



# POLICY Brief

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## Pesticide Exposure - a Growing Problem for Nepal's Farmers

**Vegetable farming is an important income generating activity in parts of rural Nepal. However, vegetable farming is pesticide intensive and pesticide exposure is beginning to emerge as a problem. A SANDEE study examines the impacts of pesticide use on vegetable farmers in the mid-hills area of Nepal, some 40km east of Kathmandu. The study finds that farmers and their families face medical bills and other costs as they attempt to deal with the problem of pesticide exposure. Farmers spray their vegetables approximately two times per month. The resulting pesticide exposure costs NPR 1,105,782 (US \$ 15,797) per year.**

The study, led by Kishor Atreya from the Aquatic Ecology Centre, Kathmandu University also finds that current measures to help farmers avoid pesticide poisoning are inadequate. Intensive awareness campaigns are required at the national and regional levels to provide information to farmers about exposure. Farmers also need training and equipment to protect themselves.

### THE PESTICIDE CHALLENGE

Long-term, low-dose exposure to pesticides is increasingly linked to health effects such as immune-suppression, hormone disruption, diminished intelligence, reproductive abnormalities and cancer. Farm workers who deal with pesticides on a daily basis also experience short-term symptoms such as headache, dizziness, muscular twitching, skin irritation and respiratory discomfort. Pesticide pollution also affects soil and water quality, crop productivity and the health of wild animals and plants.

Until now, pesticide pollution and poisoning has not been a high-profile issue in Nepal. This is primarily because pesticide use is still very low compared to other countries such as India, Korea and Japan. However, agricultural intensification is rapidly changing this situation. In response, the government has begun to emphasize integrated pest management (IPM). However, little has been done to understand the health impacts of pesticides. Such research is vital if resources are to be allocated effectively for health promotion and if effective rules and regulations are to be drawn up.

### AN ECONOMIC ASSESSMENT

Atreya's study assesses the economic impact of pesticide use among farmers who grow vegetables in an area close to Kathmandu. This area was chosen because it is becoming increasingly commercialized and local farmers are beginning to use relatively high levels of pesticides. The study is based on a series of field interviews with 300 farmers and their families (see side bar).

Atreya calculates the cost of the illnesses caused by pesticide use. His analysis focuses on short-term acute health problems directly caused by pesticide handling and use. He takes into account lost productivity due to sickness and the cost of any related medical care. Atreya also calculates the cost of measures taken to reduce the health impact of exposure (termed averting costs). This calculation includes the outlay on items such as masks, pants, handkerchiefs and long-sleeved shirts used to reduce exposure to chemicals. The cost of illness and averting costs are used to assess the true economic impact of pesticide use. To reach a final figure allowances are made for health issues not linked to pesticide exposure.

*This policy brief is based on SANDEE working paper No. 28-07, 'Pesticide Use in Nepal: Understanding Health Costs from Short-term Exposure', by Kishor Atreya, Aquatic Ecology Centre, Kathmandu University, Dhulikhel, Nepal. The full report is available at [www.sandeeonline.org](http://www.sandeeonline.org)*



## STUDY AREA AND DATA COLLECTION

The communities selected for the study come from the Deubhumi Baluwa and Panchkhal Village Development Committees (VDC) of the Jikhu Khola Watershed region. Each VDC is comprised of 9 wards (the smallest administrative unit). One or two representative villages were selected from each ward and a sample of 300 households was randomly selected from these villages. From each of the households three people were interviewed: two pesticide users and one non-user. Non-Users were members who never sprayed pesticides during the study period. In all, the researchers surveyed 295 people who sprayed pesticides regularly, 148 people who sprayed pesticides less regularly and 126 Non-Users. Weekly interviews were used to gather information. The interviews took place during both spraying and non-spraying periods. In all, over 12,700 observations were made. Information collected ranged from general demographics to pesticide specific information.

## Frequency of Acute Symptoms (Incidence per 1000 Spray)

SN	Variables	Users A	
		Treatment (with exposure)	Control (without exposure)
1.	Headache	193	24
2.	Muscle twitching/pain	158	55
3.	Chapped hands	149	43
4.	Excessive sweating	136	57
5.	Eye Irritation	81	4
6.	Skin irritation/burn	79	1
7.	Weakness	61	17
8.	Respiratory Depression	50	4
9.	Chest pain	37	11
10.	Throat discomfort	30	8

## PESTICIDES: AN EMERGING PROBLEM

The study shows that farmers who spray pesticides suffer from a range of short-term symptoms on the days when they work with the chemicals. For example, when a farmer applies chemicals on farms, the predicted probability of acute illnesses is 0.41 compared to 0.18 for exposure to the local environment among non-users. On average, pesticide use results in a health cost of NPR 144 per farmer per year. This cost is nearly eight times higher than the health costs of people who do not use pesticides. Taking into account avertive costs, the total annual economic cost of pesticide use for the population of the Panchkhal and Baluwa VDCs is estimated to be NPR 1,105,782 (US \$ 15,797).

Putting these figures in context, it is apparent that pesticide-induced health costs constitute 0.2 percent of annual household expenditure, 13 percent of annual household expenditure on pesticides and 10 percent of annual household expenditure on health care and services. Each VDC in the study area currently gets NPR 1000,000 per year in developmental funds from the government. The aggregate health cost of pesticide use is equivalent to some 50% of the annual development and administrative budgets of the two VDCs surveyed.

The study also finds that farmers do not take adequate protective measures when they spray pesticides. When they do take protective measures, these are generally restricted to wearing long-sleeved shirts and long pants. Low levels of awareness and education, humid hot weather, low incomes and discomfort are the main factors that stop farmers from using protective equipment.



## OTHER KEY ISSUES

To investigate the nature of the pesticide challenge facing Nepal's farmers, Atreya assesses what factors reduce or aggravate the health impact of pesticide use. The main factors that increase the health costs of pesticide use are the concentrations of the chemicals used and the amount of time farmers spend applying chemicals. For example, a one unit rise in insecticide concentration increases sickness by 7 percent and health costs by nearly NPR 30. Similarly, a 10 percent increase in the amount of time spent applying fungicides leads to a 6 percent increase in sickness and a rise in health costs of NPR 34.

The main factors that reduce the health impact of pesticide use are farmers' experience and formal education. This is probably because educated and experienced farmers have better knowledge of safe handling practices. Interestingly, IPM training seems to have little impact.

## UNDERESTIMATING THE TRUE COST

While the economic cost of pesticide use is significant, it is still relatively small. One important reason is because the chemical Mancozeb, which is relatively non-hazardous, is used in almost 95% of the spray events. Other reasons also prevail. For example, farmers treat many of the symptoms of pesticide poisoning as being unrelated to pesticides and view them simply as a part of agricultural life. They also use local alcohol to get rid of symptoms. This may have



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lead to a certain reluctance to discuss symptoms with outsiders. Even more importantly, pesticides do not only cause short-run health effects, but can also result in chronic diseases such as cancer. Pesticides also cause problems for domestic animals, environmental damage, increased pesticide resistance, bird and fishery losses and surface and sub-surface water contamination. Therefore, the cost of pesticide pollution estimated in this study is a very conservative estimate.

## MORE ACTION NEEDED

This is the first empirical study of its kind in Nepal to focus on pesticide use and its health costs in rural Nepal. The study shows that the use of insecticides and fungicides has a negative effect on human health. It also shows that it has an economic cost for individual farmers. Thus, agricultural and environmental planners need to review their strategies (including those relating to IPM) from a health perspective. It is clear that much more needs to be done by agriculture extension workers to promote awareness about safe-handling of pesticides.

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