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Eyes in the sky: A cross-sectional study to assess community perception and acceptance for drone usage in vector surveillance and control

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Abstract

Background

The threat of vector borne diseases has been continuing to burden and overwhelm our health systems for a long. The traditional methods of vector surveillance are often time consuming, labour intensive, and may have operational limitations, particularly in large or inaccessible areas. In this era of technological advancements, unmanned aerial vehicles, commonly known as drones, have emerged as a promising tool for various public health applications such as mapping of breeding habitats and targeted delivery of control measures. For the successful implementation, the acceptance and perception of this newer technology by the community is sine-qua-non, and this study was done with the same objective.

Methods

A total of 406 participants between the age group of 18–65 years, were recruited in this observational descriptive study in urban and peri-urban population with mixed housing types. The data was collected using pre tested structured questionnaire mobile based Open Data Kit. Statistical analysis and visualization were performed using R (Version 4.5.1). Data was summarised using means, range for continuous data, and frequencies, percentages for categorical data. Chi-square test of association was applied on selected variables to find association with acceptance of drone technology.

Results

Out of 406, 349 participants were found to be willing to participate in community awareness session, whereas 334 respondents said they would allow the drop to fly over their households for mapping of larval breeding sites. About 80% of the participants perceived the drone usage for vector control as safe, and believed better mosquito control can be achieved by using drones. About 70% of the participants believed that the drones can spray insecticide or larvicide with precision and believed it can replace the traditional methods of mosquito surveillance and control. The drone was perceived to be costlier but more effective than present methods by a large majority of the participants.

Conclusions

High community acceptability of using drones for vector surveillance and control was found along with positive community perception, as most of the participants considered this technology safe and useful.

Background

The Vector Borne Diseases (VBDs), particularly mosquito-borne diseases including Dengue, Malaria, Chikungunya, Zika, and Filariasis, continue to pose a formidable challenge to human health. Globally,

more than 17% of all infectious diseases are caused by VBDs, resulting in more than 700,000 human deaths annually. Among these diseases, Malaria continues to be the leader with an estimated 249 million cases globally, with more than 608,000 deaths.[1] In the Indian context, the mosquito-borne diseases, Dengue, Malaria, and Chikungunya continue to have high morbidity and mortality. In 2024, India reported approximately 233,519 cases of Dengue with 297 deaths,[2] 255,500 cases of Malaria with 86 deaths,[3] and 240,180 suspected and 17,930 confirmed cases of Chikungunya reported to the national program.[4]

The most challenging part in control of VBDs is managing vectors responsible for the transmission of these diseases. The man has been battling these vectors targeting both adult mosquitoes and their immature stages (larvae and pupae) to interrupt disease transmission. Adult mosquito control commonly involves Indoor Residual Spray (IRS) and Long-Lasting Insecticide-treated Nets (LLINs) as core interventions, whereas space spraying with insecticides during outbreaks or in emergencies. Additionally, repellents are being used for reducing human–vector contact. Larval control methods focus on preventing mosquito development at breeding sites through environmental management, such as eliminating stagnant water, covering water storage containers, and improving drainage. Further, biological and chemical larvicides are applied to water bodies to kill mosquito larvae. The control of vectors is most feasible in their larval stage, when the vectors are in a defined territory and have limited ability to evade the larval control measures.[5] Moreover, larval control is the only option for urban systems in India.[6]

However, the most challenging part in larval control is the identification of the breeding sites and timely intervention. The breeding sites of different vectors, particularly mosquitoes, are widely distributed and vary with species. Several types of vectors have breeding grounds in small, concealed, temporary, and unreachable water bodies like discarded containers, roof gutters, tree holes, tyres, overhead tanks, and pools. Moreover, the rainwater that is accumulated during the rainy season could very quickly produce additional breeding places, posing challenges to surveillance activities. Furthermore, some breeding grounds may be situated in inaccessible locations. The timely identification of these breeding sites is of paramount importance for larval control measures.

At present, the traditional approach in the identification of breeding sites is where the trained staff visit all possible larval breeding sites and identify the sites for larval control. This is the method of choice so far, served its purpose well, however, there are limitations in operations. These methods are time consuming tedious, and efficiency is dependent on the number of trained staff used.[7] Moreover, the efficiency of control is limited to the reach of human manpower utilized and the community participation in such activities.[8] Due to high densities and varied housing types in urban settings, there is a felt need to introduce complementary efforts along with community participation on a regular basis, as the breeding sites and mosquito densities are also being supported by natural conditions other than anthropogenic conditions.

Communities play a major role in the success and sustainability of any vector control intervention. The community-based interventions, including mobilisation for vector surveillance and control, have proven to be beneficial in the control of vectors. The role of community participation in larval control has been studied in detail in African regions, and is proven that community engagement is essential in successful vector or larval control interventions.[9] The World Health Organization (WHO) has also acknowledged that community participation remains a critical complement of public health.[10] The assessment of community perception provides important insights about the various issues affecting acceptance of control interventions.

The Unmanned Aerial Vehicles (UAVs), commonly known as drones, are emerging as a key disruptive technology that has changed the way public health planning and delivery used to be. This technology has been exploited all over the world to further the public health activities. The drones have been used for the delivery of medicines, blood products, vaccines, and emergency drugs to remote and hard-to-reach areas. The Indian Council of Medical Research (ICMR) pioneered in harnessing this technology for public health in India under its iDRONE initiative, wherein transportation of vital medicinal supplies, including COVID-19 vaccines and, more recently, cornea transport, was successfully carried out using drones.[11-13] More recently, the feasibility of drone utilisation for sputum sample transportation was studied in Telangana, India.[14]

The drones, in conjugation with Artificial Intelligence (AI) and Machine Learning (ML), offer to overcome the limitations of the traditional methods of vector surveillance. Due to their short-range scanning ability with a topical view, may enhance the vision of the same area for searching the breeding sites that are cryptic and cannot be seen easily by the ground teams due to reach limitations. There have been attempts to exploit this technology in VBDs surveillance and control, and its efficiency is being assessed.[15] Usage of low-cost commercial drones to survey and map potential breeding sites was tested in Tanzania,[16] whereas the use of drones with a multispectral camera to locate anopheline breeding sites was studied in Amazonian Peru.[17] The quantity of accumulated surface water on a tidal marsh using a commercial drone with a multispectral camera was done, while also outfitting the drone with a zoom video camera to visualise mosquito larvae in containers in a simulated laboratory setting.[18] The use of AI & ML to identify the larvae and pupae was also studied in this. The drones offer promising results in the identification of mosquito breeding sites and the detection of mosquito larvae, using AI & ML.

However, as is the case with any emerging technology, the usage of drones for public health purposes may be associated with apprehensions, unintentional outcomes, and issues of social acceptability. Communities may have concerns regarding safety, noise, or privacy. The drone technology acceptance for public health emergencies in Israel was studied using an integrated model of technology acceptance and task technology fit models. It was found that the behavioural attitudes had a significant relation with perceived usefulness and intended drone usage.[19] An online survey to assess the community acceptability of dengue fever surveillance using drones was done in Malaysia, Mexico, and Turkey.[20]

Therefore, despite the great potential of drones in enhancing vector surveillance and control, the success of their application depends to a large extent on public perception and acceptance of the technology. Therefore, the current study was conducted to explore the perception and acceptance of drones in vector surveillance and control.

Methods

Study Area: The study was conducted in the South West district of Delhi, the capital of India. The study area was selected due to various reasons including this area having a varied mix of urban, and peri-urban populations with mixed house types. This area is conveniently selected owing to its proximity to the host institute, and also it is the area where the pilot testing of vector surveillance using drones is proposed by the host institute.

Study Design: It was an observational descriptive study. The sample size was calculated using Cochrane's formula, with an expected prevalence of 50%, margin of error 0.05%, and a confidence level of 95%. The minimum sample size calculated was 385 participants. However, a total of 406 respondents were included in the study, exceeding the minimum required sample size. The study was conducted in preselected peri-urban and urban localities of Delhi. The first house was chosen randomly using paper chits of available house numbers, on each day of the data collection. The subsequent households were consecutively selected in ascending or descending order. For multi storied houses, the data collection was started from the highest floor to the lowest floor. The households found locked or unresponsive or refusing to participate were left out, with no revisits to any such houses. Only one resident from each participating household was taken to minimise the selection bias.

Inclusion and exclusion criteria: All the consenting adult aged 18-65 years, permanent residents (spent at least one year in that house) of the locality, were included in the study. The residents with any self-declared conflict of interest were excluded from the study. The conflict of interest was defined as anyone who has worked in the past or is presently working with any form of drone technology, including drone photography or videography. Any persons who have been associated with vector surveillance or control in the past or present were also excluded from the study.

Data collection: The present study used Open Data Kit (ODK) as its mobile-based digital data collection platform. Trained field investigators used Android-based mobile devices to conduct the structured questionnaire while they recorded participant responses in real time through electronic systems. The ODK system provided efficient data entry functions while it reduced transcription mistakes and delivered secure methods for storing and moving collected data to be used in analysis.[21] The questionnaire was pilot tested on 35 individuals who were not included in the final study. A few questions were rephrased, and two questions were deleted as it was deemed repetitive by the experts. The questions were rearranged to make it more convenient and acceptable for the participants. The questionnaire was in a pre-designed format with a semi-open questionnaire, and a few had the pre-decided fixed options to choose from, whereas some questions also had multiple choices wherein participants could choose

more than one option. The participants were also given the choice to give their own understanding of the issue in the ‘others’ option, and the answer could be manually typed instead of pre-fixed options. The ODK was designed in such a way that every question was mandatory to answer to reach the next question.

Data analysis: The collected data were exported from the ODK platform and compiled in Microsoft Excel. Statistical analysis and visualization were performed using Microsoft Excel and R (Version 4.5.1) within the RStudio Integrated Development Environment (Version 2026.01 'Apple Blossom). Data cleaning and validation were performed prior to analysis to check for missing values, inconsistencies, and outliers. Variables were coded appropriately, and categorical data were converted into numerical codes for statistical analysis. Descriptive statistics were used to present the socio-demographic information of the study participants together with their questionnaire responses. Frequencies and percentages were used to summarize categorical variables that included gender, education level, occupation, knowledge of mosquito-borne diseases, and preventive practices, as well as their perceptions about drone use. Chi-square test of association was performed on selected variables, i.e., age, sex, education, area of residence, information, IEC campaign, and past history of having suffered from VBD, which were analysed using cross tabs to calculate the odds ratio. The variables were converted from continuous (age) and categorical (education) to dichotomous for the computation of the odds ratio. The age was categorised into two groups: more than or equal to 35 years and more than 35 years. The cut-off was considered based on the general acceptance of 35 years as the beginning of middle age, since all our participants were adults. Similarly, the educational status was converted into two categories of participants who had the highest degree of graduation and above, with the second group being those who were educated below graduation. A p-value of less than 0.05 was considered statistically significant for all analyses. The findings were presented in the form of tables and graphical representations to facilitate clear interpretation of the results.

Ethical considerations: The study was approved by the ethics committee of ICMR-National Institute of Malaria Research, Delhi vide number NIMR/IEC-M/2023/970/V6-Aug/06.

Results

A total of 406 households participated in the study, including 98 females, 307 males, and 01 other (Trans female). The trans female was added to the female category for the purpose of calculating odds ratio. Out of these 223 (54.93%) were aged 35 years or less, and the remaining were above 35. The educational status of the participants was assessed by simply asking about their last qualified degree. Out of these 128 (31.5%), 200 (48.3%), 55 (13.5%), and 13 (3.2%) were found to have done graduation, higher secondary, matric, and primary, respectively. The remaining 10 (2.5%) were found to have not received any formal education / not qualified even the primary examination. (Table 1)

Table 1: Demographics and general characteristics of the respondents

Characteristics	N = 406 (%)
Gender	
Male	307 (75.62)
Female	98 (24.14)
Others	01 (0.25)
Age	
≤ 35	223 (54.93)
> 35	183 (45.07)
Highest education qualification	
Graduation and above	128 (31.53)
Higher Secondary	200 (49.26)
Matriculation	55 (13.55)
Primary	13 (3.20)
Never attended school	10 (2.46)
Area of residence	
Urban	320 (78.82)
Peri-urban	86 (21.18)

About one-fifth (83) of the participants reported at least one episode of a prevalent mosquito-borne diseases, affecting either themselves or an immediate family member. Out of these, 41 had this experience within one year of the interview. The participants were asked if they had heard/seen/read any IEC material on VBD prevention electronically or otherwise, 331 (81.5%) responded in the affirmative, 47 (11.6%) denied, and the remaining 28 (6.9%) were 'Not Sure' about it. The participants were asked about their knowledge of VBDs prevalent in the region, and were given five choices, namely malaria, dengue, chikungunya, JE, and Zika. They were given an option to choose multiple answers for the given options. Based upon the correct answers received, the participants were awarded the scores 1/5, 2/5, and so on. Out of 406 participants, 283 (69.7%) scored 5/5 marks, and only 33 scored 1/5, reflecting that the participants had high knowledge about the names of the prevalent VBDs. Similarly, the participants were also asked about the breeding of Malaria causing mosquitoes and were given the choice to select multiple answers out of clean, stagnant, and dirty water. The participants who chose dirty water were scored zero marks, those choosing option of either clean water or stagnant water were scored one and the maximum of 2 marks were awarded to participants who chose both clean & stagnant water as the answer. Only 23 (5.66%) out of 406 scored the maximum marks of 2, and 88 (21.67%) were awarded

zero marks. The level of confidence was assessed using a progressive scale with 4 choices, i.e., Very Confident, Confident, Somewhat Confident, and Not Confident. A majority of participants (211) chose the highest level of confidence, i.e., 'Very Confident' in the knowledge regarding VBD & its control, whereas 33 expressed the lowest level of confidence, i.e., 'Not Confident'. The participants were also asked about their knowledge of government agencies conducting vector surveillance and control activities. The majority of them, i.e., 297 (73.2%), said they knew about it, 72 (17.7%) were not aware, and the remaining 37 (9.1%) were not sure of this. The water storage practices were assessed using closed ended question having four choices wherein the participant had to choose the best option for himself/herself, out of 406, 246 (60.59%) chose the option of always keeping the water stored water covered, and 26 (6.40%) admitted they never cover the stored water as per Figure 1.

The participants were specifically curious and forthcoming about the questions on drone usage. They were asked about their perceptions and acceptance of the usage of drones in their locality, around their households for vector surveillance and control. The responses received were varied. On the question about the safety of drones, 323 (79.6%) considered drone's usage in their locality as safe, whereas 72 (17.7%) considered it unsafe. A significant number, i.e., 37 (9.1%), were not sure about drones being safe or unsafe. There were a large number of participants, i.e., 334 (82.3%), who expressed their acceptance to allow usage of drones around their household, while 72 (17.7%) said they will not allow it (Fig 2). The reason for not allowing the drones was also asked by those who denied. Amongst these, half, i.e., 36 (50%) had concerns regarding privacy, a quarter, i.e., 18 (25%) had concerns about the safety of the drones, 4 participants said the drone would cause disturbance, whereas 9 participants chose not to assign any reason for their denial. The participants were also asked about their perception if the drones can detect mosquito breeding, and if the drones can replace humans / traditional methods for the same purpose (Fig 3). A large number of participants perceived the drones to be costlier but more effective approach than the traditional methods (Fig 4)

Table 2: Association of Drone acceptance with selected variables (N=406)

Characteristics	Drone usage for vector surveillance around household acceptable		Odds Ratio (95% CI)
	Yes (334)	No (72)	
Age			
≤ 35	179	44	0.735 (0.437-1.237)
>35	155	28	
χ^2 test = 1.352, df = 1, p value = 0.245			
Sex			
Male	272	35	4.638 (2.708-7.944)
Female	62	37	
χ^2 test = 34.615, df = 1, p value < 0.001			
Educational status			
Graduation and above	109	19	1.351 (0.763-2.394)
Higher secondary or below	225	53	
χ^2 test = 1.070, df = 1, p value = 0.301			
Area of residence			
Urban	284	36	5.680 (3.273-9.856)
Peri urban	50	36	
χ^2 test = 43.54, df = 1, p value < 0.001			
IEC campaigns on VBDs attended			
Yes	285	46	3.287 (1.862-5.804)
No	49	26	
χ^2 test = 18.079, df = 1, p value < 0.001			
History of suffering from VBD by self or immediate family members			
Yes	57	26	0.470 (0.272-0.810)
No	266	57	

χ^2 test = 7.596, df = 1, p value = 0.006

A significantly higher proportion of male participants, urban residents, and those who were aware of IEC campaigns for vector-borne diseases accepted drone usage for vector surveillance around households. The odds of acceptance were 4.6 times higher for male participants, 5.7 times higher for urban residents, and 3.3 times higher for participants informed about IEC campaigns. In contrast, age and educational level did not significantly relate to acceptance of drone use. (Table 2)

In line with the results related to drone acceptance in vector surveillance and control, the drone usage for vector surveillance perceived safety was significantly associated with sex, area of residence, and awareness of IEC campaigns for vector borne diseases. It was found that males, urban dwellers and IEC campaigners were more likely to consider the use of drone safe. Age and educational status were not significantly associated with perceived safety. (Fig 5)

Discussion

In the current study, the aim was to assess community perceptions and acceptance of drone use for vector surveillance and control in urban and peri-urban areas. The most important outcome of this study was that participants had positive views regarding its application for vector surveillance and larval source identification. This finding is significant as any new technology used in the field of public health must be both technically feasible and socially accepted.

The highest proportion of study participants came from urban areas (78.82%), whereas peri-urban areas comprised 86 individuals (21.18%). In India, urban areas include places where the population density is more than 400 per square kilometre, and at least 75 percent of males are engaged in non-agricultural occupations.[22] Peri-urban areas are the transitional zones located between rural and urban communities that exhibit features of both rural and urban zones, are economically connected to both rural and urban zones, and are in a state of perpetual transition.[23] The residents of urban areas were significantly more accepting of drones (5.7 times the odds) and believed them to be safe for conducting vector surveillance (3.9 times the odds) within their residential environments. Urban populations could have demonstrated higher levels of acceptance and safety perception regarding drone utilization due to their better understanding of digital technologies and technologically supported services.[24]

Moreover, urban settings include different types of housing structures, such as independent houses, apartment complexes, temporary settlements, slum clusters, mixed residential-commercial buildings, and under-construction areas. This diversity in housing patterns affects the distribution and type of breeding places available for mosquitoes. Overcrowded housing, ineffective drainage systems, storage of water on rooftops, ongoing construction sites, and solid waste provide many breeding places for mosquitoes. In this scenario, the traditional method of conducting larval surveys is tedious and cumbersome. Therefore, the use of drones may be particularly beneficial in urban systems with complex housing patterns and inaccessible areas.

The majority of participants in this study were male (75.62%), followed by female participants (24.14%), while only one participant identified as other gender (0.25%). The acceptance of drone usage was highly favoured by males (4.6 times higher odds), along with the perception of drones as safe tools for surveillance (3.4 times higher odds). This could be attributed to the fact that male subjects were generally exposed to technological innovations as well as the use of technological services. This finding is also supported by a study conducted in India, which revealed that gender plays a role in technology adoption.[25]

The results of our study revealed that 81.5% of respondents were exposed to IEC campaigns. There was an association between the knowledge of the IEC campaign and three times higher odds of acceptance and two-and-a-half times higher odds of perceiving the use of drones as safe. Education using IEC campaigns could positively influence knowledge, attitudes, and openness towards any new intervention in public health. It has been reported earlier that IEC campaigns promote awareness, change in health behaviour, and acceptability of health seeking behaviour.[26]

Fifty-two percent of those who took part in the survey were "very confident" of their VBD knowledge. Increased community knowledge on VBDs will help increase participation in preventive practices, facilitate acceptance of prevention and control measures, as well as promote sustained community involvement in monitoring and source reduction efforts.[27] The presence of 8% who are “not confident” highlights existing knowledge gaps that could limit the effectiveness of control measures in certain groups. A recent study revealed that although awareness of VBDs exists, the adoption of vector protection measures remains inconsistent, highlighting the need for targeted interventions to improve awareness and preventive practices.[28]

About 20% of participants in the present study had either experienced VBDs themselves or had a family member affected by malaria, with about 10% reporting this within the past year. Such personal experiences with disease may have contributed to greater acceptance of improved surveillance technologies, including drones. Communities that have directly experienced mosquito-borne diseases are often more willing to support innovative interventions if they perceive them as useful, safe, and capable of reducing disease burden.

Most of the respondents felt that drones had the ability to spray insecticides effectively for vector control (70.2%), as well as conduct vector surveillance within a relatively shorter time compared to current practices (83.3%). From these results, it can be deduced that the use of drones was viewed as efficient, as it was considered capable of enhancing the efficiency of vector surveillance and control through its ability to reach remote areas, detect mosquito breeding sites, and facilitate effective spraying. Previously it has been found that drone surveillance is less laborious and faster than conventional methods, while precision spraying enhances efficiency.[15]

Despite the potential benefits, some participants may still have concerns regarding privacy, noise, safety, and misuse of drones. In this study, 79.6% of participants believed that using drones was safe, while

82.3% stated that they would permit surveillance of drone flights around their houses. Of the 17.7% of participants who would not permit the flight of drones over their houses, the reasons for their concern revolve around privacy (50%) and safety (25%). The results obtained in this study agree with previous research on public attitudes towards drone surveillance. Although the use of drone technology has been increasing in different areas such as vector control, due to its numerous advantages, it is important to ensure that public attitudes and perception are taken into consideration in relation to issues of safety and privacy.[17] Research also shows that community issues must be handled well since community negativity towards drones might hinder their application as an effective tool in using technology for public health measures.[29] On the other hand, community acceptance of innovative means of dealing with dengue vectors has been seen in several Asian nations like *Wolbachia* mosquitoes and autocidal traps.[30–31]

The positive attitudes towards drones can be fostered through awareness initiatives among communities, demonstration activities, and collaboration with community leaders and healthcare practitioners. As soon as the community members are aware of the capabilities of drones to pinpoint mosquito breeding grounds, mitigate risks of diseases, and enable prompt control measures, they will become more receptive to the innovation. It is important to highlight the applications of drones for improving public health, promoting agricultural productivity, protecting the environment, and responding to natural disasters to dispel any apprehensions and foster trust. In the current age, when new technologies receive negative feedback due to misuse, it becomes even more crucial.

Moreover, in addition to health, there is potential to integrate vector surveillance using drones with other government initiatives. It can be combined with programs related to vector control, urban health campaigns, smart cities initiatives, activities under Swachh Bharat Mission, environmental sanitation efforts, water supply initiatives, waste management schemes, and ecosystem development efforts. The integration of such programs may contribute to identifying mosquito breeding grounds, along with improving coordination among the various sectors like health, municipality, environment, and urban development.

Limitations of the current study must be considered when interpreting its results. Being a cross-sectional study, it is a snapshot of perception at a particular moment in time and does not determine how people's opinions can change in the future, once drones have been routinely deployed. Also, people's answers could be affected by their previous experience with drones and their recent encounters with vector-borne disease cases. Nonetheless, the study yields relevant data concerning public opinion about drone usage for vector surveillance.

In the future, surveillance systems using drones along with AI, machine learning, geospatial mapping, and data platforms could be one of the key elements of vector control programs. Urbanization, denser populations, climate change, water storage practices and waste generation are making vector surveillance even more challenging. Traditional efforts are in a dire need for technological assistance, and drones hold a strategic position for their larger roles in public health measures.

Conclusion

The results of this cross-sectional survey have shown that there is high community acceptability of using drones for vector surveillance and control, as most of the participants considered this technology as safe and useful. Therefore, it can be concluded that there is good community acceptance for drones' usage in vector control efforts. Nevertheless, a certain number of participants had fears regarding privacy issues and safety problems, and low awareness. Consequently, it means that the issue of information dissemination, community involvement, and effective communication must be addressed successfully before implementation at any scale.

Abbreviations

AI & ML, Artificial Intelligence and Machine Learning

ICMR, Indian Council of Medical Research

IRS, Indoor Residual Spray

LLIN, Long-Lasting Insecticide-treated Nets

ODK, Open Data Kit

UAVs, Unmanned Aerial Vehicles

VBDs, Vector Borne Diseases

WHO, World Health Organisation

Declarations

Ethics approval and consent to participate

This study being a interview based study involved less than minimal harm to the participants, and due written consent was taken from all the participants as per extant ethics guidelines. The study was approved by institutional ethics committee vide NIMR/IEC-M/2023/970/V6-Aug/06 date 30 Jun 2025.

Consent for publication

Not applicable.

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests None

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Authors' contributions SK, SG, SP, AA and HS conceptualized and designed the study. GK, SK, SG, SA, MSC collected the data. SK and SG analyzed the data. All authors interpreted the data. SK, SG & GK contributed in manuscript writing, SA, AA & HS critically reviewed the manuscript.

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Figures

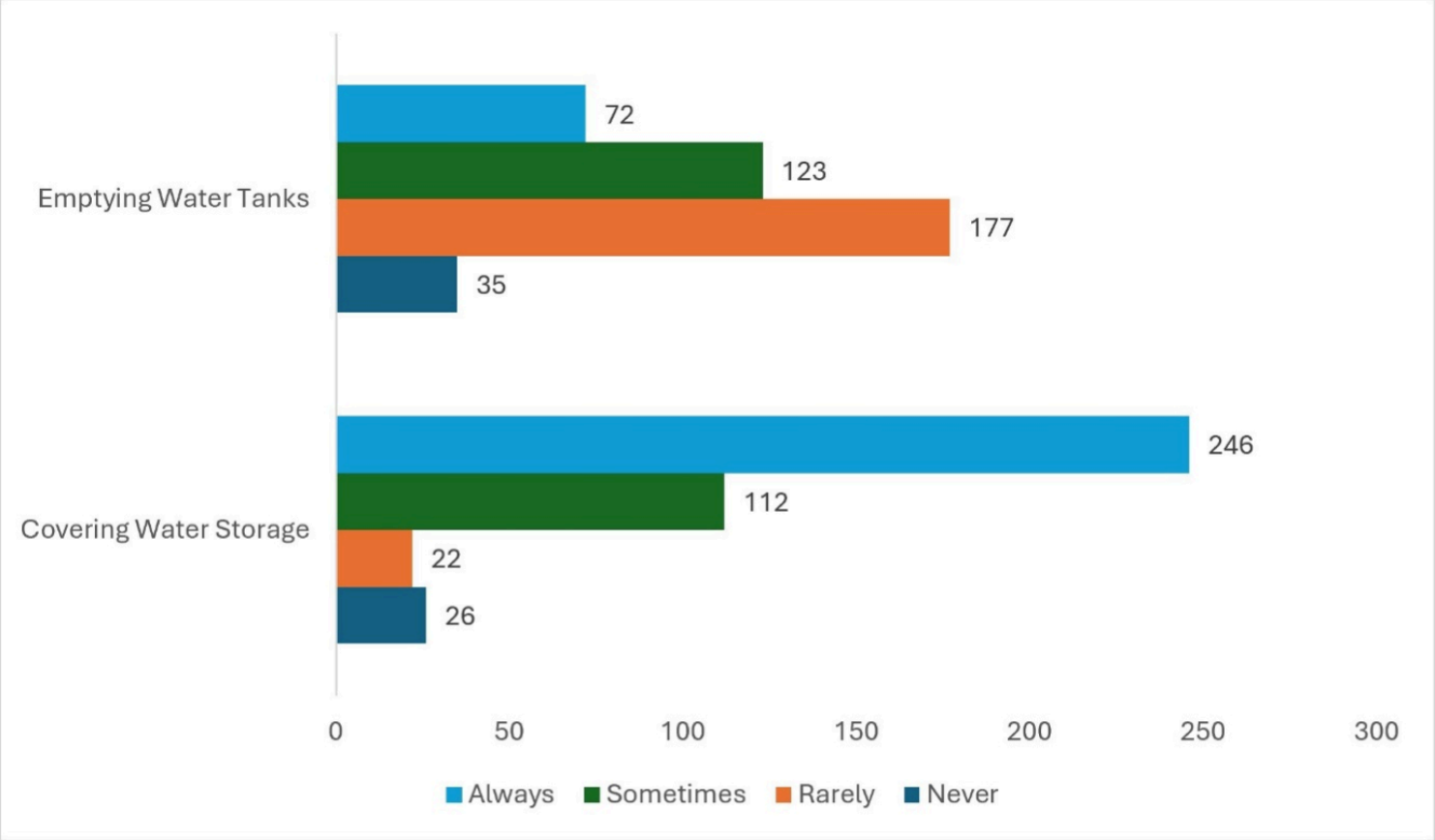


Figure 1

Water storage practices of the study participants pertaining to emptying of water tanks and covering the stored water in households

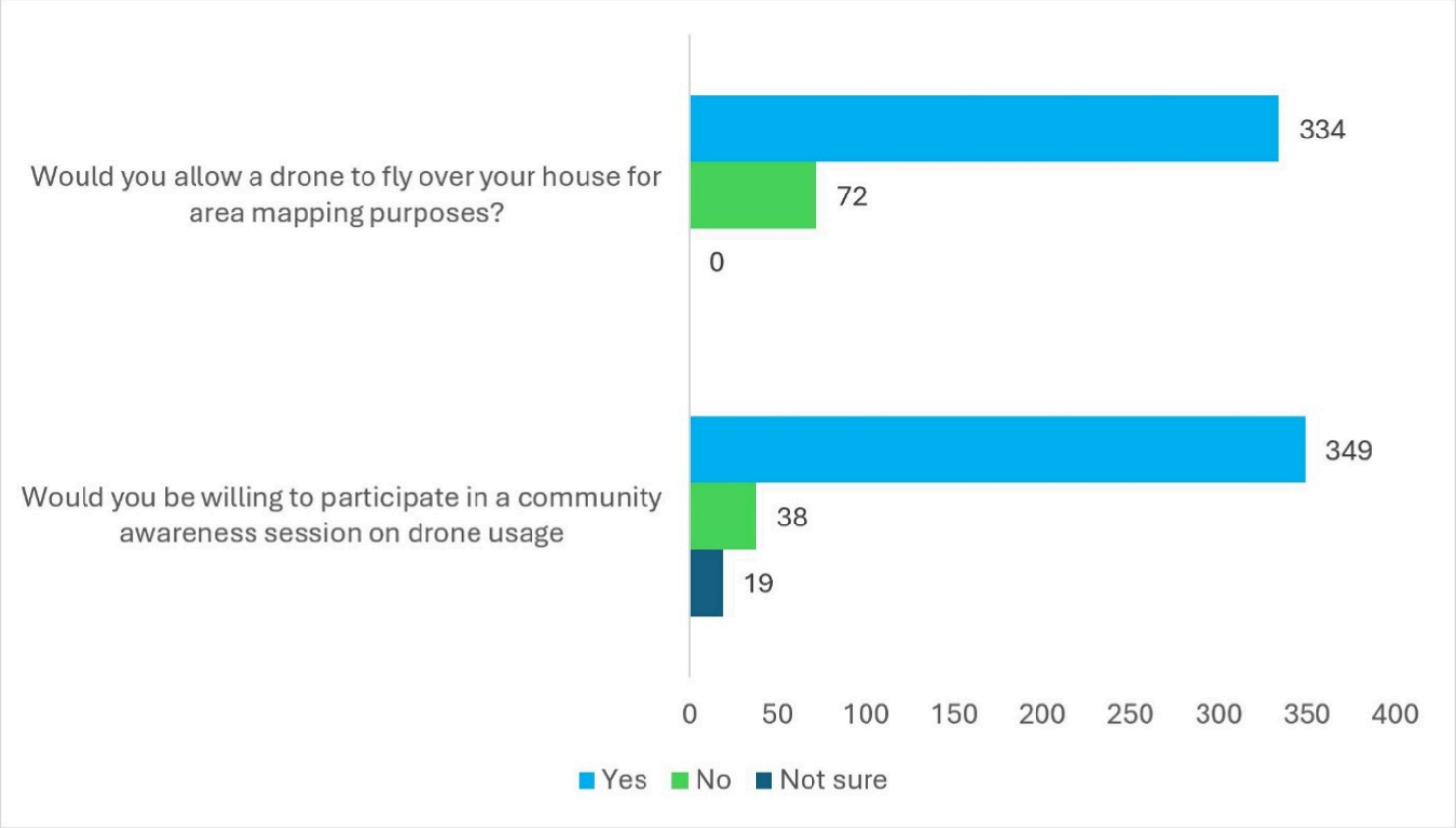


Figure 2

Acceptance of the participants for usage of drone in vector surveillance & control around their households.

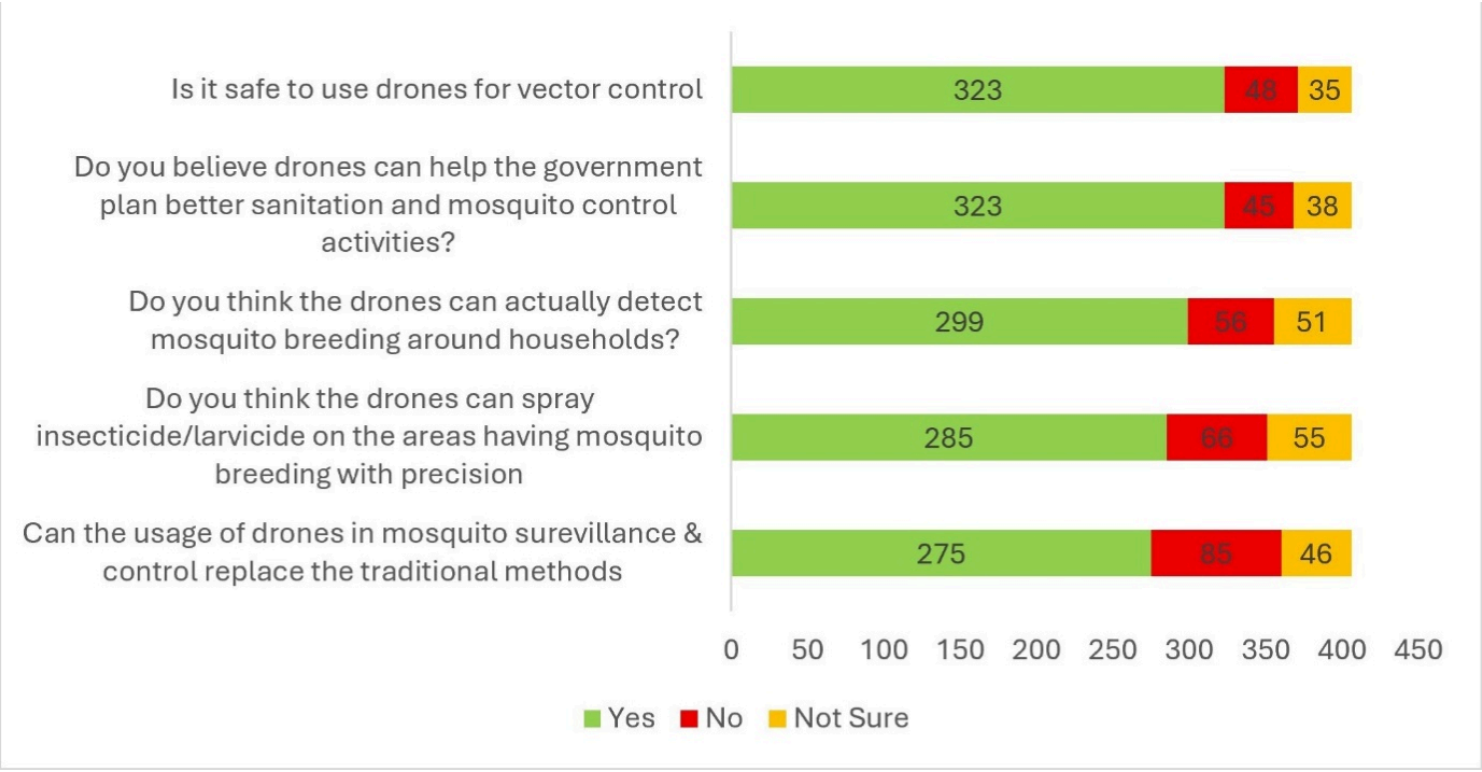


Figure 3

Community perception on the usage of drones for vector surveillance and control activities in the locality

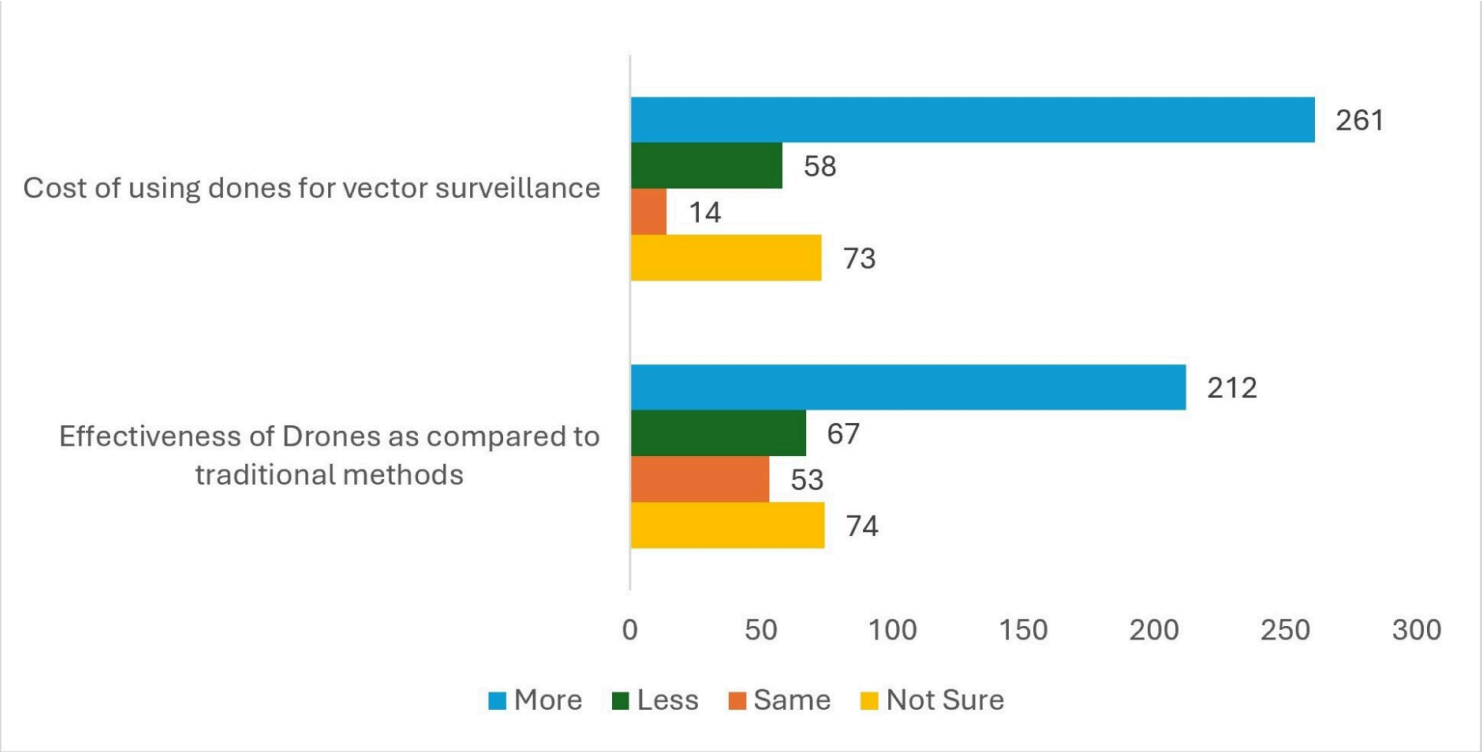


Figure 4

Perception of the participants regarding the effectiveness and cost of drone-based vector surveillance

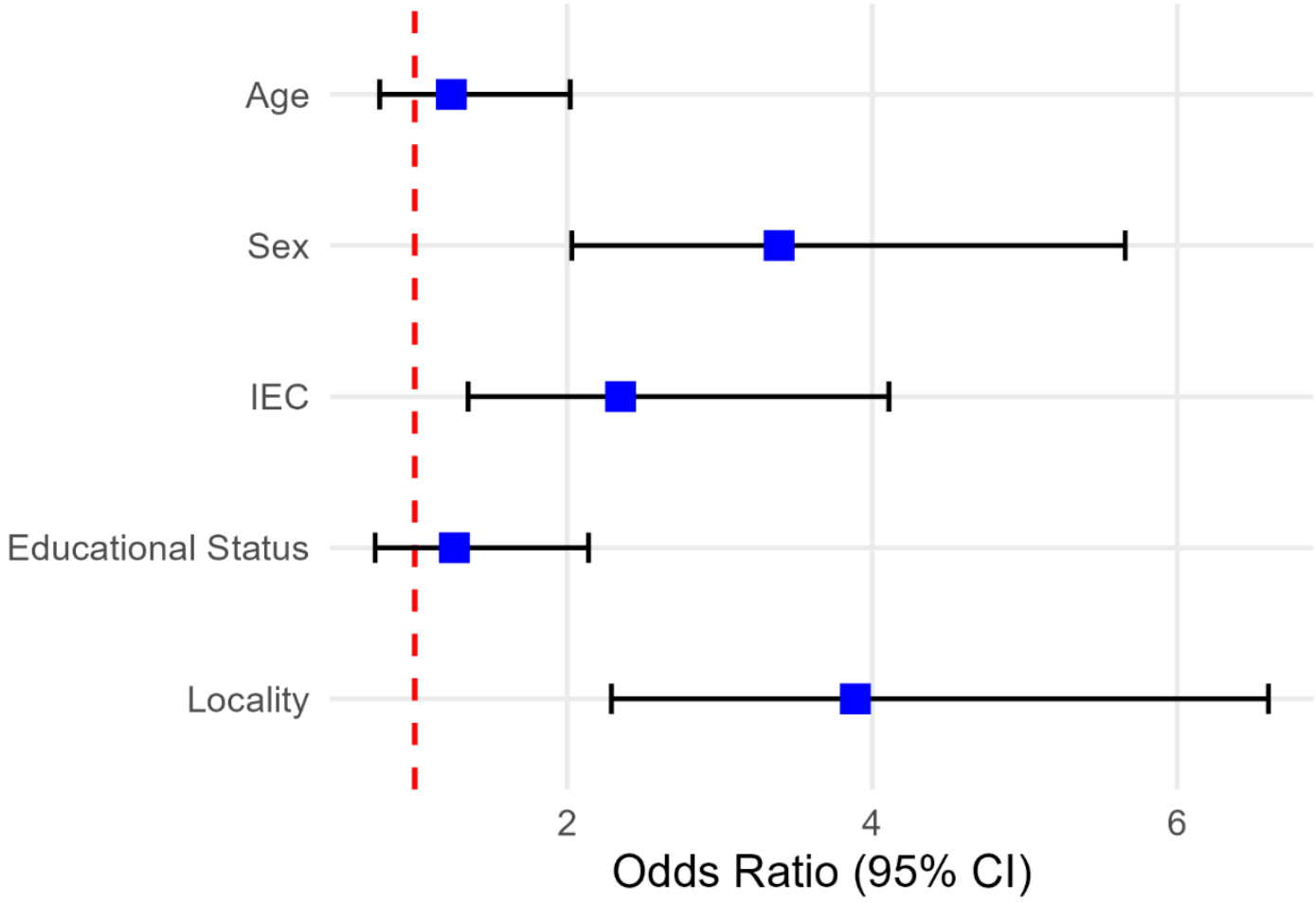


Figure 5

Forest plot depicting odds of perceiving drone usage safe by the community participants