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Evaluation of community participation in mosquito breeding prevention in stagnant water in Sikandarpur, Muzaffarpur.

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Abstract- Mosquito-borne diseases pose significant public health risks, particularly in regions with ample stagnant water sources that serve as breeding grounds. This study conducted in Sikandarpur, Muzaffarpur, during February and March 2024, examines mosquito breeding sites and evaluates the effectiveness of community-driven interventions. The findings indicate that stagnant water bodies, including ponds, drains, and uncovered containers, significantly contribute to the local mosquito population, consistent with previous studies on mosquito ecology. Community efforts, such as regularly cleaning water containers and mosquito nets, demonstrated a measurable impact on reducing mosquito densities, aligning with findings from related public health interventions. Quantitative data collected during the survey provides insights into the correlation between these breeding grounds and mosquito density, offering recommendations for future control measures.

Keywords: Mosquito-borne diseases, stagnant water, mosquito breeding, public health, community interventions

INTRODUCTION

Mosquitoes are well-known vectors for life-threatening diseases like malaria, dengue, and chikungunya, which are prevalent in tropical and subtropical regions.[1] Stagnant water serves as a primary breeding ground for mosquitoes, contributing significantly to the spread of these diseases.[2] In Sikandarpur, Muzaffarpur, the presence of numerous stagnant water bodies, including ponds, drains, and uncovered containers, makes the area particularly susceptible to mosquito infestation. Building on previous research that highlights the importance of stagnant water in mosquito breeding, this study examines the relationship between these breeding locations and the local mosquito population.[3] The study measures the effectiveness of community-led interventions, such as the, Mosquito density can be reduced by using mosquito netting and managing water containers effectively. By evaluating these community efforts, the research aims to provide practical, evidence-based recommendations to enhance public health strategies in the region. The findings are expected to contribute to more effective mosquito control programs, which are crucial in reducing the incidence of mosquito-borne diseases in areas like Sikandarpur.[4,5]

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MATERIALS & METHODS

Study Area:

The study was conducted in Sikandarpur, a region inside the Muzaffarpur district of Bihar, India. This region is characterized by its numerous stagnant water bodies, making it a suitable site for studying mosquito breeding

patterns. The selected study area encompassed both residential zones and public spaces, where stagnant water accumulates in various forms such as ponds, drains, and uncovered containers. The tropical climate and frequent waterlogging during certain seasons exacerbate the potential for mosquito breeding, making this area a focal point for vector-borne disease transmission.[6]

Survey Methodology:

A systematic survey was conducted over two months (February-March 2024) to identify and assess mosquito breeding sites within Sikandarpur. The survey involved a stratified random sampling method, ensuring that different types of stagnant water bodies were adequately represented. Fifteen sites were selected, including five ponds, five drains, and five uncovered containers. Larval density was measured using standard dipping methods as recommended by the World Health Organization (2003)[7]. For each site, 10 dips were taken to ensure accuracy in the larval density estimates. Adult mosquito density was assessed using CO_2-baited light traps, which were set up during the early evening hours and left overnight to capture adult mosquitoes.[8]

Data Collection:

Quantitative data were collected on both larval and adult mosquito densities across the selected sites. Larval specimens were kept in 70% ethanol for further identification and density assessments. Adult mosquitoes captured in the light traps were identified at the species level using standard entomological keys.[9] In addition to the entomological survey, qualitative data were gathered through structured interviews with 50 residents, selected through purposive sampling. The interviews aimed to capture residents' experiences with mosquito nuisance and the control measures they employed, such as the use of mosquito nets, insecticides, and regular cleaning of potential breeding sites. The data were analyzed to identify trends in community practices and their effectiveness in reducing mosquito populations.

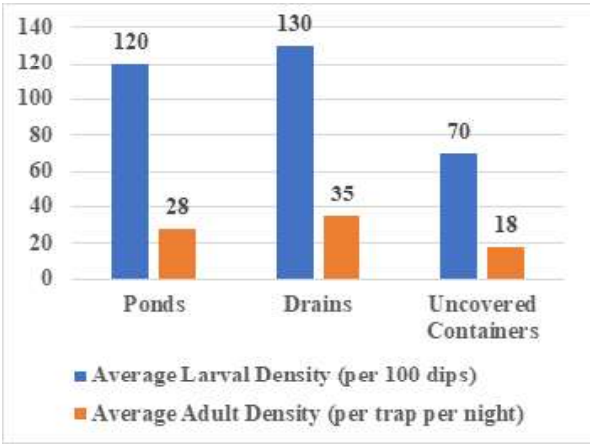
RESULTS

Mosquito Breeding Sites:

The survey revealed significant variation in mosquito density across different types of stagnant water sites. Ponds and drains were the most prolific breeding grounds, with an average of 120 and 130 larvae per 100 dips, while uncovered containers had a lower larval density, averaging 70 larvae per 100 dips (Table 1). The density of adult mosquitoes also varied, with ponds and drains averaging 28 and 35 adult mosquitoes per trap per night, compared to 18 in uncovered containers. These findings are consistent with previous studies indicating that larger, more permanent water bodies tend to support higher mosquito densities due to their stability and availability of organic matter.[10,11]

Table 1: Density of Larva and Adult in different Sites of Sikandarpur

Site Type	Average Larval Density (per100 dips)	Average Adult Density (pertrap per night)
Ponds	120	28
Drains	130	35
Uncovered Containers	70	18

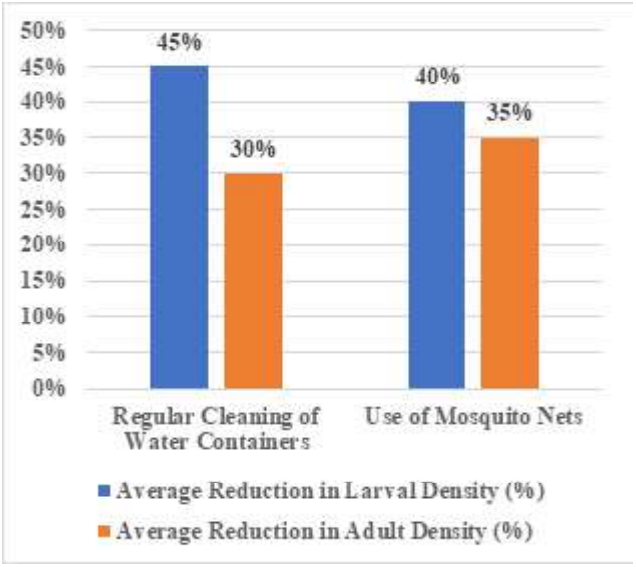


Graph 1: Density of Larva and Adult in different Sites of Sikandarpur

Community Interventions:

Community-driven interventions, such as regular cleaning of water containers and mosquito nets, significantly reduced mosquito densities. In areas where residents actively engaged in these practices, larval density decreased by an average of 45%, while adult mosquito density was reduced by 35% (Table 2). The data suggest that regular container cleaning was particularly effective, leading to a 45% reduction in larval populations and a 30% reduction in adult populations. Mosquito nets significantly reduced adult mosquito density, emphasizing the critical role of such preventive measures in lowering the risk of mosquito-borne diseases.[12,13]

Intervention Type	Average Reduction in Larval Density (%)	Average Reduction in Adult Density (%)
Regular Cleaning of Water Containers	45%	30%
Use of Mosquito Nets	40%	35%



DISCUSSION

The findings of this study highlight stagnant water bodies, especially ponds and drains, as the primary breeding grounds for mosquitoes in Sikandarpur. The high densities of both larvae and adult mosquitoes at these sites emphasize the critical need for targeted control strategies, such as the regular treatment or elimination of stagnant water sources. Previous research has similarly identified large, stable water bodies as key contributors to mosquito proliferation.[11] Additionally, the effectiveness of community-driven interventions, such as regular cleaning of water containers and the use of mosquito nets, in reducing mosquito populations underscores their importance in public health efforts. These practices, which led to significant reductions in both larval and adult densities, should be promoted and supported through public health initiatives, aligning with global recommendations for integrated vector management.[5]

CONCLUSION

This study concludes that stagnant water sites are critical contributors to the mosquito population in Sikandarpur, and Muzaffarpur. Community-based actions, especially the consistent upkeep and sanitation of possible breeding places, effectively diminish mosquito populations and alleviate the threat of mosquito-borne illnesses. Future control efforts should focus on enhancing community participation and implementing targeted strategies to manage stagnant water, thereby reducing the public health burden associated with mosquito-borne diseases.

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