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Understanding farmer pesticide use and disposal behaviour with implications for food safety: Empirical evidence from Nigerian tomato farmers

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Abstract

In sub-Saharan Africa, small farmers rely heavily on synthetic pesticides, the overuse of which poses significant risks to human health, the environment, and food safety. Yet detailed empirical evidence on the knowledge and drivers of pesticide management practices remain scarce, limiting insights for policymakers and development practitioners. To address this gap, we leveraged data collected from 1,556 tomato producers in northern Nigeria to investigate the determinants of pesticide, use behaviour using a sequential exploratory mixed-method approach. We examined a broader range of pest management-related practices than prior literature, including safety equipment usage, pesticide disposal methods, and adherence to pre-harvest intervals (PHIs)–the intervals between the last pesticide application and the crop harvest. We found substantial non-compliance with the recommended practices: 45 % of farmers reuse empty pesticide containers for other purposes, 14 % discard them on the farm, 15 % burn containers in open fires, and 40% harvest tomatoes within 1–5 days after pesticide application, violating the 7-day PHI guideline. These findings suggest that many tomato farmers adopt unsafe practices, which have adverse implications for their health, the environment, and the safety of food for consumers. We show that training on pesticide disposal and midstream market channels (e.g., wholesalers and aggregators) are strongly correlated with improved pesticide handling and PHI compliance. Overall, our results underscore the need for targeted training programmes to enhance farmers' awareness of safe pesticide application, disposal practices, and PHI adherence. These eorts should be complemented by stronger regulatory frameworks and mechanisms to align farmer pesticide use practices with consumer preferences for safe products, as observed in the higher PHI adherence among farmers selling to midstream actors.

Keywords: Disposal, food safety, integrated pest management, pesticides, preharvest interva, use practices

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