Dirty Cotton: Pesticide Exposure and Suicide in India

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INTRO

India is one of the world's most suicidal countries.[1]

The WHO reported an estimate of 170 000 deaths from suicide in 2010.[1] That same year, India's National Crime Records Bureau (NCRB) reported approximately 135 000 suicide deaths.[1] The difference in estimates is likely due to sociocultural beliefs about suicide within the country. In India, the act of taking one's own life is a criminal offense; underreporting is probable.[2]

Farmers and agricultural laborers comprise the second largest group of persons (after housewives) committing suicide in India.[2] Interestingly, most of the farmer suicides have occurred in India's cotton-growing states.[3]

Pesticide is the umbrella term for a vast variety of chemical compounds, including fungicides, herbicides, and insecticides.[4] Such toxic substances are designed to minimize crop loss from weeds and pests, pre- and post-harvest.[5] Cotton holds sixteen percent of the global pesticide market, making it the most pesticide heavy crop.[5] It also happens to be a major commercial crop in India.[6]

India Top Ten Cotton Producing States: 2014-2015. (2017). Retrieved from http://www.mapsofindia.com/top-ten/india-crops/cotton.html

OBJECTIVES

The primary aim was to determine whether or not occupational pesticide exposure is associated with elevated suicide risk among male cotton farmers in India.

There is little research about occupational pesticide exposure and its potential linkage to the country's farmer suicide epidemic. The pesticide industry has a relatively long history in India and goes back as far as 1948.[7] Conversely, the publishing of farmer suicide data began in the mid-1990s.[8] Two historical events at two very different time points; we might consider this gap of events as a major contributor as to why there is minimal research surrounding the pesticide-suicide relationship among the target population.

METHODS

Target Population: Male cotton farmers in India

I reviewed documents published prior to (and after) the year 2002 to account for:

- the history of pesticide exposure since 1948
- NCRB's provision of occupation-wise suicide data--classified by sex--since 1995
- farmer suicide rates pre- and post-genetically modified cotton adoption in India in 2002.[8]

Occupational Pesticide Exposure and Suicide: I researched studies outside India, including those from Brazil, United States of America, and Spain to find evidence of the pesticide-suicide link.

Pesticide Exposure and Depression: As depression increases suicide risk, I reviewed findings concerning pesticide exposure and depression.[9]

Neurotoxicity of Pesticides: I examined data on pesticide toxicity, specifically organophosphates as they are the basis of many pesticides and among the most (acute and chronic) toxic compounds with neurobehavioral effects , including but not limited to depression and mood disorders.[9]

Bacillus thuringiensis (Bt) Cotton and Farmer Suicides: Since India's cotton fields are planted with over 90 percent of genetically modified seeds, I investigated the genetically modified organism cotton, or Bt cotton, largely supplied in India to learn if there was a spike in the suicide rate among the target population since the introduction of GM cotton to the country.[3]

Additionally, I looked into India's pesticide dealers to determine how they might be contributing to farmers' suicides and studied the primary reasons for farmer suicides in India.

RESULTS

- Studies outside India show a positive correlation between work-related pesticide exposure and suicide.
- Animal studies have shown that pesticides, as organophosphates (OP), are toxic, producing neurobehavioral effects that include mood disorders and depression—a primary risk factor for suicide mortality.
- Since the introduction of genetically modified (GM) cotton to India, pesticide consumption (and suicide) has increased among the Indian farmer population.
- Conventional cotton practices, involving agricultural biotechnology and high-priced agricultural inputs (e.g., pesticides) with interest rates up to 45 percent from pesticide retailers, trap low-income and often poorly educated farmers into massive debt; their response can be tragic.[10]
- While economic hardship is a major reason behind farmer suicides, one study from Maharashtra, a state heavily affected by the epidemic of farmer suicides, revealed that psychiatric illness (OR = 7.81) appeared to be the most significant risk factor for suicides by farmers when compared to indebtedness.[11]

The Hindu. (2014). Widows of farmers. Retrieved May 27, 2017 from http://agriviolence.blogspot.com/2014_10_01_archive.html

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CONCLUSIONS

India's farmer suicide epidemic can be stopped.

The provision of information about the consequences of occupational pesticide exposure entails availability and accessibility. The implementation of a community-based education intervention may enhance cotton farmers' engagement and change their perceptions and practices with pesticide use. Less harmful substances may replace OP pesticides, should they not be banned altogether.

Organic cotton cultivation offers a viable alternative to low cotton yield and high agricultural input costs from conventional cotton production. Distribution regulations along with appointed local and state agricultural authorities would help to weed out corrupt pesticide dealers.

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