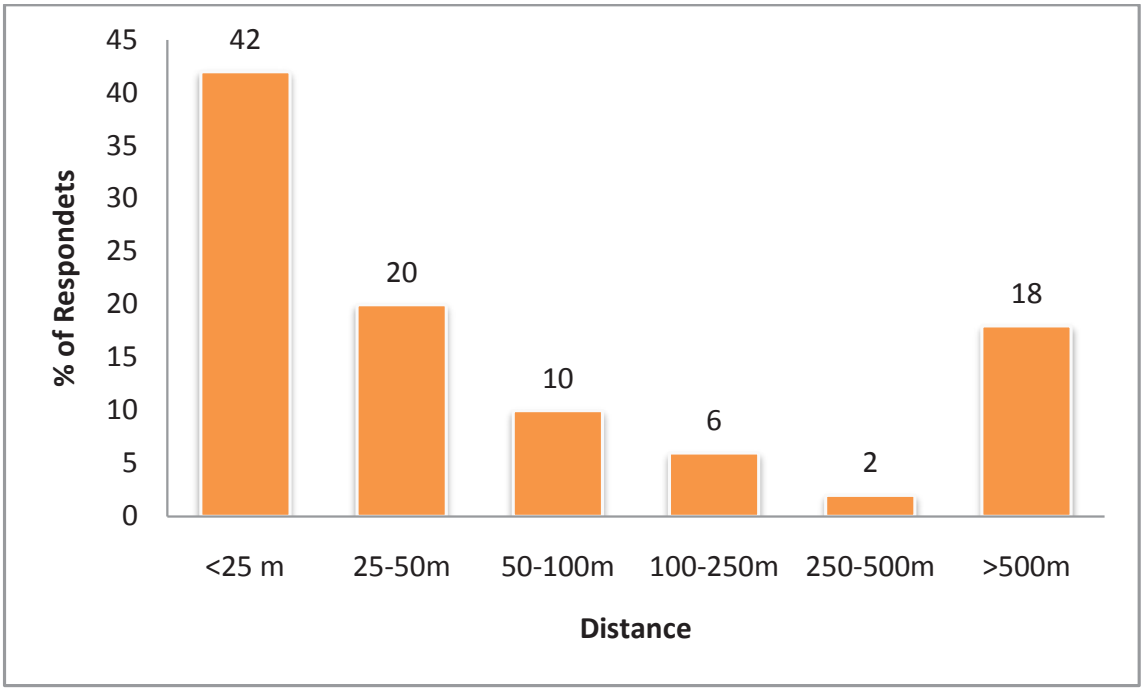
4.5.11 Risk of Contamination of Water Used for Household Activities

The sources of water used for household activities including for drinking were public water supply from water authority / jalanidhi or open well. Respondents in 34% households said that they depend on water authority / jalanidhi supply and 64% households said they depend on open wells as sources of water, the rest 2% did not provide data for this question. Some households use both sources to meet their water requirement.

4.5.12 Distance between Source of Water for Household Use and Agriculture Field Where Pesticides are Applied

The distance between source of water for household use and agriculture field where pesticides are applied may have an effect on water contamination. Respondents reported that pesticides are applied in field close to water sources. About 48% of the respondents said that they noted pesticides are applied three to five times, 4% noted two times of application in year. The application usually happens between June and December, which is also the period where downpour happens; due to which runoff contamination can also happen. The distance between water source and agricultural field were recorded during the survey, as provided by the respondents. Percentage of households with respect to source of water and distance from nearby agriculture field are given in chart 7. Majority of the water sources are very much close to farm field – 42% are with 25 meters, 20% are within 25-50 meters, 10% are within 50-100 meters. While, 6% are within 100-250 meters, 2 % of them are within 250-500 metres and the 18% are located more than 500 meters away.

Chart 7: Distance between Source of Water for Household and Agriculture Field where Pesticides are Applied



It is important to assess the details of source of water used for household activities including for drinking, as most of the households are located close to agriculture fields. The risk of contamination increases as the distance between water source and nearby agriculture field where pesticides are applied decreases.

4.6 Observations from Survey Conducted Among ST Workers

4.6.1 Demographic Details of Workers Involved in Pesticide Application

This survey interviewed 99 respondents who have been involved in various activities in agriculture sector. Among them, 81.81% were men and rest were women. Most of them were hired workers, mainly dependent on agriculture sector for livelihood. A community analysis shows that 66.66% of the respondents were of Paniya, 32.32% were of Kurichya and 1.01% was of Kuruma community. Among them, 88.88% were involved in activities related to pesticide use. Classification of respondents based on age and educational attainments are provided in charts 8 and 9. The average

Chart 8: Age Wise Distribution of Respondents

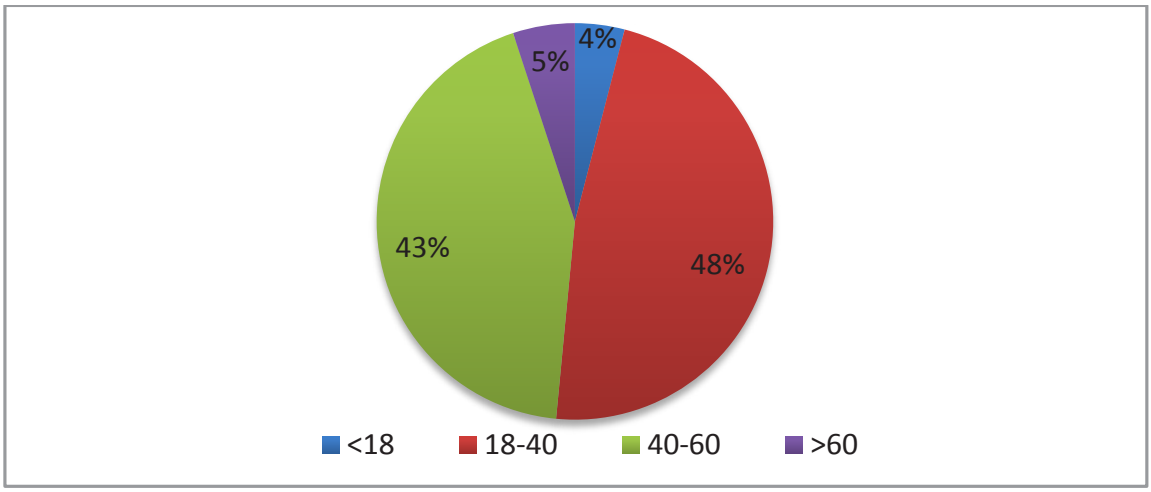
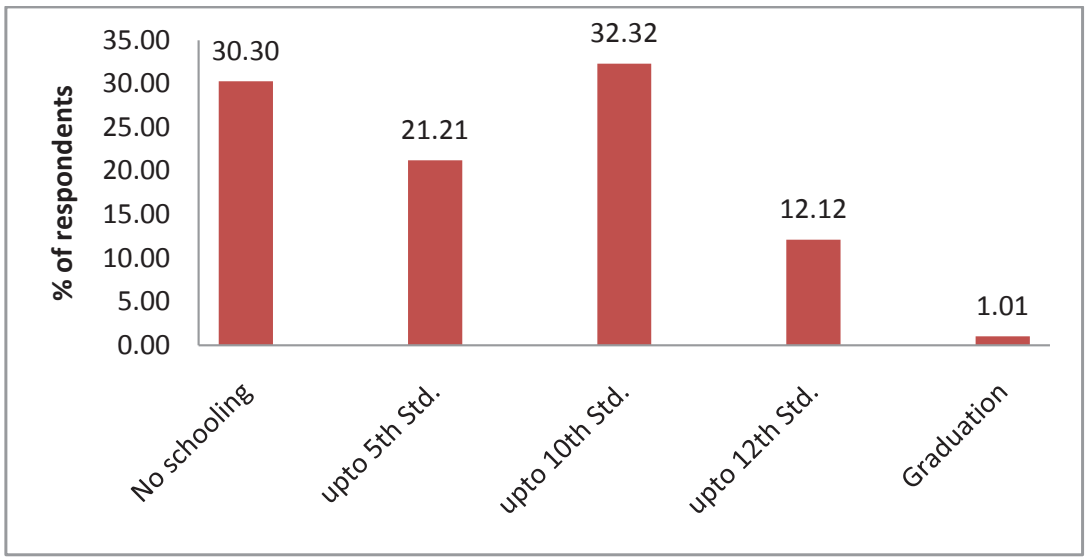


Chart 9: Educational Attainment of Respondents



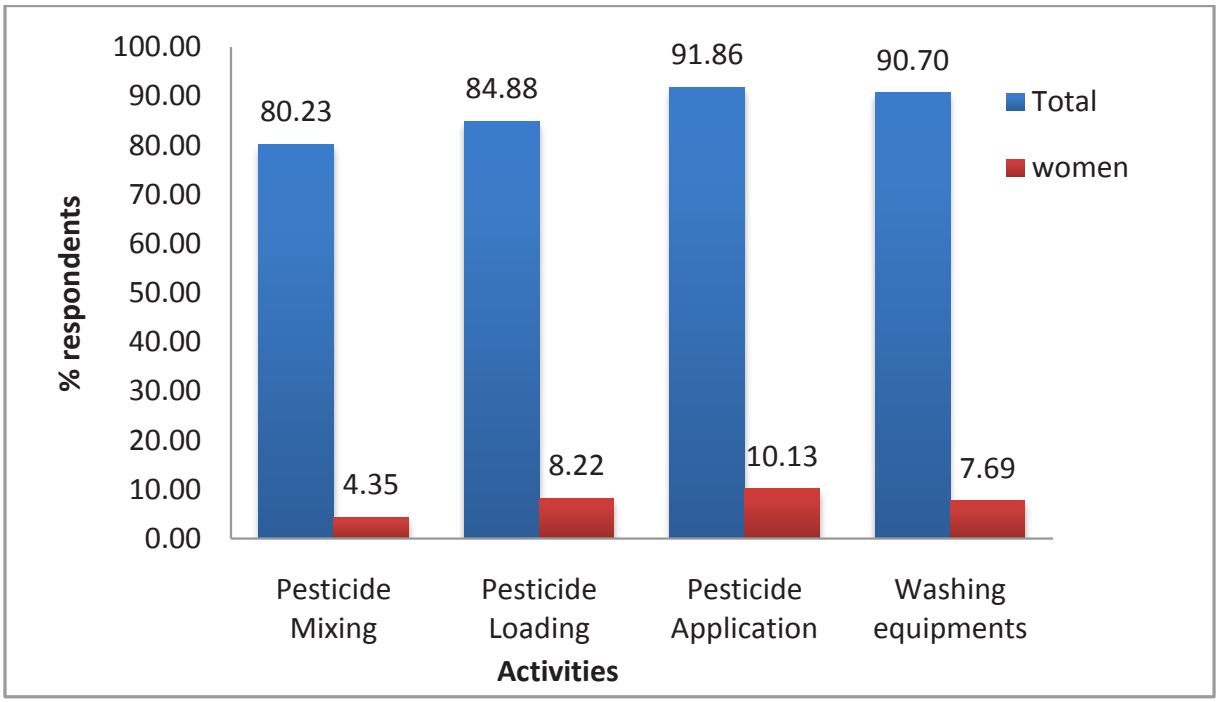
age of respondents is 40.76 years, with minimum 16 and maximum 70. Age wise distribution shows four per cent respondents are less than 18 years, 48% belong to age group of 18-40, 43% to age group of 40-60 and 5% are more than 60 years. Analysis on educational attainment reveals that a 30.3% did not have schooling at all. Further, 21.21% have studied up to V standard, 32.32% studied up to X standard,12.12% up to XII standard and 1.01% studied up to graduation. Majority of the respondents (66.66%) have 10-40 years of work experience in agriculture sector, 10.01% have an experience up to 10 years and the rest have more than 40 years. Apart from 13.13% respondents, all (86.86%) reported that they have been part of agriculture activities where pesticide use was involved. Majority (53.49%) reported that they have worked with activities involving pesticides for about less than 10 years, while 26.74%% reported about 10-20 years, 13.9% for about 20-30 years and the rest for more than 30 years.

4.6.2 Activities Involving Pesticides in Agriculture

Use of pesticides has become an unavoidable part of agriculture nowadays. Because of lack of proper awareness among farming community, pesticide usage has become a part of farming culture. Farmers are caught in pesticide trade mill, and huge use of pesticides is prevalent in our production systems. Need based spraying is not happening as recommended by Institute of Palliative Medicine (IPM). Farmers fear about crop loss if they do not use pesticides. The major crops in which pesticides are applied as reported by most of the respondents in this study are banana, ginger, rice and areca nut. Coffee, rubber and tea are the other crops reported in the study. In addition to insecticides, herbicide application is common for crops such as banana, ginger, coffee, rubber and areca nut.

There are four major farm activities that involve pesticides use; they are pesticide mixing, pesticide loading, pesticide application, and washing the equipments used. All these four activities have been reported in the current study. Chart 10 shows percentage of respondents who are involved in these

Chart 10: Percentage of Respondents Involved in Pesticide Use Activities



various activities. It has been noted that more than 80 % of the respondents have been involved in each of the activities. Women workers are also noted as being working on such activities, including one under less than 18 years of age. They mark 10.13% for application, 8.22% for loading, 7.69% for washing equipments, and 4.35% for mixing. Most of them are from Paniya community.

The share of work time per day for each of the activity varies considerably when they are hired for work. In the case of pesticide mixing, it usually takes half an hour to nearly two hours. Field data shows that most of the respondents have mentioned half an hour for this. It has been reported half an hour to two hours for pesticide loading, which involves carrying pesticides from storage site to farm field, and carrying from site of mixing to the site of application. However, pesticide application takes more time. 60.46% respondents reported full day working on application, often six to eight hours of work. For washing equipments used for spraying, mixing, etc., it takes less than an hour. This is a common pattern observed and during farming season on an average two to three days per week are reported by respondents working with pesticides.

4.6.3 Worker's Awareness on Pesticides Use

Awareness on pesticides is a crucial factor for workers as they are dealing with chemicals that have inherent potential to cause health effects. This study shows that majority of the respondents have low level of awareness as shown in charts 11 and 12 on pesticides as well as safety measures especially, Personal Protective Equipments (PPE). Majority of the respondents, 89.9% and 93.94%

Chart 11: Survey Results on Questions Asked About Training on Pesticides and PPE Use

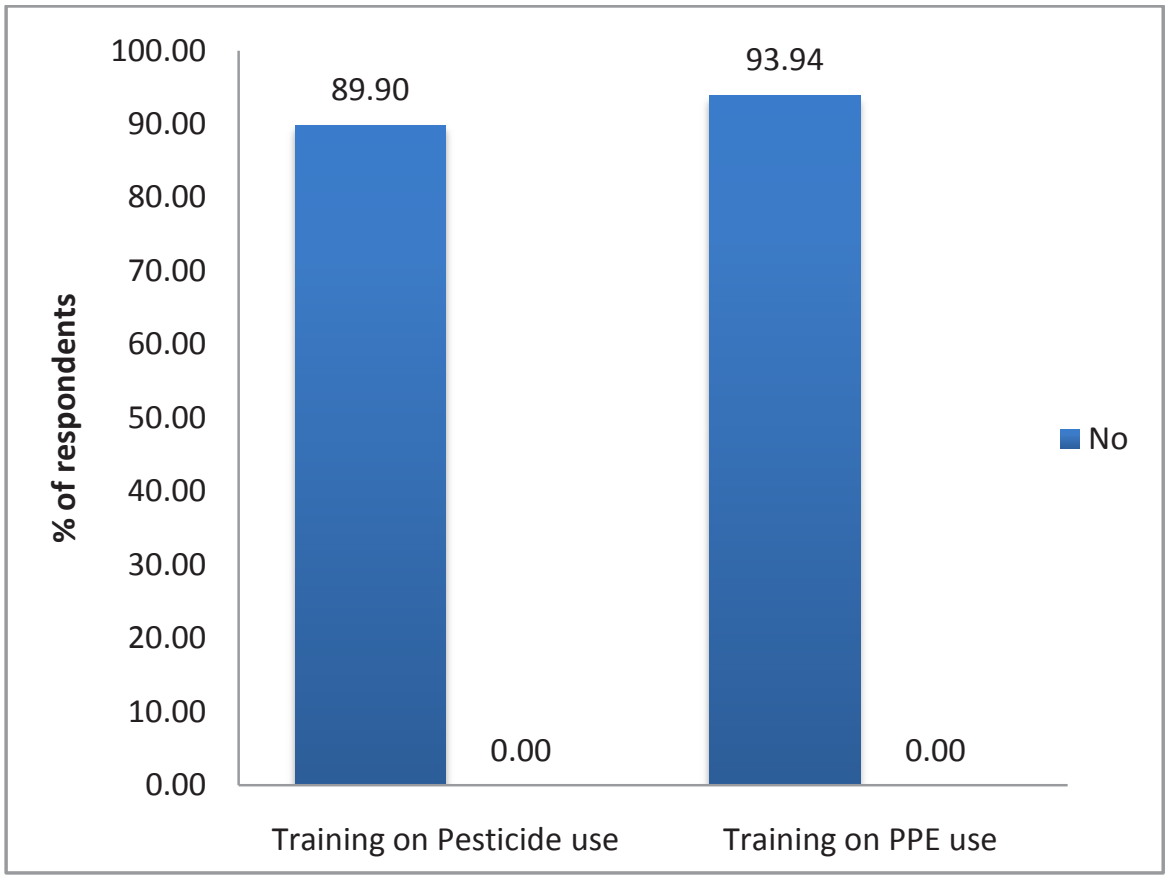
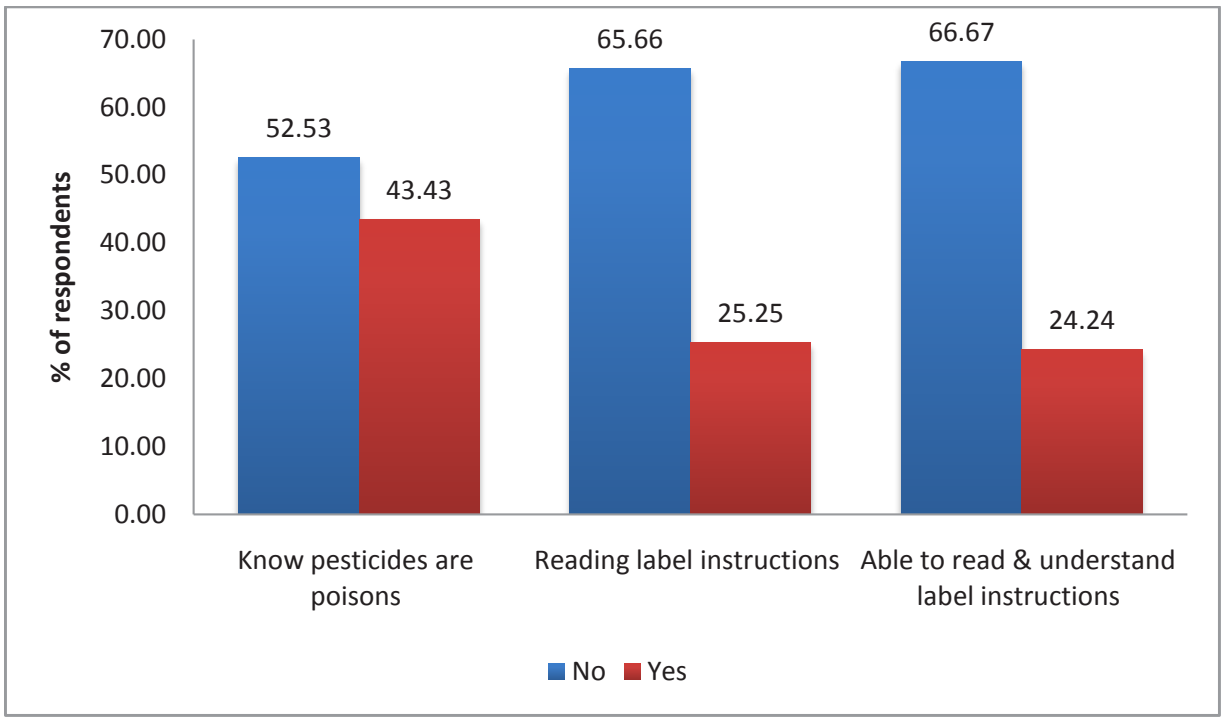


Chart 12: Survey Results for Questions on Awareness

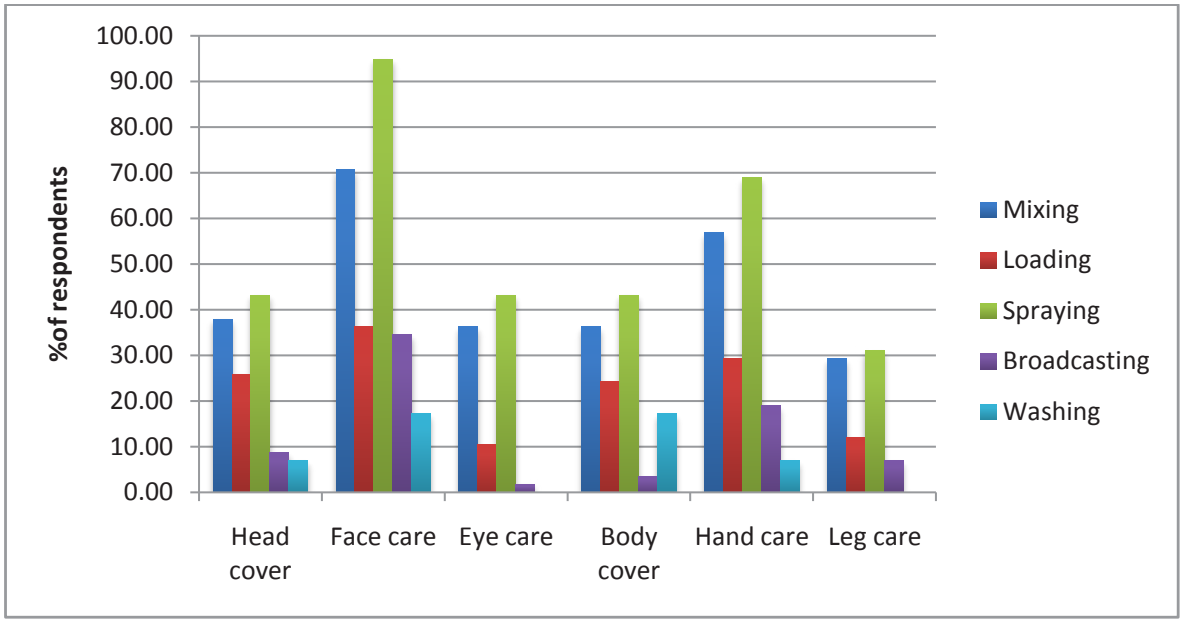


reported that they did not avail training respectively on pesticide and use of safety measures such as PPE. About 52% respondents said that they do not know pesticides are poisons; 65.66 % reported that they did not read the pesticide label instructions, while 66.67% reported that they are unable to read and understand the label instruction. In majority of the cases, the label instruction is provided in English or Malayalam.

4.6.4 Use of Safety Precautions and Use of PPE

As pesticides are inherently hazardous substances, use of safety precautions is inevitable while handling pesticides. However, field data shows that the recommended safety precautions including Personal Protective Equipments (PPE) are not followed as required. When asked about whether they use PPE while working with pesticides, 85.85% respondents have provided answers. Among them, 68.24% respondents replied 'yes' while the rest 31.76% replied 'no'. Further questions revealed that most of those who have replied 'yes', reported use of gloves, and a few have reported use of facemask. An analysis reveals that properly recommended personal protective measures are not used. Only minimum set of protective gears have been used by the respondents, mostly gloves. Hence, the protection offered by use of such gears is very much insufficient. A few respondents said that they use facemask or wrap a cloth around their mouth and nose to keep away the foul smell. Use of protective gears reported with respect to various activities involving pesticides are presented in chart 13. Among them, maximum usage has been noted for spraying followed by mixing.

Chart 13: Survey Result of Use of Personal Protective Equipments



4.6.5 Use of PPE while Working in Sprayed Fields

With regard to use of PPE while working in pesticide sprayed fields, 84.84% respondents reported that they do not use, while 2.02% reported that they use PPE sometimes. When asked about the time gap (re-entry) between entering into a sprayed area for work after the spray, majority of respondents (45.45%) reported 'immediately after the spray'; 10.1% each reported next day and after two days, while 24.24% reported after a week. Applying fertilizers, harvesting, inter cultivation, etc. are the activities they have to do in such cases.

Regarding provision of PPE, 65.66% respondents reported that farm owners do not provide them with PPE, while 19.19 % reported gloves and masks are provided occasionally, and the rest did not responded to the question.

Table 7: Re-entry Period and % of Respondents

Re-entry time after spray	**% of respondents**
Immediately after Spray	45.45
Next day	10.10
After two days	10.10
After a week	24.24

4.6.6 Exposure to Pesticides

About 68% respondents reported that they are exposed to pesticides mainly during spraying and loading. Most of them reported that they felt spray mist on their body parts, and felt head ache, nausea, burning sensations, itchy skin, abdominal pain, etc. during such times. As many of the respondents does not consider wind direction while spraying, incidents of spray mist blowing to applicators face or body is common. About 84% of respondents said they do not consider wind directions. Besides, time of pesticide application and duration of working with pesticides is also

an important matter that decides the extent of exposure to pesticides. About 40% of respondents reported that most of the spraying is done during morning time, and about 36% reported they spray pesticide for the whole day. About 6% noted spraying pesticides during evening. It is also a fact that taking food, smoking, chewing of beetle nuts, etc. while spraying can also result in higher exposure to pesticides. Additionally, it was also reported that containers of pesticides are used for various household activities such as storing food items, vessels for water use, in toilets, etc. which pose exposure risk.

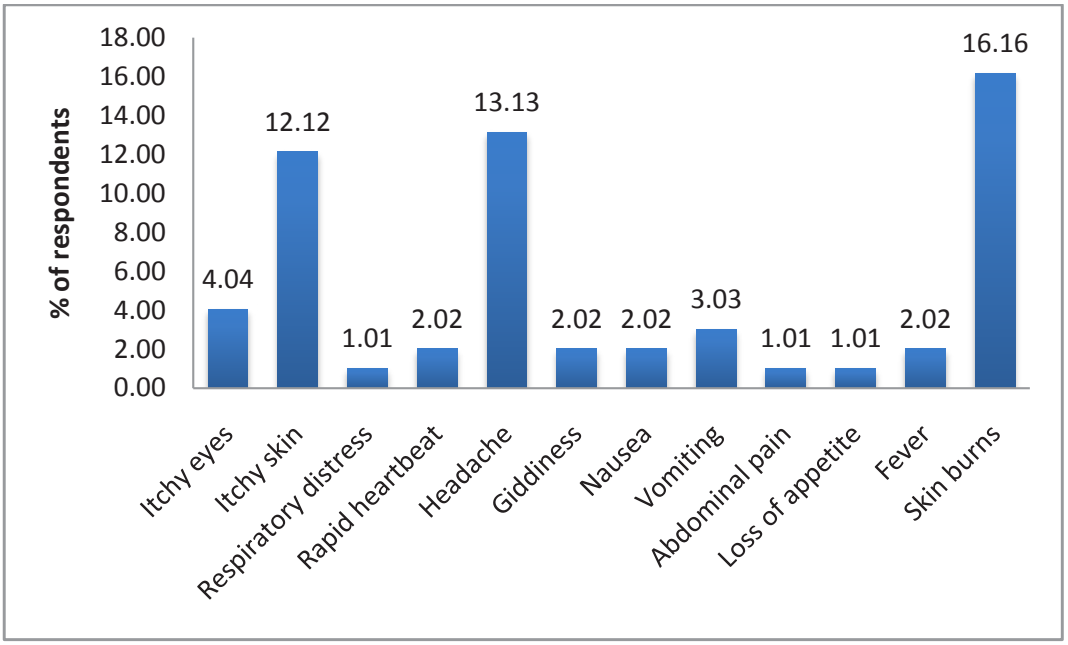
4.6.7 Involvement of Children and Women

During the field study, it was reported that women and children are involved in application of pesticides as well as working in sprayed field, often without using required safety precautions. Women are involved in pesticide mixing, loading and washing equipments, while children in mixing and loading. Further, it has been noted that women are mainly involved in working in sprayed field, such as fertilizer application, inter-cultivation, weeding, harvesting, etc.

4.6.8 Health Effects Reported

This study has reported a number of health effects among the workers. It has noted itchy eyes, itchy skin, respiratory distress, rapid heartbeat, headache, giddiness, nausea, vomiting, abdominal pain, loss of appetite, fever, and skin burns. Among them, skin burns, headache, itchy skin and eyes were the commonly noted symptoms. Though these symptoms are of the common type, the acute health effects caused by pesticide exposure are shown in chart 14.

Chart 14: Health Effects Reported in the Study



The health of ST communities in Waynard district has affected acutely and adversely due to exposure to pesticides. There are many factors contributing to residential exposure to pesticides. This may be due to pesticide application in agriculture field near to households resulting in contamination of food and water the inhabitants consume. Besides this, lack of workers awareness on pesticides use, Personal Protective Equipments (PPE) compound the problem further.

Chapter 5

CONCLUSION AND RECOMMENDATIONS

Kerala is home to a number of adivasi communities. Many of them are socially and economically marginalised. They constitute significant proportion of agriculture workforce in the State. Nowadays, use of synthetic pesticides has become the dominant pest control strategy in agriculture sector and the official records on pesticide use in Kerala shows an increasing trend. Being a major workforce, adivasi communities are commonly involved in various agriculture operations that involve pesticide use. Wayanad district in Kerala is basically agrarian in nature and harbours highest proportion of ST communities in the State, and most of them are involved in agriculture operations. ST communities are never provided with awareness and training on various health and environmental problems of pesticide use as well as the required safety measures. This makes them vulnerable to exposure to hazardous chemicals, which can trigger serious health implications. Field realities show that pesticides are applied in farm fields, very close to ST settlements, who are exposed to pesticides through the air they breathe and the water they consume. Further, while handling pesticides, workers never provided with the recommended Personal Protective Equipments. This results in higher risk of exposure to pesticides via inhalation and contact. Use of pesticides can contaminate various uncultivated food resources that these communities depend on which further pose the risk of exposure via food. Often, women and children are at high risk of exposure to pesticides.

The ill effects of pesticides can be manifested immediately after exposure or after a long period. An analysis shows that some of the pesticides they spray are able to cause severe health effects that ranges from neurotoxic effects, cancer, hormone disruption, reproductive and developmental effect, etc. The health care system in the district is not really concerned about these facts. Unless stringent measures are implemented targeting elimination of toxic pesticides and promotion of alternative non chemical ways of pest control, the ST communities would experience and suffer from acute and chronic health effects due to exposure to pesticides, often which are unable to cure. As they are economically disadvantaged groups, they would not be able to get a better health care facility. Therefore, stringent actions from authorities concerned are required to safeguard ST communities from the ill effects of pesticides.

Recommendations

Poverty and health are interlinked. Unless, a safe, secure and reliable means of livelihood is ensured to the SC/ST communities, they would be forced to be employed in hazardous circumstances risking their lives. The study based on the analysis makes some recommendations to Agricultural Department, Tribal Development Department and Health Department.

5.1 To Agriculture Department

1. Use of highly hazardous pesticides has to be eliminated at the earliest and replaced with non-chemical pest control practices based on agroecological principles.
2. Farmers and farm workers including adivasi communities have to be given proper awareness on pesticide use and the risks associated with.
3. Farmers and farm workers including adivasi communities have to be provided with adequate training on safety measures and use of Personal Protective Equipments while handling pesticides.

4. Use of all types of chemical pesticides including insecticides, fungicides, herbicides and plant growth regulators has to be prohibited in the vicinity of human settlement areas so as to prevent unintentional exposures via air and contact.
5. Promote organic farming or cultivation based on agroecological principles, and empower farming community with technical information on how to make shift into such farming practices that does not rely on agrochemical inputs.

5.2 To Tribal Development Department

1. Create awareness among adivasi communities about the risks of working with hazardous chemicals and ensure that they are protected from exposures to chemical pesticides and dangerous agrochemicals at their residential areas as well as work sites.
2. Proper monitoring has to be done in adivasi populated areas to ensure that they are not forced to work in dangerous conditions where hazardous agrochemicals are used.
3. Strict surveillance systems has to be implemented to prevent adivasi communities being exploited by landowners and farmers by giving gift in kind and making them to work in dangerous farm operations such as pesticide application.
4. Ensure that the farmers or landowners who hired adivasi workers for handling pesticides are provided with good quality recommended Personal Protective Equipments and other facilities in the field to prevent exposures to pesticides.

5.3 To the Health Department

1. Conduct an epidemiological study among the adivasi communities to understand the health issues they are suffering with. A detailed and comprehensive study has to be done in order to capture the realities.
2. Undertake a comparative assessment between the health issues noted among adivasi community and the use of pesticides and agrochemicals, which would help in proper treatment decisions. The exposure to pesticides has to be factored in the process of diagnosis of health effects.
3. Undertake a technical study to analyze presence of pesticide residues in locally gathered food items as well as water used for household activities by adivasi communities.
4. Ensure that adivasi communities are enjoying a pesticide free environment both at residential areas as well as worksites so as to ensure that they are not exposed to dangerous agrochemicals.
5. Maintain a separate register/database for adivasi communities at district level and capture health effects faced by them especially reproductive and developmental problems, infertility/ sub-fertility, miscarriages, health effects during pregnancy, premature births, birth defects, post delivery problems, hormone related disorders, mental health, general health effects, etc. This would help as tool of decision making in implementing various schemes aimed at improving health status of the community.

Annexures

ANNEXURE - I

Questionnaire for Household Survey

Field Study to Document Pesticide use and Related Implications among SC-ST Communities in Wayanad district

No..... **Date.....**

Name of Field Assistant.....

I. Geographic information

Sl. No.	Particulars	Details
1.	Name of colony	
2.	Panchayat	
3.	Village	
4.	Thaluk	

II. Demographic details

A. Name of respondent and occupation :

B. Gender and Age :

C. Community :

D. Address with Contact number :

E. Do you wish to remain anonymous : Yes No

F. Land ownership (in acres) :

G. If they have land, what it is used for? : farming / lease out / kept fallow

H. Give details of crops grown if any? :

III. Household Information

Sl. No.	Name of Family Member	Age	Gender	Education *	Occupation #	Health issue if any**
1.						
2.						
3.						
4.						
5.						

6.						
7.						
8.						

* I. No schooling; II. Up to class V; III. Up to 10th; IV. Up to plus two; V. Graduate
# I. Agriculture worker; II. Non-Agri worker; III. Government Sector IV. Private sector; V. Student; VI. Nil

** Need to document in detail

IV. In the case agriculture workers, mention the crops and activities/work under taken:

Sl. No	Crops	Activities/work done

V. Source of Food to family:

PDS	Open market	Own cultivation	Gathered locally/field/ forest/etc.

VI. Changes in availability of gathered items from locally/paddy/agriculture fields:

Sl.No.	Items	Source	Reduced	Reasons	Increased	Reasons
1.	Leafy vegetables*					
2.	Fish					
3.	Molluscs					
4.	Crabs					
5.						
6.						

*Note down names

VI.A. Because of pesticide/weedicide use, have you stopped gathering food resources from farm field: I. Yes II. No III. If yes, give details:

VI.B Any health issues noted after consuming such gathered food items:

I. Yes II. No III. If yes, give details:

VII. Residence location and details

1. Distance between house and nearest farmland where pesticides are applied:

   I. Less than 25m; II. 25-50m; III. 50-100m; IV. 100-250m; V. 250-500m; and VI. More than 500m

2. Have you noted pesticide/weedicide application in nearby farm? I. Yes; II. No.

   If yes,

   A. date/month of latest incidence;
   B. Have you experienced foul odour of pesticide : I. Yes; II. No;
   C. If yes, duration of foul odour: I. less than a week; II. 2 week; III. One month;
   D. Any health effects noted during this period;
   E. Name of the pesticide/weedicide applied, if known;
   F. In a year, how many such incidents occurs;
   G. During rainy season, does the water flowing through this field reaches near to the water sources your family depends on: I. Yes; II. No. if yes, give details; and
   H. Have you filed any complaint against this?: I. Yes; II. No. if yes, give details.

3. Source of water for household use: I. tapwater (KWA/Jalanidhi); II. Open well near to house; III. Tube well; and IV. Streams/river.

4. Distance between source of water and nearby farmland: I. Less than 25m; II.

   25-50m; III. 50-100m; IV. 100-250m; V. 250-500m; VI. More than 500m.

   A. Have pesticides been applied in the farmland near to the water source: I. Yes; II. No
   B. Number of pesticide/weedicide application in this farmland a year;
   C. Give name of month/s during which pesticide/weecidies are applied here;
   D. Name the crops cultivated here;
   E. During rainy season does the water flowing through this field reaches near to the water sources your family depends on and contaminate it: I. Yes; II. No;
   F. Give details of such incidence;
   G. Have you noted any health issues because of consuming water from such sources? I. Yes; II. No. III. If yes, give details;
   H. Have you noted death of fish/frog/other animals in water source during such periods? I. Yes; II. No. III. If yes, give details.

ANNEXURE - II

Questionnaire for Agricultural Workers

Field Study to Document Pesticide use and Related Implications among SC-ST communities in Wayanad district

No..... **Date.....**

Name of Field Assistant.....

1. Name:
2. Gender and Age :
3. Community:
4. Education: no schooling / class 5 / 10th / plus two / Graduate
5. How long you have been working in the agriculture fields : ……..Years
6. Employed in plantation: I. Yes; II. No.;
7. Casual hired agriculture worker: I. Yes; II. No
8. How long have you been working with pesticides and weedicides: ……..Years
9. What are the activities/work normally done in farm? Fill the table below.

Sl. No.	Activities	Yes/ No	If Yes, how many hours a day	Number of days spent per week	Days of work a year
1.	Mixing Pesticides and Weedicides				
2.	Pesticide loading				
3.	Pesticide application				
4.	Weedicide application				
5.	Washing equipments				

10. Name the crops and month in which you apply pesticide more frequently?

Crops	Month	Name of Pesticides and Weedicides

11. Have you received any training on handling Insecticides/herbicides?

    I. Yes II. No

12. Have you ever received training on the use of personnel protective equipments?

    I. Yes II. No

13. Do you know the hazards of exposure to these chemicals?

    I. Yes II. No III.

    If yes, give details:

14. Do you read the instructions given along with Pesticides?

    I. Yes II. No

15. In which language the instructions are given?

    I. Malayalam II. English III. Don't know

16. Do you able to read and understand the instructions?

    I. Yes II. No if no, why?

17. Are you able understand the colour code given on the product label? :

    I. Yes II. No

    if yes, give details:

18. Do you use any personnel protective equipment [PPE] while handling pesticides?

    I. Yes II. No

If yes, provide the following details

Activity	**Recommended PPE**	**Head cover**	**Face care**	**Eye care**	**Hand care**	**Leg care**	**Body cover**	**Others**
Mixing								
Loading								
Spraying								
Broadcasting								
Washing equipments								

[**Tick exact PPE used among the following - Head cover**: hat, helmet, others; **Eye-care:** glasses, others; **Body cover**: full sleeved shirt, others; **Hand care:** gloves, others; **face care:** mask, others; **Leg care:** Full length trousers, boots/shoes, others]

19. Whether the farm owner/plantation authority provides any PPE while working in the field where pesticides are applied?

    I. Yes II. No III. If yes, give details:

20. How soon you enter the field after the spraying pesticides?

    I. Immediately after the spray; II. Next day; III. After two days; IV. After a week; V. Others (specify)

21. Do you use any personnel protective equipment [PPE] while working in the fields where above mentioned pesticides are applied?

    I. Yes II. No

If yes, provide the following details

Activity/work	Recommended PPE	Head cover	Face care	Eye care	Hand care	Leg care	Body cover	Others
Fertilizer application								
Inter-cultivation								
Weeding								
Harvesting								
Others								

[**Tick exact PPE used based on the following - Head cover**: hat, helmet, others; **Eye-care:** glasses, others; **Body cover**: full sleeved shirt, others; **Hand care:** gloves, others; **face care:** mask, others; **Leg care:** Full length trousers, boots/shoes, others]

22. Have you ever been exposed to any pesticides?

    I. Yes II. No

    III. If yes, how it happened and give details on what happened after the exposure.

23. Time of application of chemical in the field

    I. Morning II. Forenoon III. Afternoon IV. Evening V. Whole Day

24. Do you consider wind direction while spraying/dispersing?

    I. Yes II. No III. If yes please tick any of the following

    a. Spraying along wind direction

    b. Spraying against wind direction

25. Do you eat/drink/smoke/chew thambaku while applying pesticides?

    I. Yes II. No

26. Did you experience any irritation or discomfort while handling or working in fields where above mentioned pesticides is applied?

Sl. No.	Name of Pesticides	Health effects [symptoms] noted*
1.		
2.		
3.		
4.		
5.		

[* Possible acute effects [symptoms] of pesticide poisoning are the following: Respiratory distress, shortness of breath and rapid heartbeat; loss of appetite, abdominal pain, thirst, nausea, vomiting, and diarrhoea; giddiness, headache, fever, muscle pain, and lethargy; burns to the mouth, nosebleeds, skin fissures and irritation, peeling, burns and blistering; eye injuries; and nail damage including discolouration and temporary nail loss]

27. How sure or confident are you that the symptoms you have experienced were caused by exposure to above mentioned pesticides? Please tick the any of the following

    I. Not sure II. Little III. Rather IV. Very V. Extremely VI. Don't know

28. How are the containers or packages of pesticides disposed off?

    I. Returned to farm owner II. Thrown in open field III. Taken to home

    IV. Buried V. Burnt VI. Others (Specify)

29. Are the pesticide containers used for other purposes afterwards?

    I. storing seed/grains II. Storing food items III. Used in toilets

    IV. Used as vessels for handling water V. children play with them VI. Others, specify:

30. Are you aware of women/children involved in any of the following activities where pesticide use is involved:

Activity/work Pesticide/Weedicide	Women involvement* application	Children involvement*
Mixing		
Loading		
Spraying		
Broadcasting		
Washing equipments		
Working in pesticide/Weedicide sprayed fields		
Fertilizer application		

Inter-cultivation		
Weeding		
Harvesting		
Others		

*NB: If yes needs to document in detail.

31. Do you know anybody who has become sick after being worked with or exposed to pesticides?

    I. Yes II. No if yes, please provide the following details.

32. How he/she became exposed to the pesticides?

33. What was his/ her occupation? :

34. Name the pesticides involved:

35. What were the symptoms noted after exposure or what happened after the exposure?


UPL
SAAF
UPL
SAAF
Vazra 25
(Insecticide)
CHEMINOVA


CHLORPYRIPHOS 50%
CYPERMETHRIN 5% E.C