

Movement patterns of seasonal migrant workers associated with malaria risk derived from outpatient register books in Amhara Region, Ethiopia

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Background

The malaria burden in Ethiopia has steadily decreased over the last decade. The country now is aiming to achieve subnational malaria elimination in 245 districts by 2020.

However, increased internal population movement and importation of malaria infections from high- to low-risk areas remain key barriers to achieving the elimination goals.

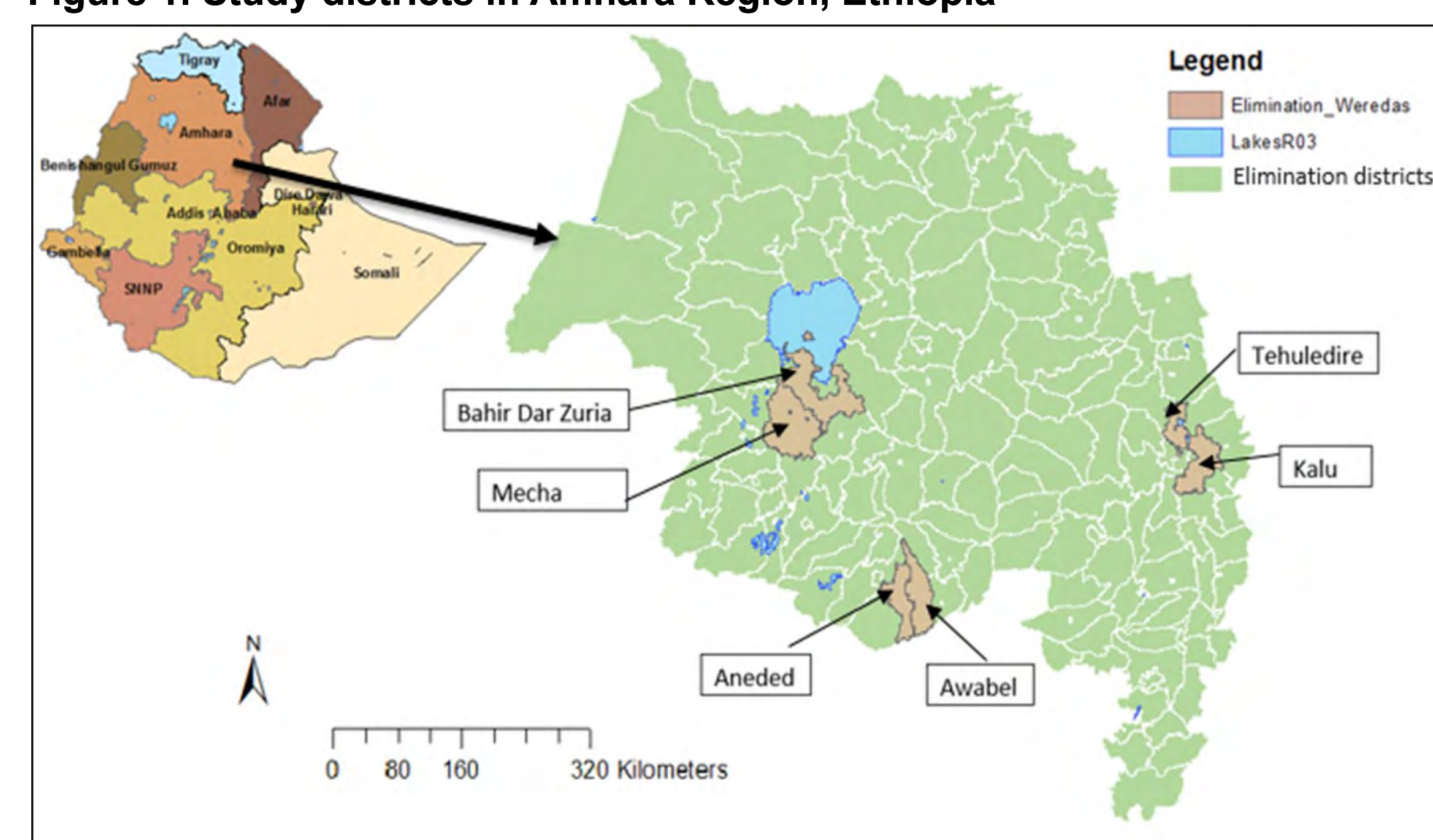
This study aims to assess spatial movement patterns of migrant workers and related malaria risk in Amhara Region, Ethiopia.

Methods

Study site

The study was conducted in 133 health posts in six low to moderate malaria transmission districts in Amhara Region (Figure 1).

Figure 1. Study districts in Amhara Region, Ethiopia



Data collection and analysis

Data were collected from October 2014 through October 2016.

All patients who presented with fever, history of fever, or other malaria-compatible symptoms received a rapid diagnostic test (RDT) and, if positive, received antimalarial treatment.

Individual patient data such as sex, age, history of fever, promptness to treatment, travel history in the past month, and origin (start) and destination (end) locations of travel were recorded in a standard outpatient register book. Individual patient data for travel history including cases positive for malaria but with no travel history were then transcribed into an electronic form using the DHIS2 event tracker.

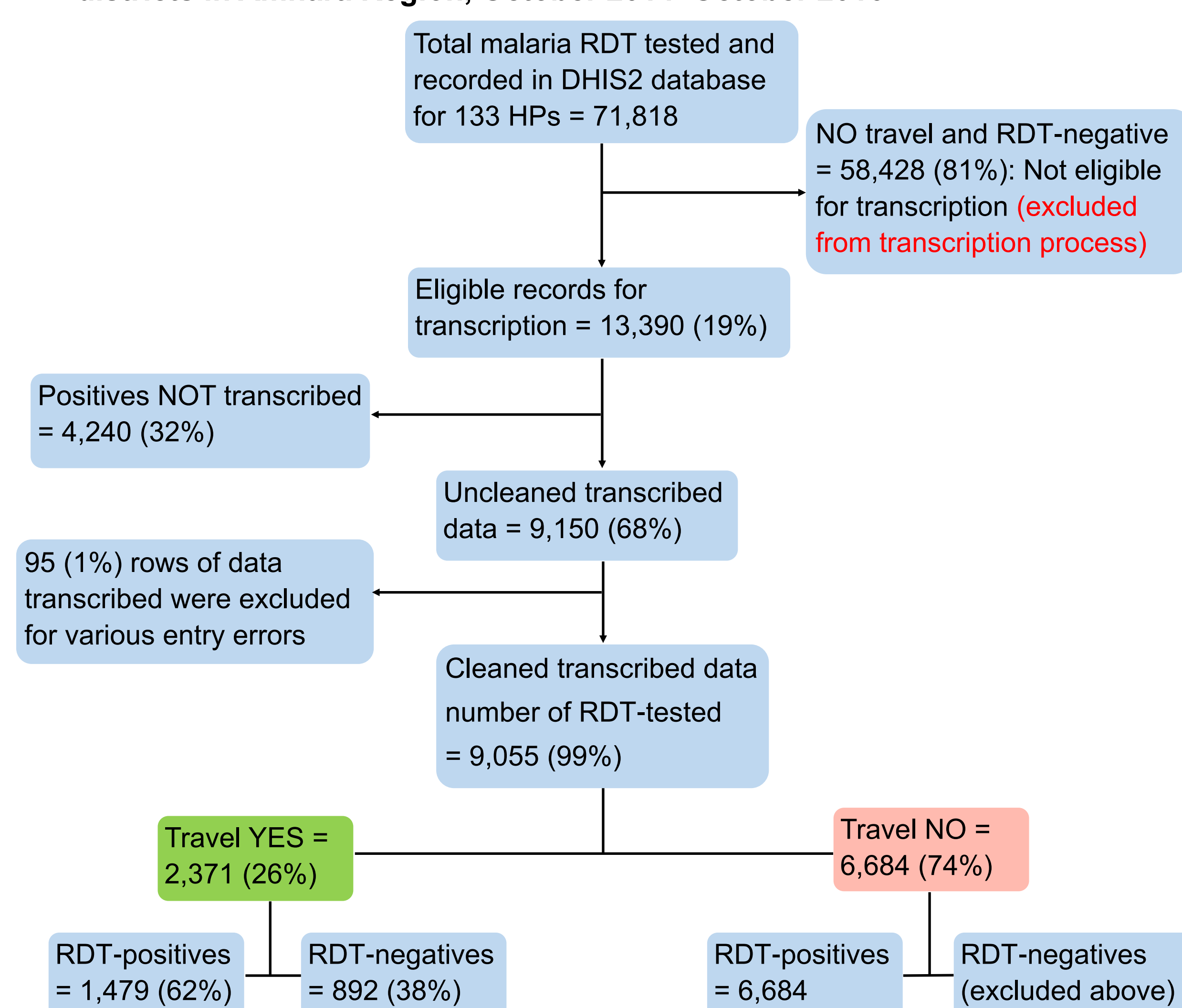
Travel origin and destination locations were extracted from existing village maps for further descriptive analysis.

Statistical analyses were conducted in Stata 13.1 (Statacorp, College Station, TX). Socio-demographic characteristics and malaria risk factors were evaluated for patients with or without travel history.

Descriptive statistics (mean, range, percentages) were calculated for a number of operational considerations. Spatial movement patterns between origin and destination locations were mapped.

Results

Figure 2. Flow chart showing the outpatient department (OPD) data transcription process in 133 health posts from six malaria elimination districts in Amhara Region, October 2014–October 2016



Between October 2014 and October 2016, a total of 71,818 outpatients were tested with an RDT and their travel history in the previous month was recorded in the OPD register.

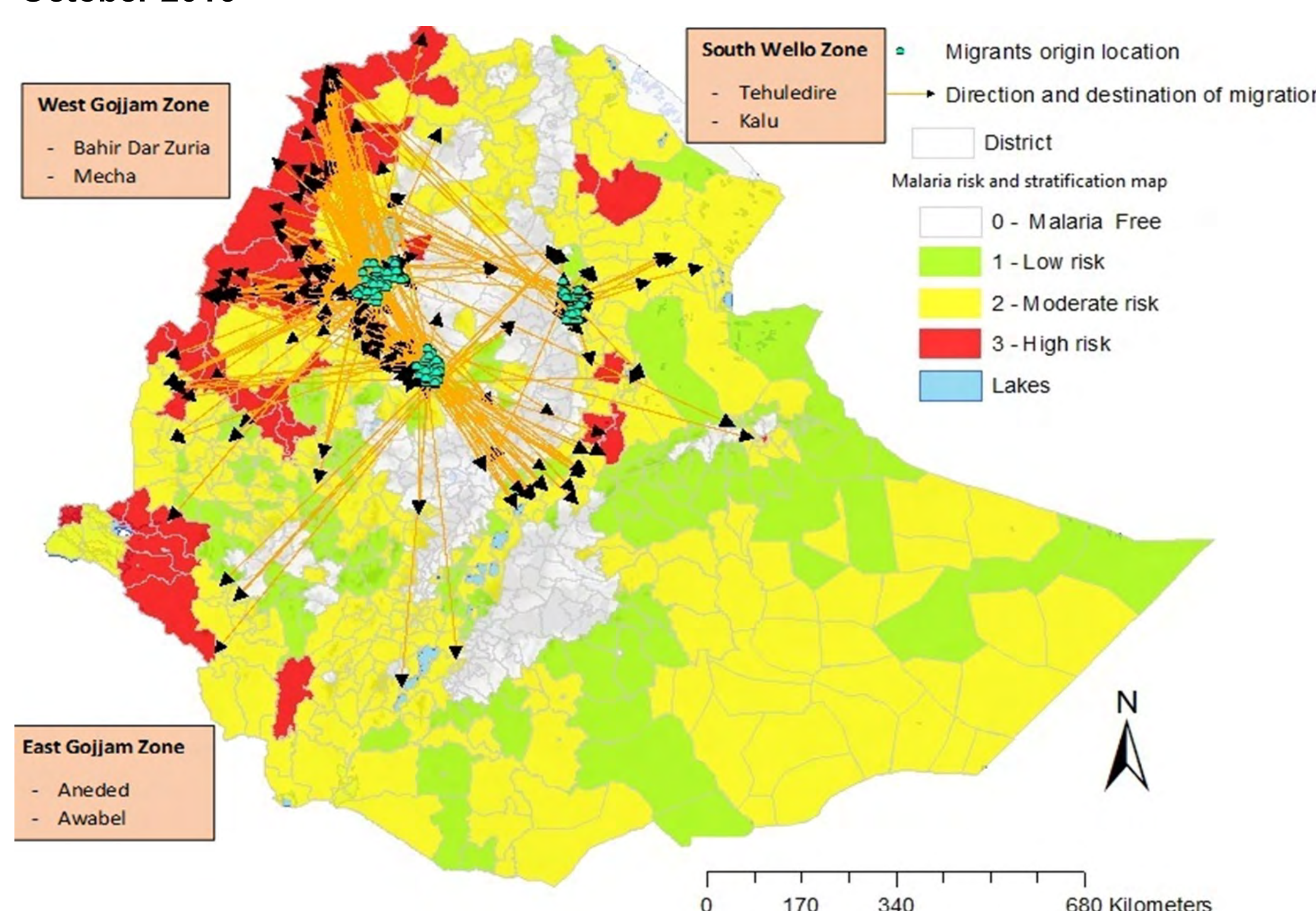
Of these, 9,055 records were transcribed based on the eligibility criteria (all positives with and without travel history plus negatives with travel history).

Among 9,044 transcribed and analyzed records, 75% were male and over 42% of them were between the ages of 20 and 40.

Among the 8,163 RDT-positive patients, 74% were male and 18% had travel history; 41% of infections were due to *P. vivax*, 36% were due to *P. falciparum*, and 23% were due to mixed infections.

P. falciparum (including mixed) infections were more frequent among travelers than non-travelers.

Figure 3. Movement direction and destination of seasonal migrant workers from six malaria elimination districts in relation to the different levels of malaria risk (categorized as high, moderate, low and free) in Ethiopia, October 2014–October 2016



Results continued

The percentage of cases due to *P. vivax*-only malaria decreased with age among both travelers and non-travelers, whereas *P. falciparum* (or mixed) increased with age.

The mean age of RDT-positive cases with travel history was significantly higher (25.1 years [SD 10.7]) than those without travel history (20.6 years [SD 14.8]).

Among the 2,371 cases with travel history, 84% were males, 80% were 15–44 years old, and 62% were RDT-positive.

Patients with travel history had a 6.1 times greater risk of having malaria compared to patients without travel history.

Of the travelers, 69% traveled within the Amhara Region, while 31% traveled to other regions such as Tigray (19%), Oromia (6%), Benishangul-Gumuz (5%), and Afar (3%).

Figure 4. Age distribution of RDT-positive cases by sex and travel history, Amhara Region, October 2014–October 2016

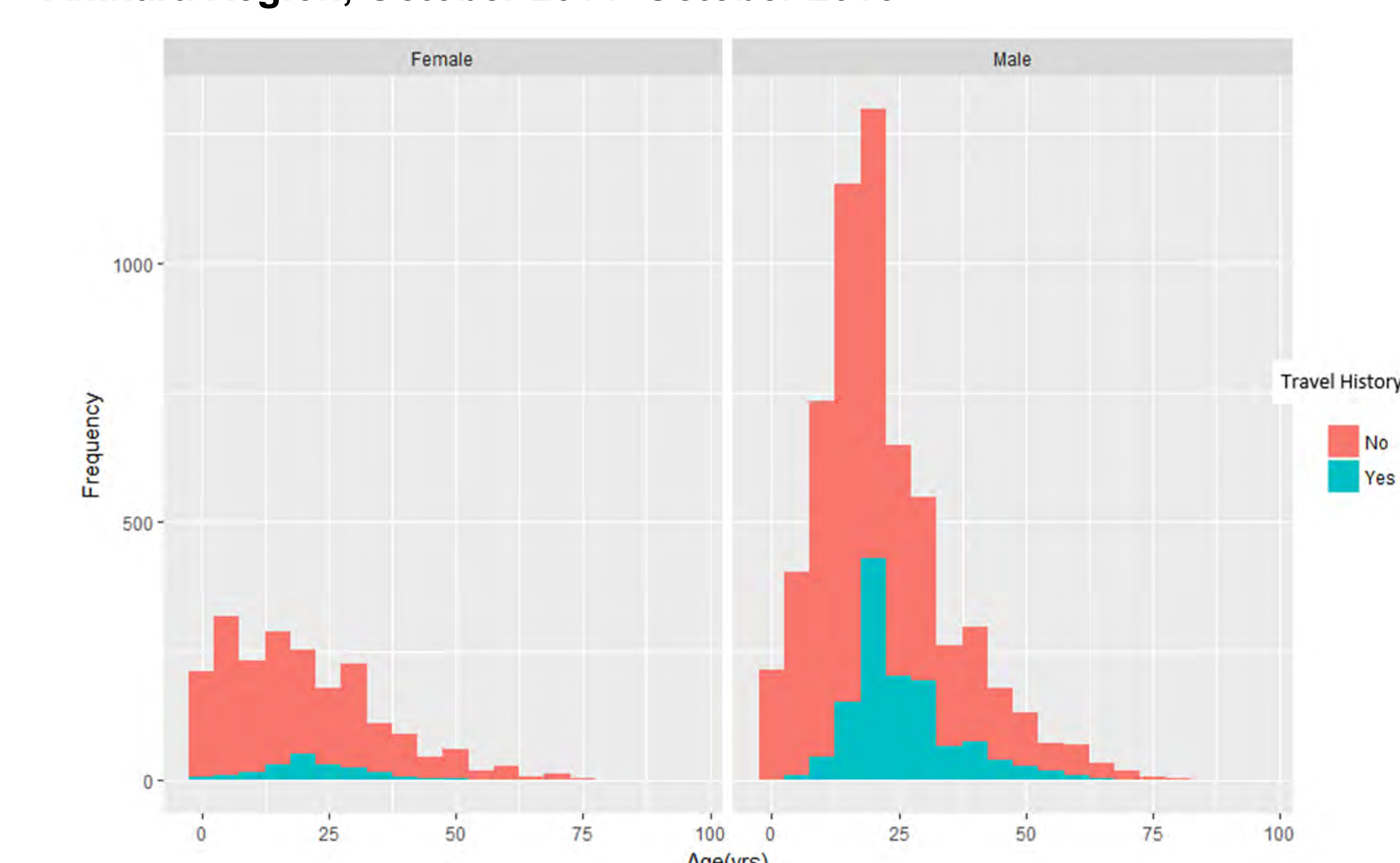
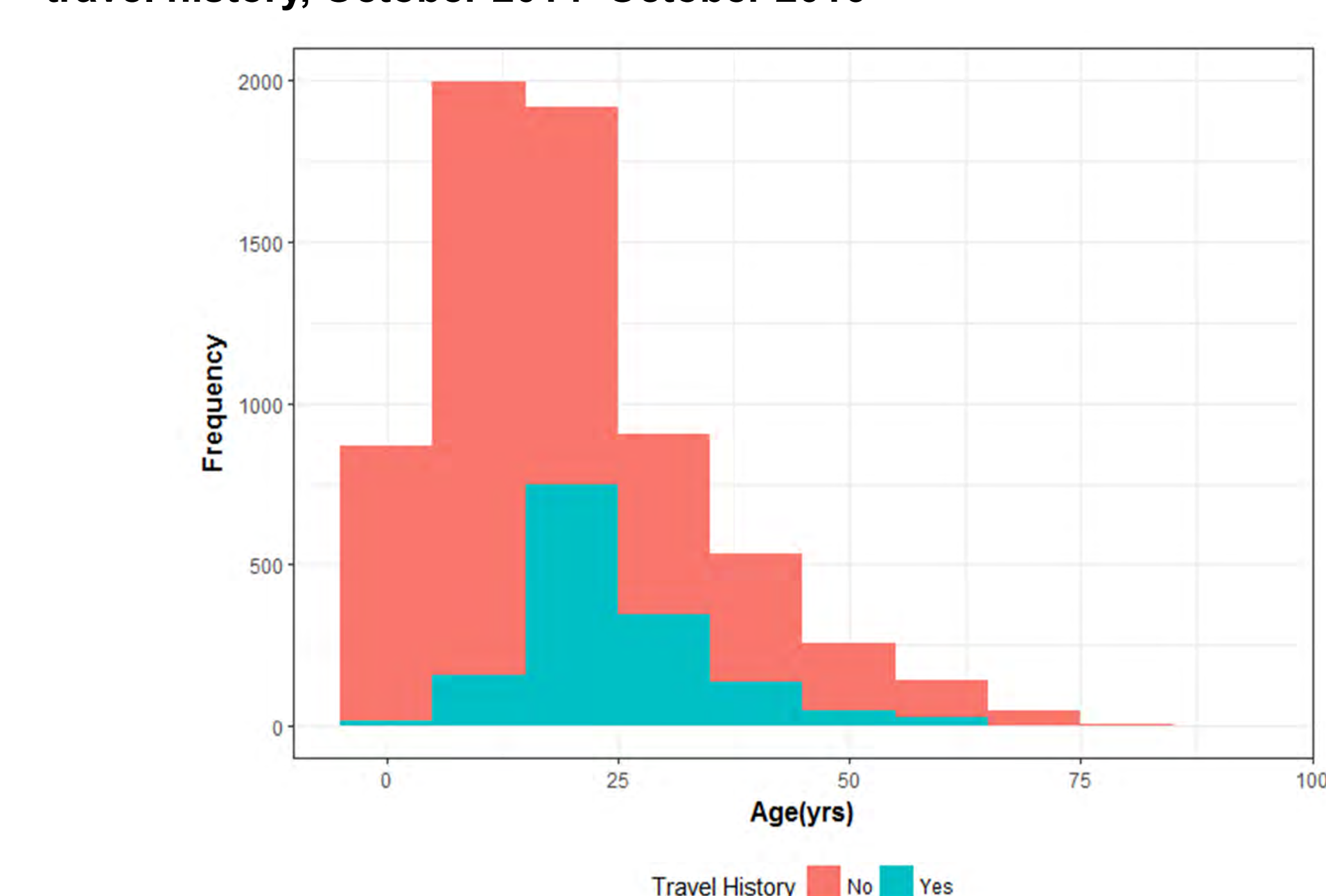


Figure 5. Histogram plots of age of OPD visitors recorded and transcribed by travel history, October 2014–October 2016



Conclusions

Nearly all travel destinations were high-risk areas located in the western lowlands and the Nile valley, and comprised large agricultural farms that attract a high influx of seasonal laborers.

These laborers have a high risk of becoming infected at the farms, and specific strategies are needed on both ends (source and spread of infection) to reduce the risk of bringing malaria back to their homes in low-transmission areas.

Proper case documentation with travel history including destination location at health facilities is essential for taking timely and spatially targeted antimalarial interventions.