

Pesticide Poisoning that Turned the Rice Bowl of Odisha into a Cancer Battlefield

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ABSTRACT

This report examines the agricultural landscape and the rising incidence of cancer in Bargarh district, Odisha, with a focus on the impact of pesticide usage. The Green Revolution, which boosted agricultural productivity through high-yielding varieties and chemical inputs, has contributed to environmental degradation and health issues, particularly cancer. In Bargarh, extensive use of WHO Class II pesticides, including organophosphates and pyrethroids, has led to groundwater pollution, soil degradation, and health risks. Despite a significant increase in pesticide use and a lack of protective gear among farmers, awareness of safe usage practices remains low. The report also highlights the increasing cancer cases in Bargarh, with a specific rise in peptic and breast cancers, and emphasizes the need for measures to mitigate pesticide exposure and promote sustainable farming practices.

INTRODUCTION

Agriculture in Odisha, especially in Bargarh, has been shaped by Green Revolution practices, leading to

increased yields but also environmental and health issues. Excessive use of harmful pesticides has contributed to soil degradation,

water contamination, and a rise in cancer cases among farmers. A lack of protective measures and awareness exacerbates these problems. Sustainable farming, organic practices, and stricter regulations are needed to safeguard both the environment and public health.

Green Revolution Legacy

The Green Revolution, initiated in India during the 1960s, boosted agricultural productivity through high-yielding crop varieties, irrigation, and chemical inputs like fertilizers and pesticides. While these practices significantly increased crop yields, their excessive and prolonged use has led to environmental pollution, soil degradation, water contamination, and health risks, including a heightened incidence of cancer.

Agriculture in Odisha & its Contribution

In Odisha, 76% of the population depends on agriculture, which contributes 26% to the SGDP and employs 65% of the workforce. The state has 64.09 lakh hectares of cultivable land, with 61.50 lakh hectares under cultivation, including 40.17 lakh hectares of acidic soil, 4.00 lakh hectares affected by salinity, and 3.00 lakh hectares of waterlogged areas. With 87.46 lakh hectares as the total cropped area, 18.79 lakh hectares are irrigated. Odisha is a major rice producer and grows crops like jute, oilseeds, pulses, and sugarcane. Receiving 1452 mm of annual rainfall, mostly in June-September, it has an irrigation potential of 27.63 lakh hectares in Kharif and 13.31 lakh hectares in Rabi. Key agricultural hubs include Cuttack, Dhenkanal, Balashwar, and Sambalpur.

Bargarh at a Glance

Bargarh, known as Odisha's "rice bowl," plays a key role in rice production, supported by the Hirakud Dam. It cultivates six major rice varieties—Asan Chudi, Bada Kalia, Babulal, Chit Pagalia, Radha Jugala, and

Sahabhagi—favored locally and internationally. With a cultivated area of 3.49 lakh hectares, 44% is irrigated in Kharif and 27% in Rabi, while 58% remains non-irrigated. Paddy covers 1.99 lakh hectares, with 43% in medium land, 38% in low land, and 19% in high land. The

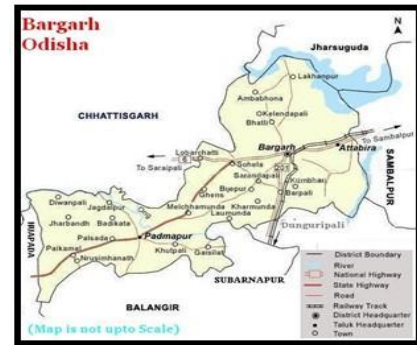


Fig 2: Bargarh district map

district also produces groundnuts, pulses, and vegetables, contributing significantly to food security. Home to 1.95 lakh farm families—36% small, 38% marginal, and 26% large—Bargarh's dedicated farmers drive high agricultural productivity, helping combat hunger and malnutrition.

Rising Cancer Cases

Since 1950, irrigation from the Hirakud reservoir has boosted paddy and vegetable cultivation in Bargarh, attracting farmers from other states. However, excessive use of fertilizers and pesticides has led to groundwater pollution, soil degradation, and health issues, including a higher cancer incidence. A 2017 survey by Dr. Ashok Kumar Panigrahi revealed Bargarh as the most cancer-affected district in Odisha, with cases rising from 1,017 in 2014-15 to over 1,100 in 2017-18. Despite the dangers, 64% of farmers lacked protective gear while spraying pesticides. Pesticide use surged from 440.7 tonnes in 2016 to 713.9 tonnes in 2017, with chemical inputs rivalling those in Punjab and Andhra Pradesh. Bargarh's water availability allows for two paddy crops annually, contributing to high productivity but exacerbating environmental and health concerns.

Types of Pesticides Used by the Farmers

Over the past 10–12 years, farmers have extensively used WHO class II pesticides, considered moderately hazardous but harmful to health and the environment. Commonly used pesticides include Organophosphate + Pyrethroid (63%), Buprofenzin (68%), and Acephate, a broad-spectrum pesticide introduced in 2016. Unlike studies in Bolivia and Vietnam that focused on highly hazardous class I pesticides, this highlights the widespread use of class II pesticides, emphasizing the need for safer alternatives. "Organophosphates and carbamates, which were responsible for the most acute toxic symptoms, require stricter regulation. (Jors, 2006)"

Primary causes of surge in cancer cases

Farmers in the region commonly use WHO Class II hazardous pesticides, such as including pyrethroids, organophosphates, and neonicotinoids, which significantly harm health and the environment. (Seth & Mahananda, 2016) Farmers and their families **who do not use protective gear** are at high risk of health problems (Abate, 2000). Despite rising pesticide usage, from 440.7 tonnes in 2016 to 713.9 tonnes in 2017, around 64% of farmers lack protective gear like gloves or boots, and many remain unaware of safe practices. Mahananda found that 35% of farmers ignored usage instructions, 18% were unaware of such guidelines, and 11% were uninformed about pesticide risks.

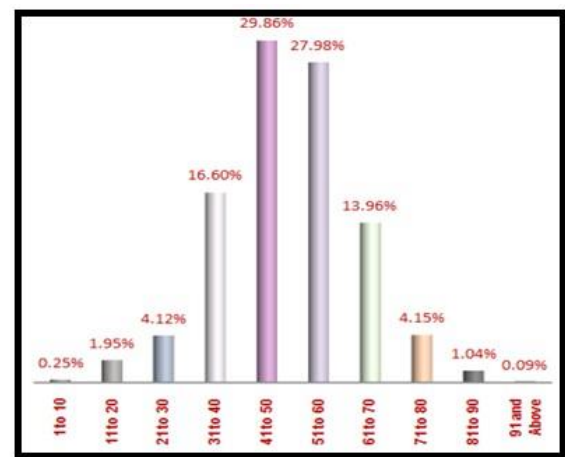
Cancer Statistics

Cancer cases in Bargarh district increased from 1,017 in 2014-15 to 1,100 in 2017-18. In Odisha, cervical cancer (25.34%) and carcinoma breast (23.51%) were the most common, while peptic and breast cancers were more prevalent in Bargarh, suggesting a dietary link. Despite the Chief Minister's

announcement, Odisha is not yet part of the National Cancer Registry, and no progress has been made.

Sl.	District	State	Incidence
1	Bargarh	Odisha	26.34%
2	Sambalpur	Odisha	24.58%
3	Balangir	Odisha	10.81%
4	Sonepur	Odisha	9.68%
5	Jharsuguda	Odisha	7.64%
6	Sundargarh	Odisha	5.94%
7	Deogarh	Odisha	2.96%
8	Baudh	Odisha	2.36%
9	Raigarh	Chhattisgarh	2.26%
10	Kalahandi	Odisha	2.04%
11	Nuapada	Odisha	1.54%

(a) Territorial Spread of cancer prevalence in Odisha



(b) Age distribution of cancer prevalence

(a) Bargarh district has the highest cancer prevalence at 26.34%, followed by Sambalpur at 24.58%, with six Western Odisha districts accounting for 85% of cases. Neighbouring Chhattisgarh contributes 4.09%. The cancer centre primarily serves rural populations from Western Odisha, Chhattisgarh, and Jharkhand.

(b) The mean age of cancer patients shifted slightly from 50.2 years in the first year to 51.5 years in the third year, with an overall mean age of 50.8 years, predominantly affecting farmers.

Contingency measures

Contingency measures include creating a list of farmers eligible for fertilizer subsidies,

setting limits on their usage to prevent excess application, and ensuring subsidies are well-targeted. Due to a lack of knowledge and practice on pesticide classification systems, application rates, re-entry periods, and mixing and storage of pesticides, farmers were unable to make informed crop decisions and practice proper pesticide usage. (Yassin, 2002) Promoting the use of protective gear during pesticide application and implementing strict regulations on fertilizer and pesticide use are essential for minimizing harm. Encouraging organic farming through government schemes like PKVY and NMSA, alongside providing training on organic techniques and the risks of chemicals, would further help. Expanding soil testing and issuing Soil Health Cards, as well as supporting integrated pest management (IPM) and sustainable farming practices, will reduce reliance on harmful chemicals. Collaboration with experts and ongoing awareness campaigns are also crucial for safer, more sustainable agriculture.

CONCLUSION

The rapid increase in pesticide usage in Bargarh, along with inadequate protective measures for farmers, has exacerbated health and environmental concerns, contributing to the growing incidence of cancer in the region. The reliance on chemical fertilizers and pesticides, while enhancing agricultural productivity, has led to long-term negative effects. To address this, it is essential to implement targeted contingency measures,

including stricter regulations on chemical inputs, better protective gear usage, and a shift towards organic farming. Additionally, promoting soil testing and integrated pest management will help reduce dependence on harmful chemicals. Collaborative efforts with agricultural experts and continuous awareness campaigns will play a crucial role in fostering a healthier and more sustainable farming environment in Odisha.

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