Report from the monitoring of Dengue in Italy through digital epidemic surveillance InfluWeb

Descriptive analysis

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Summary

The sample collected via InfluWeb from May 13 to October 27, 2024, consists of 1,720 questionnaires completed by 405 unique participants. Given the monthly nature of the questionnaire, responses were divided into six waves based on the completion period. The sample characteristics of each wave are similar. There is a slight predominance of men over women, with most participants coming from the North-west of Italy, followed by the North-east and the Center. In each wave, over 85% reported being aware of the disease, and more than 40% rated their knowledge as medium or higher. At least a third of participants (30%) actively sought information, primarily using informational and educational websites (over 60%) rather than national newspapers.

Out of the 405 unique participants, only 2 were vaccinated against Dengue, while more than half of the remaining participants (a minimum of 59.0% in Wave 6 and a maximum of 68.6% in Wave 2) expressed willingness to be vaccinated if a vaccine were available. The main reason for not getting vaccinated, reported by about half of those who would not vaccinate, was not being in a high-risk category. The surveyed population tends to show little concern regarding Dengue infection and its economic impact. 2 participants tested positive for the disease, and despite the low prevalence,

participants reported knowing at least one person who tested positive in the past month on 31 occasions. In all cases, the positive individual was not known directly by the respondent.

Introduction

Dengue is an infection caused by four viruses of the Flavivirus family and is transmitted to people by the Aedes Aegypti and Aedes Albopictus mosquito species, the latter known as the tiger mosquito. Transmission occurs through the importation of cases from at-risk areas, which facilitates the virus's transmission from humans to local mosquitoes and consequently from infected mosquitoes to new patients.

In recent months, South America has seen a significant increase in Dengue cases compared to previous years, reflected in an increased risk of imported cases in Italy. Dengue virus infections in Italy are on the rise: according to the Istituto Superiore di Sanità, there were 667 cases as of November 6, 2024, of which 207 were indigenous, with a median patient age of 45 years, while last year there were over 200 cases, 82 of which were autochthonous, i.e. due to infections occurring in Italy.

In most cases, the disease does not produce symptoms. Typical symptoms include fever, with very high temperatures, accompanied by headaches, pain around and behind the eyes, severe muscle and joint pain, nausea, vomiting, and skin irritation.

Methods

The questionnaire is administered monthly to subscribers of InfluWeb, the participatory surveillance platform for influenza monitoring in Italy, which this year also ran during the summer to monitor Dengue and preventive behaviors against Dengue infection.
Once a month, InfluWeb participants complete an additional questionnaire after the flu symptom questionnaire, collecting information on awareness, prevention, and concern levels, as well as potential Dengue-compatible symptoms and reported diagnoses among the population.
The collected data were divided into waves based on completion dates as follows:

- Wave 1: 05/13/24 to 06/09/24
- Wave 2: 06/10/24 to 07/07/24
- Wave 3: 07/08/24 to 08/04/24
- Wave 4: 08/05/24 to 09/01/24
- Wave 5: 09/02/24 to 09/29/24
- Wave 6: 09/30/24 to 10/22/24

Each wave lasts exactly four weeks, except for the last one, which is slightly shorter. Questions on concern level and the estimated effectiveness of certain anti-infection measures are marked with a Likert scale, rating from 1 (very low) to 5 (very high).

To ensure greater representativity, a post-stratification technique was applied. Each wave sample was divided into strata based on gender (male and female), age (18-44, 45-64, 65+), and education level (secondary or lower, post-secondary). The percentage of the population in each stratum was compared to the real Italian population within the same strata using ISTAT data. Each response was then weighted to reflect the sample's population proportion relative to the actual population.

Results

Sample

Below is the breakdown of the sample in each wave by gender, age, education, and macro-region of origin.

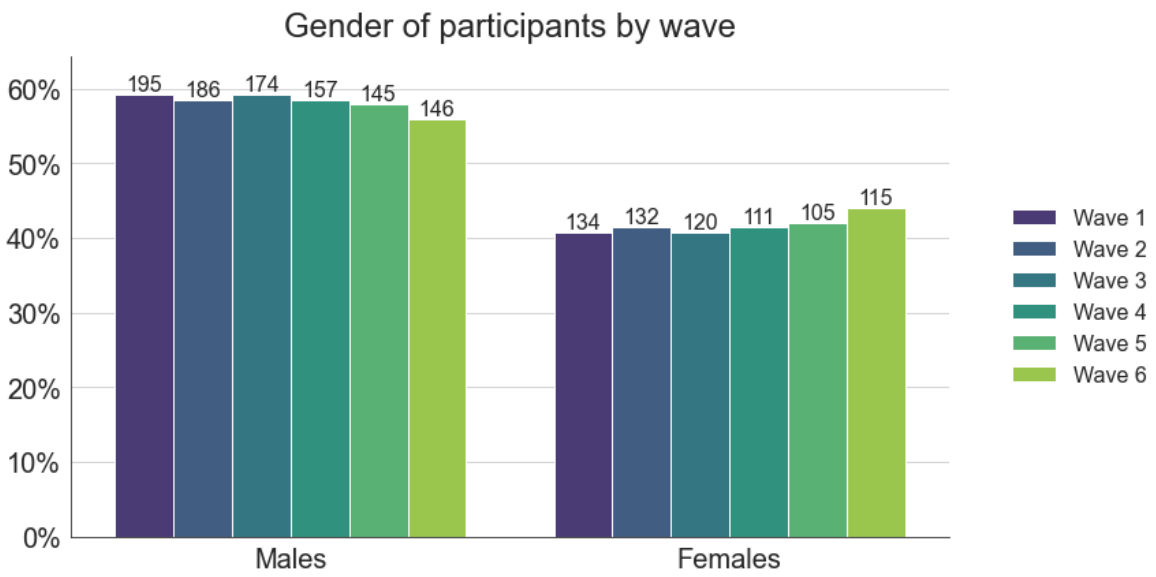

Figure 1: Percentage of responses obtained by gender for each wave. The absolute number of responses received is shown above each column.

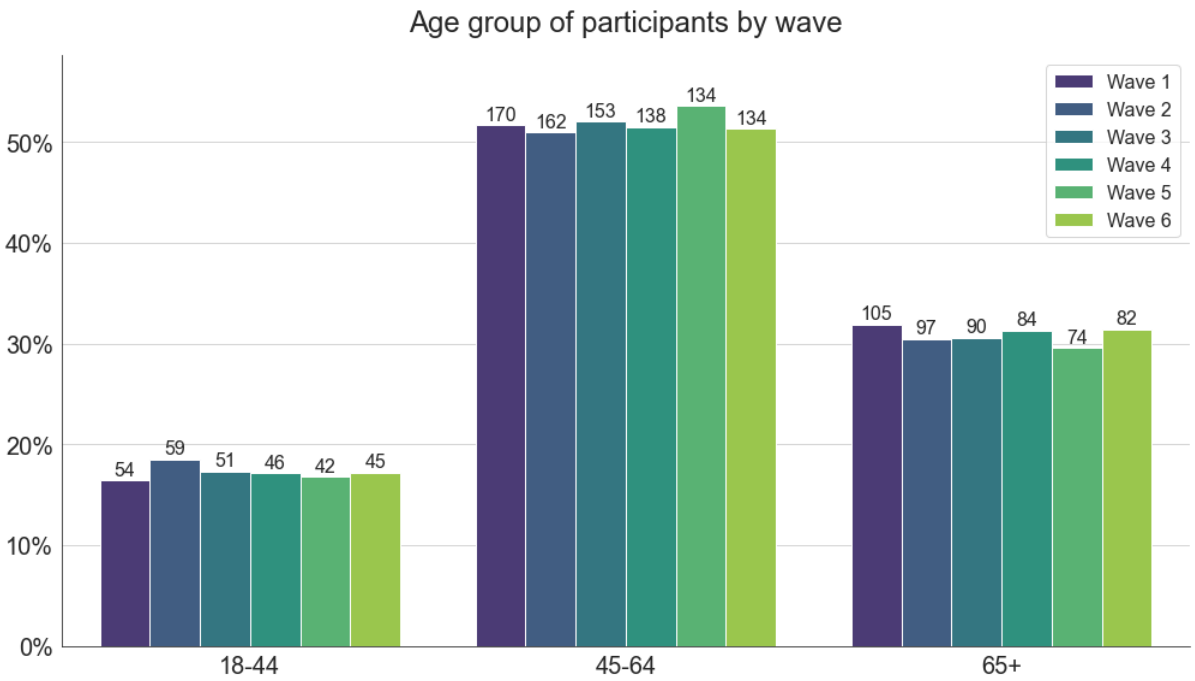

Figure 2: Percentage of responses obtained by age group for each wave. The absolute number of responses received is shown above each column.

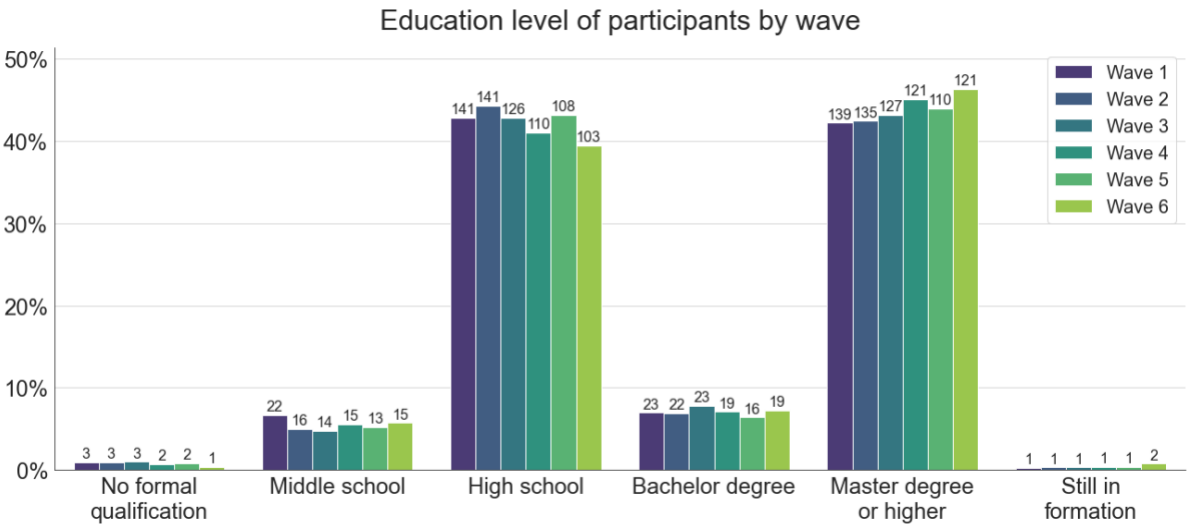

Figure 3: Percentage of responses obtained by education level for each wave. The absolute number of responses received is shown above each column.

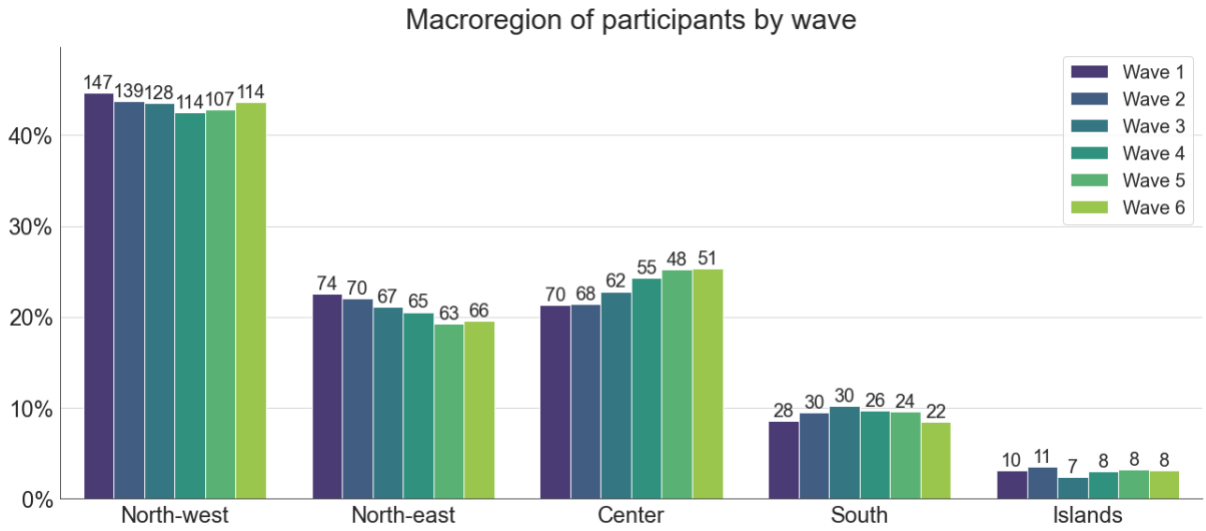

Figure 4: Percentage of responses obtained by macroregion for each wave. The absolute number of responses received is shown above each column.

Dengue symptoms

Below we show the number of participants who reported specific dengue symptoms in each wave.

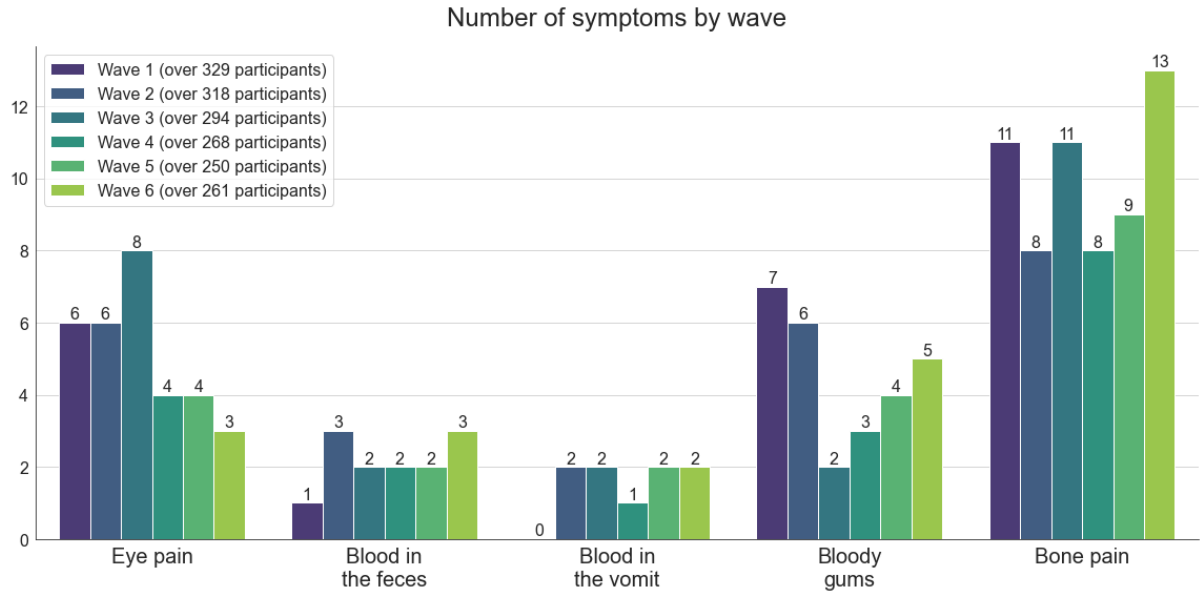

Figure 5: Number of specific Dengue symptoms reported by participants for each wave. The absolute number of responses received is shown above each column.

Awareness

In all waves, more than 85% of participants were aware of Dengue (lowest in Wave 1 and Wave 3 with 86.9% and highest in Wave 2 with 90.6%). Of the participants with knowledge of Dengue, at least 30% sought information on its spread, with a percentage in waves after the first around 40% and a maximum touched in Wave 6 of 44.6%.
Information was sought in the following media (multiple response):

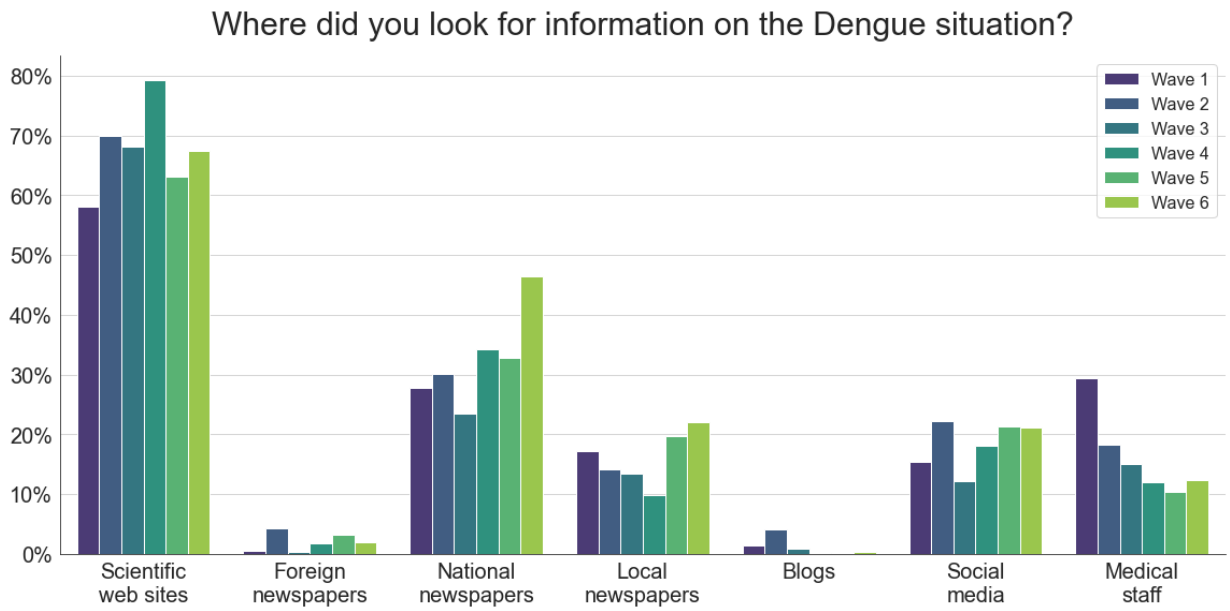

Figure 6: Percentage of participants who reported each source of information among those who sought information on the spread of Dengue by wave.

The auto-evaluation on the level of information sees an improvement with the percentage of those stating that they have vague or less knowledge (Likert-type scale items 1 and 2) going from over 60% in Wave 1 to 43% in Wave 6.

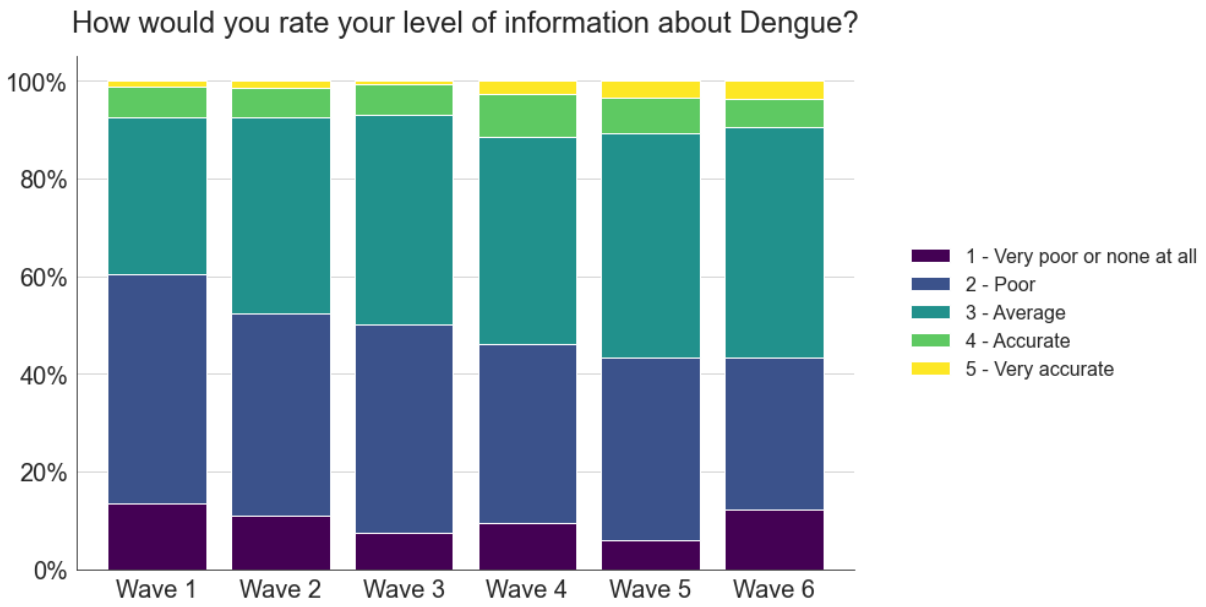

Figure 7: Self-declared level of information by wave on a scale from "Very poor or none at all" (minimum, dark blue) to "Very accurate" (maximum, yellow).

Knowledge of Dengue Characteristics

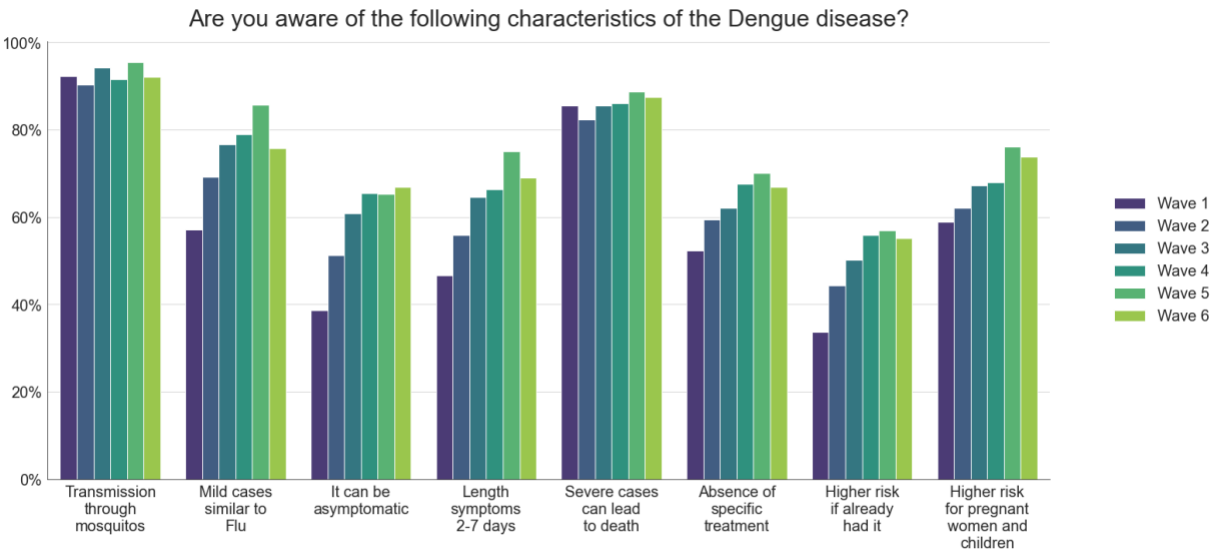

Figure 8: Percentage of participants who reported knowing the characteristics of Dengue by wave.

Concern

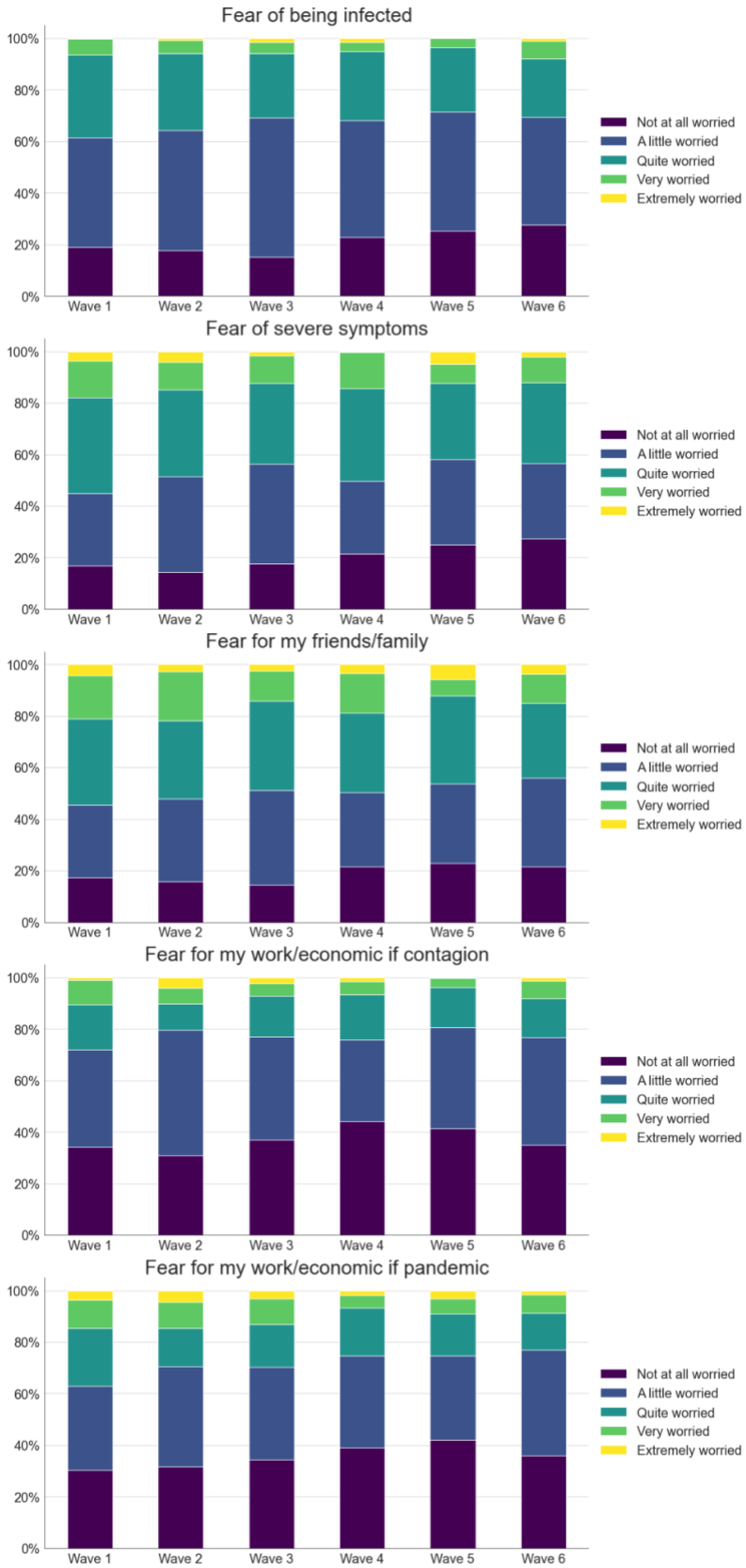

Figure 9: Level of concern from the lowest (Not at all worried in dark blue) to the highest (Extremely worried in yellow) for each of the 5 investigated consequences in each wave. The sum of the responses in each bar equals 100%.

Vaccination

Of the 405 unique participants, 2 (0.5%) were vaccinated. Among the unvaccinated, the percentage of those who would vaccinate if they were offered a vaccine goes from 65.7% in Wave 1 to 59.0% in Wave 6 with a maximum in Wave 2 of 68.6%. Among these, there is a slight predominance of men and just under a third are over 65.
In contrast, among those who would not vaccinate, the following are the reasons reported (multiple response):

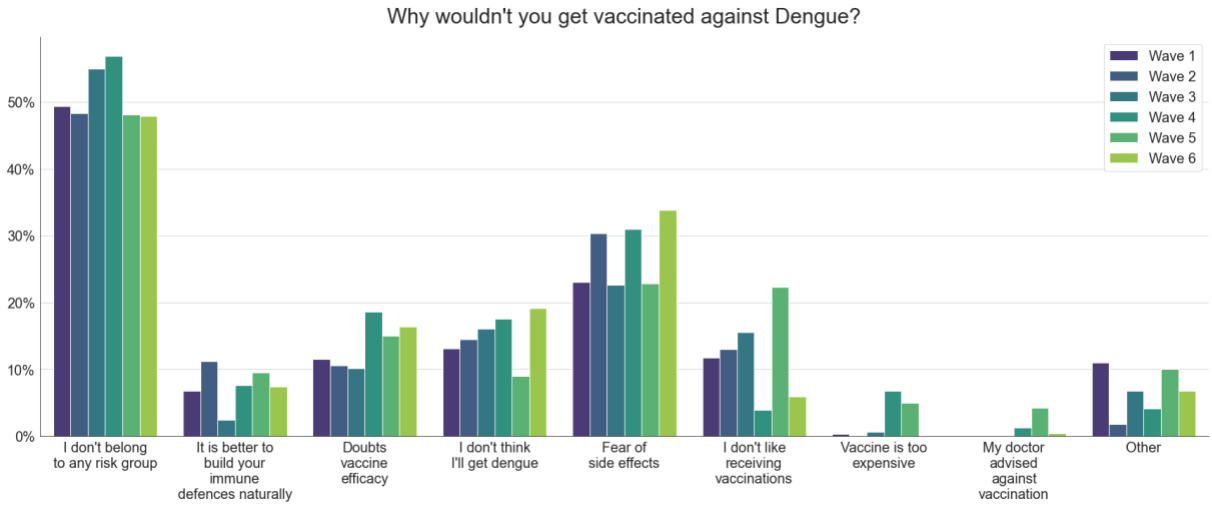

Figure 10: Percentage by wave of reasons selected by those who would not get vaccinated against Dengue.

Diagnosis

The only cases of Dengue among the participants occurred in Wave 2 with 2 people (0.6%) diagnosed. In all other waves there were no positive participants. However, several participants learned of someone diagnosed with Dengue. These were 2 (0.6%) in Wave 1, 4 (1.3%) in Wave 2, 6 (2.0%) in Wave 3, 5 (1.9%) in Wave 4, 9 (3.6%) in Wave 5, and 5 (1.9%) in Wave 6. In all cases, it was someone rarely seen or not directly known.

Protective measures

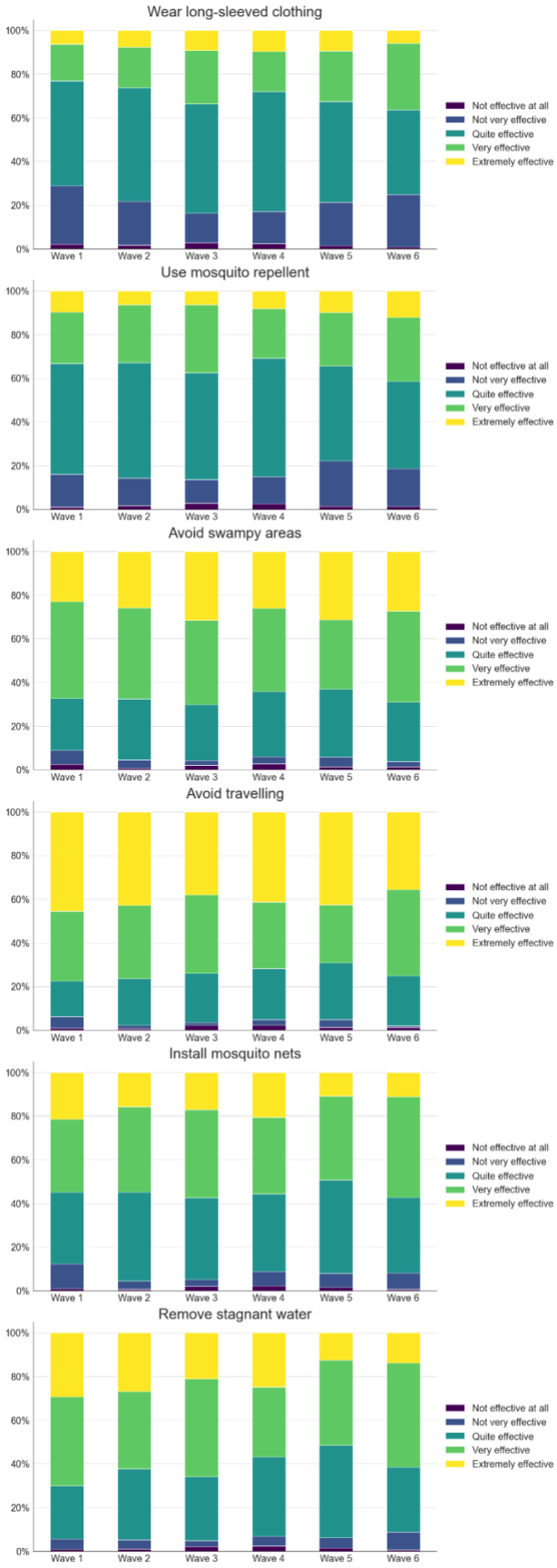

Figure 11: Level of reported efficacy from the lowest (Not effective at all in dark blue) to the highest

(Extremely effective in yellow) for each of the 6 preventive measures investigated in each wave. The sum of the responses in each bar equals 100%.

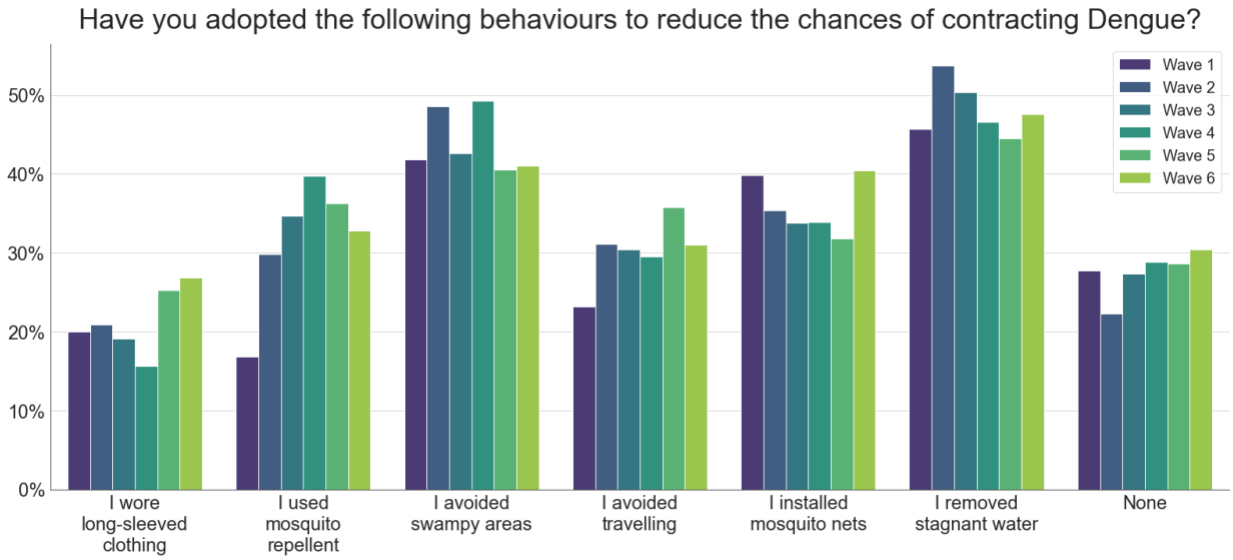

Figure 12: Percentage by wave of adoption of preventive measures (multiple answers).

Conclusions

- Only in Wave 2 did 2 participants report having been diagnosed with Dengue. In all other waves, there were no positive cases among the participants.
- Across all waves, participants reported a total of 31 instances of knowing at least one person who tested positive in the past month. In all cases, this person was not directly known to the respondent.
- Only 2 out of the 405 unique participants were vaccinated. However, the percentage of those willing to be vaccinated if offered a Dengue vaccine ranged from 65.7% in Wave 1 to 59.0% in Wave 6, with a peak of 68.6% in Wave 2.
- The main reason for not getting vaccinated is not belonging to a risk category, reported by about half of the participants.
- The majority of the population (more than 70%) considers themselves vaguely or moderately informed about Dengue.
- More than 85% of people reported being aware of Dengue. The percentage of those who actively sought information varies between less than a third (30%) in Wave 1 to 44.6% in Wave 6.
- The primary source of information is information and dissemination websites (above 50% in every wave except the first one).
- The population is typically not very concerned, especially about contagion and economic consequences.
- Of all the participants, there is a majority of men, individuals aged 41-65, and individuals from the North-West of Italy.

Limitations

This study has some limitations, the primary one being voluntary participation, which makes the survey statistics not representative of the entire Italian population. This was partially accounted for by using post-stratification weights based on gender, age and education.
The participants' responses, although the question on Dengue infection concerns a doctor's diagnosis, are not subject to any medical-professional control certifying the participant's truthfulness.
The temporal evolution of some responses to the questionnaire cannot be studied because it is affected by panel conditioning bias. In fact, the first participation in the questionnaire may have influenced the answers given during subsequent participation. An example is the knowledge of dengue characteristics in the sample, which sees an increasing trend as waves pass, probably due to previous participation.

Acknowledgments

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