

SMART surveillance: An ODK-based Android app for malaria case investigation in Amhara National Regional State, Ethiopia

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Background

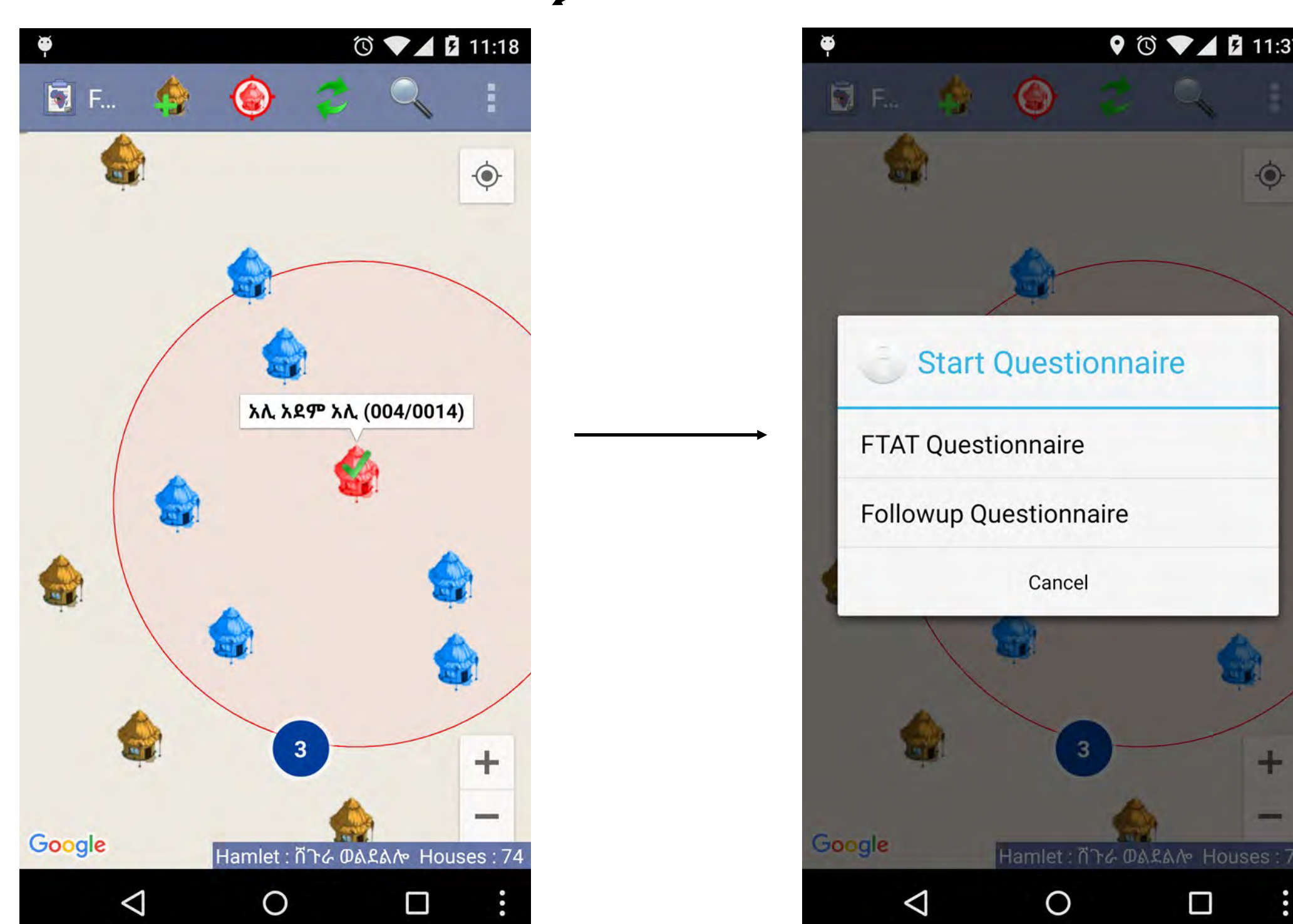
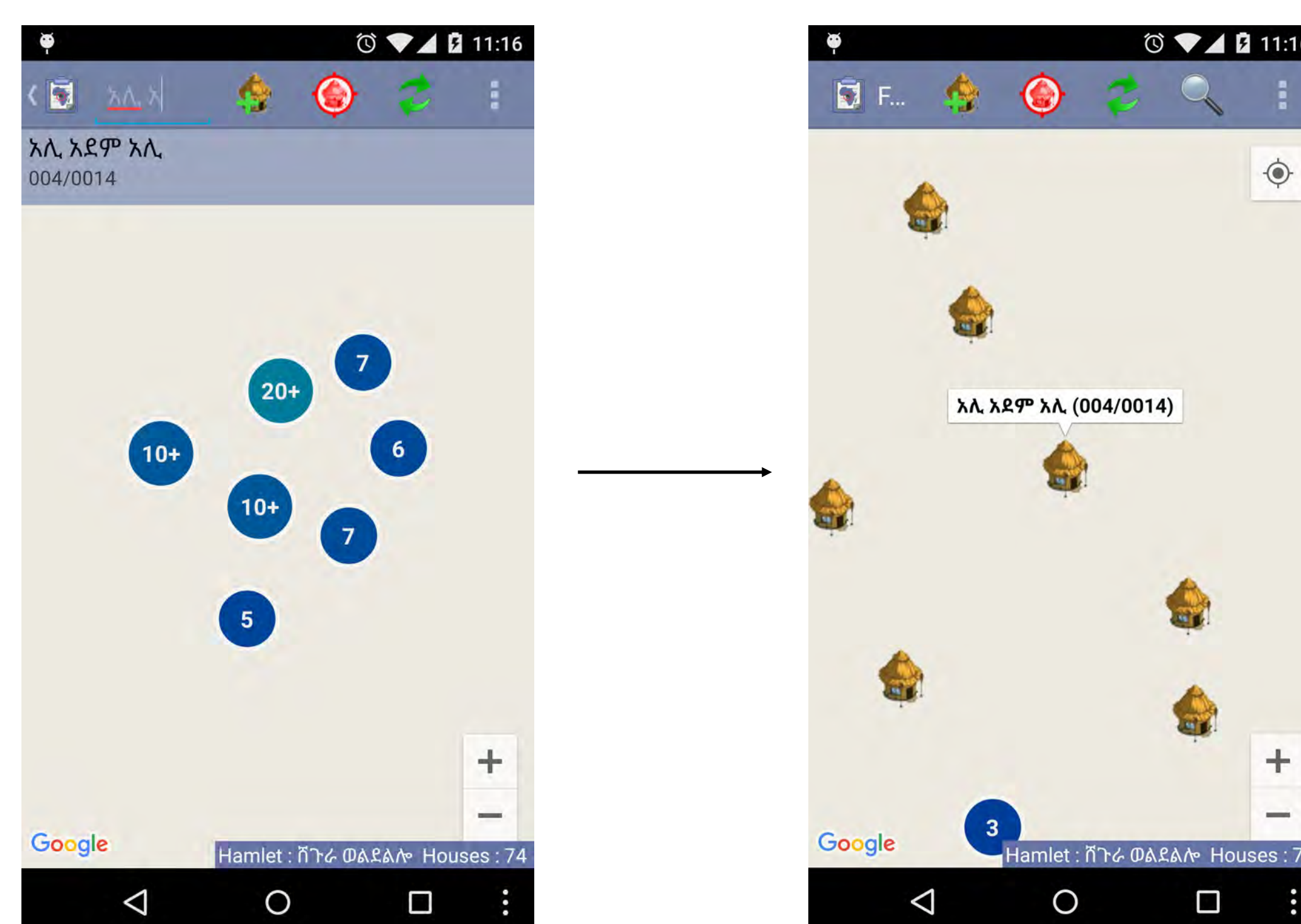
- When malaria transmission is low, investigation of index cases and neighboring households with focal test and treat (FTAT) is one strategy to identify and treat additional infections.
- The search for eligible individuals and households for case investigation is labor- and time-intensive; however, this can be made more efficient by the use of census data and relevant mobile information technology.
- We introduced an innovative ODK-based Android app named SMART surveillance for malaria case investigation that uses Google Maps and embedded geo-referenced house census data.

Methods

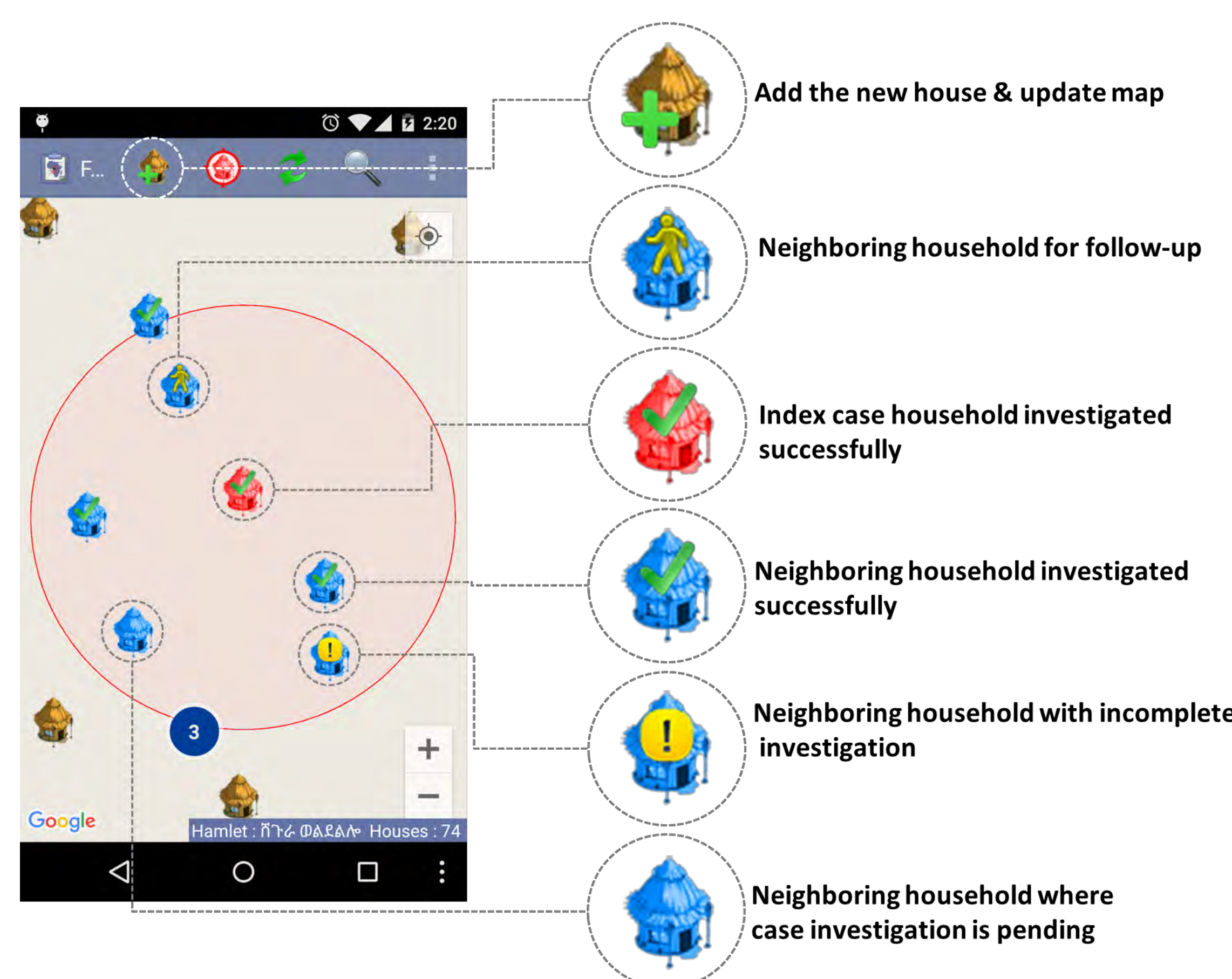
- When health extension workers at health posts encounter a new malaria case, they work with the malaria surveillance assistant (SA) to obtain all necessary basic information about the case from the outpatient department register book.
- After determining that the illness satisfies the criteria for an index case, the SA creates an index case record including the hamlet name.
- The SA brings this basic information into the field during case investigation.

Methods continued

- The app renders the geo coordinates of each household on Google Maps.
- The SA then searches for the household head name. Upon locating the household of an index case, the app then delineates the nearest neighboring houses within a radius of 100 meters.



- The SA follows a standard procedure to initiate an FTAT response beginning at an index case household and then uses the app to navigate to the next nearest house until complete coverage of FTAT response is achieved in the delineated area.



Methods continued

- The SA completes mobile data forms in ODK for each member of the household. These forms have skip logic embedded and are saved so that they are connected to the unique household ID.
- The household of an index case and the surrounding households are color coded on the app to support identification. A change in household investigation status triggers icons to change color accordingly.
- Households that need follow-up are marked with reminder symbols to remind the SA to follow up.
- If the SA misses a target household, this is indicated on the app for remedial action. If the SA comes across a new household (not in the census) then the census map is updated offline by geo-referencing the house.
- When the SA reaches a location with mobile data or Wi-Fi connectivity, they select the forms they filled out and send them to the central server.

Results

- From October 2014 to December 2016 we used this app to investigate 1,313 eligible index cases and 4,458 households, tested 5,554 eligible household members, and treated 223 positives found through this active case detection.
- A partial analysis (illustrative) of the case investigation process during the 2015–16 transmission seasons indicated that a total of 17 villages or health facility catchment areas (HFCAs) with 109,822 population and 17 SAs onboard were involved in the FTAT activities using the app.
- During the specified period, 274 cases were passively identified in health facilities, of which 39% were investigated and reactive case detection (RCD) was conducted using the app.
- Among those index cases investigated, 21.5% had travel history.

Conclusions

- The app has successfully been used to implement malaria case investigation for more than two years in Amhara National Regional State, Ethiopia.
- This approach has streamlined malaria surveillance and response and could be easily customized for use with other diseases of public health significance.
- The tool can be shared among many programs that address diseases of public health significance and those targeted for elimination.
- Being user-friendly, the app provides an opportunity to mobilize health workers unfamiliar with a geography under investigation.
- The app allows for a more efficient RCD and investigation process relative to manual case investigation.
- Future direction of this app includes redesigning the app using ODK 2.0, integrating with DHIS2 to make the data widely available to all of the health system, and incorporating offline background maps.

