# Using a mobile app and mobile workforce to validate data about emergency public health resources

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## ABSTRACT

**Background** Social media and mobile applications that allow people to work anywhere are changing the way people can contribute and collaborate.

**Objective** We sought to determine the feasibility of using mobile workforce technology to validate the locations of automated external defibrillators (AEDs), an emergency public health resource.

**Methods** We piloted the use of a mobile workforce application, to verify the location of 40 AEDs in Philadelphia county. AEDs were pre-identified in public locations for baseline data. The task of locating AEDs was posted online for a mobile workforce from October 2011 to January 2012. Participants were required to submit a mobile phone photo of AEDs and descriptions of the location.

**Results** Thirty-five of the 40 AEDs were identified within the study period. Most, 91% (32/35) of the submitted AED photo information was confirmed project baseline data. Participants also provided additional data such as business hours and other nearby AEDs.

**Conclusions** It is feasible to engage a mobile workforce to complete health research-related tasks. Participants were able to validate information about emergency public health resources.

## INTRODUCTION

Social media and the internet are changing the way people access information and contribute, collaborate and participate. Users with mobile phones can find and complete tasks based on location. A variety of industries have used new technologies such as these mobile internet workforces[1] to accomplish tasks that require input from the public. Less is known about whether a public mobile workforce can be employed to accurately collect important data about emergency public health resources.[2]

One important community health challenge that might benefit from a large mobile workforce is locating automatic external defibrillators (AEDs). These are medical devices in public locations that can significantly improve survival after a cardiac arrest.[3–7]

Despite their lifesaving potential, their locations are often unspecified. There are no national requirements for AED registration or tracking of these devices over time. As a result, AEDs often remain unused, and lives are lost that might have been saved by a nearby AED that no one could locate.[8 9] A mobile workforce might help to find such devices, making them available to bystanders and emergency responders.

Conventional approaches for locating and cataloguing AEDs might be costly—requiring the hiring of large teams to canvass AEDs across the nation. AEDs are often in areas of low visibility, which adds to this challenge, and requires interaction with staff at each place to definitively locate the device. One innovative approach to detecting these devices would be to use a mobile, flexible workforce. Gigwalk (http://www.gigwalk.com) uses a mobile application and has contracts with companies which need large amounts of real-time data. These 'gigwalkers' are paid to take pictures of things and often answer simple questions. In view of the workforce required to locate and catalogue all AEDs in US cities, we aimed to use mobile technology as a new approach to find them and verify existing locations.

## METHODS

This was a prospective feasibility study to see if a mobile workforce could collect reliable information about lifesaving AEDs in Philadelphia County. We used the mobile application, Gigwalk, to identify potential people to take photographs of AEDs.

Gigwalk describes itself as 'a mobile work marketplace connecting businesses with thousands of smartphone enabled workers across the country.' A company, or task owner, establishes tasks, known as 'gigs,' to be performed and invites users to complete them. Gigs are posted on the app and typically require the user to take a photograph and provide information. For example, a US$4 task may ask a participant to go to a restaurant, photograph the restaurant and menu, and answer questions about hours and delivery availability.

Using the phone's built-in locator, users can find tasks closest to them and read descriptions before signing up. Users apply to complete the tasks, and provide basic information such as name, skillset (eg, customer service, clerical, photography, marketing, sales), occupation, education level and name.[10] Gigwalk additionally tracks endorsements from professional colleagues and stated skills to recommend tasks that match the user's background and expertise. After completing tasks, the output is reviewed by the task owner. If the information is satisfactory, users are paid via PayPal (http://www.paypal.com).

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### Study design

We used Gigwalk to post 40 AED-based tasks for the registered users. Each task was to verify the presence of an AED at an identified location within Philadelphia county, Pennsylvania. Participants were provided with a building address, but not the specific information about where the device was located in the building. AED locations were previously identified and photographed by trained research assistants. Locations were selected across multiple neighbourhoods for presumed easy access in high-traffic areas by the public. These locations comprised public areas including the airport (n=10) and other transportation hubs (n=3), gyms (n=6), hotels (n=4), banks (n=1), shopping areas (n=4) and museums and sporting event sites (n=6) (see table 1). In order to generate these tasks, the forms from Gigwalk included: 'Instructions for Gigwalkers' and 'Locations for them to go to.' To complete the task, each participant had to (1) acknowledge that they had read and understood the task, (2) take a zoomed out photo of the AED and (3) submit directions to the AED location. Participants were also invited to provide any additional comments via free text. For correctly completed tasks, users were paid US$3.50. The period for task completion was 13 October 2011 to 7 January 2012.

Submitted data were validated in two ways to ensure that participants had visited the place of reference and taken a mobile phone picture at the location. First, submitted photos were compared with those taken previously by the study team. Second, the mobile phone-assigned global positioning system (GPS) coordinates of the picture were compared with the GPS coordinates of the building.

If a picture was included, the quality was evaluated independently by two members of the research team (RMM, AMC). Questionable entries were reviewed by the research team for adjudication.

The main outcome was the number of tasks correctly and reliably completed during a 3-month period and the types of locations where tasks were executed. The secondary outcomes were characteristics of those using Gigwalk, including age, gender and education level, and time to gig completion.

### Statistical analysis

Summary statistics were used to describe the type and number of tasks completed in this pilot study. This study was approved by the University of Pennsylvania institutional review board.

## RESULTS

The tasks to locate 40 AEDs were posted on Gigwalk for 86 days. All AED tasks were viewed 391 times. Thirty-five tasks (88%) were completed in the study period, with 19 (48%) completed within the first month. The tasks were completed by 13 separate people. During this time, the average user of Gigwalk was 31 years of age, 55% were male and 68% reported having a college degree or higher. About 80% of Gigwalkers had jobs apart from Gigwalk.

Most AED locations selected for tasks were in public buildings. Ten tasks were located in the airport, of which eight AEDs were found (figure 1); AEDs at a zoo, an outdoor concert venue and a baseball stadium were also not identified. Tasks appeared to be completed based on the proximity of locations; those tasks that were in similar locations were usually completed together. Twenty-eight tasks were completed on weekdays (80%), and all were completed before 16:00.

### AED location

Of the 35 completed tasks, 30 provided landmarks with more specific information about the device, such as between which airport gates the AED was found, or windows and other landmarks near the AED. Participants also gave information about hours of building access (n=1), locations of other AEDs in the same area (n=5) and which buildings would not let them photograph the devices (n=3) (table 1).

### AED photos

Of completed tasks, 31 (89%) included photographs of the AEDs. One task included an unclear photo of an AED taken from a stadium seat, pointing at a stadium floor a considerable distance away. Three submitted tasks confirmed AED locations; however, photography of their devices was not allowed. Photographs had GPS coordinates corresponding with the reported location of the AED location. Of the photographs, all 31 (100%) matched those earlier photographs taken by the research team. Figure 2 shows a sample of the quality of photographs taken and saved from Gigwalk.

## DISCUSSION

A mobile workforce was able to confirm locations of lifesaving AEDs in public areas. Participants completed tasks quickly and accurately, making them an ideal workforce for this type of task. Information reported by Gigwalkers was consistent with data

**Table 1** Summary of AED task, sorted by location type

| Location type | AEDs posted | AEDs found | Additional information provided by participant |
|---|---|---|---|
| Airport | 10 | 8 | Participants gave specific descriptions of locations of AED (specific gate or baggage claim numbers) |
| Train station | 3 | 3 | |
| Museum | 4 | 4 | |
| Sporting venue | 2 | 1 | Location given by seat section |
| Health club/gym | 6 | 6 | In one gym, there were an additional 3 AEDs |
| Market/grocery store | 4 | 4 | One participant gave the hours that the store was open |
| Hotel | 4 | 4 | Three hotels did not allow participant to take pictures of their AEDs |
| Bank | 1 | 1 | Located in basement |
| Casino | 1 | 1 | Three additional AEDs in building |
| University-affiliated building | 2 | 2 | |
| Theatres | 2 | 1 | |
| Zoo | 1 | 0 | |

AED, automated external defibrillator.

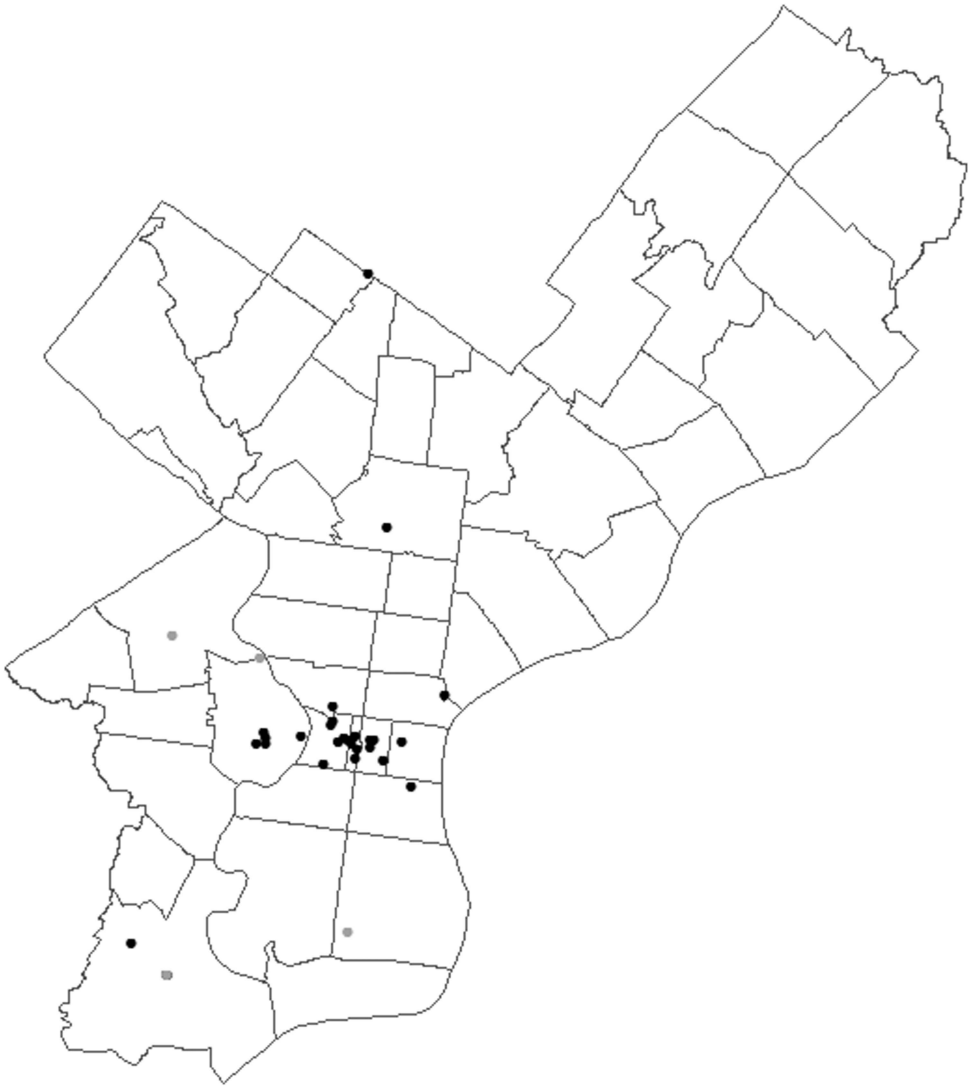

**Figure 1** Map of Philadelphia county, black dots indicate automated external defibrillators (AEDs) located, and grey dots indicate AEDs that were not located.

pre-identified by paid study research assistants. The information was high quality and included helpful descriptions. Given the low cost for each task, this may be a feasible way for many cities to locate their AEDs while simultaneously involving the public to participate in data collection and serve as 'citizen scientists.'[11] This may also increase awareness of citizens about AEDs throughout the city.

Although not a direct comparison, we estimated the costs of hiring a research assistant to complete the task. The hourly wage of a research assistant would be US$10–15 an hour. At an estimate it takes about 30 min to locate an AED, which would bring the cost to between US$200 and US$300 to locate the 40 AEDs in our study. Furthermore, this wage does not include benefits as required by many academic institutions. The cost on Gigwalk would be US$180.

Locating potentially lifesaving devices, such as AEDs, is only one application of this mobile workforce technology. Gigwalk and other companies with similar concepts are now redefining the types of supported tasks to include tasks that require on-site technical support or administrative support. We report the use of a mobile workforce in the collection of public health data; however, this technology has already been used much more broadly. Gigwalk reports that participants have performed over 270 000 tasks in over 6658 cities in the USA, and that it has over 200 000 unique users. Companies such as eBay, Microsoft, and BMW have begun to use this mobile workforce. Most recently, Gigwalk signed a deal with Microsoft for over 100 000 tasks in 3500 cities. Mobile workforce services might be useful in other public health research areas, such as focus groups on healthcare issues, collecting survey data, tracking patient crowding, disease surveillance or monitoring resource placements over time.

## LIMITATIONS

Certain characteristics of the task (locating AEDs) may not be applicable to other public health problems that might be dealt with by a mobile workforce. Our task was unique and challenging in that it required participants to interact with employees to find AED locations. Our participant rate was high, but might have been improved by higher pay. Several of our tasks were not completed, including those at an outdoor concert venue, baseball stadium and the zoo. We think that this was due to the season and the period of time allowed for these tasks; most people do not visit these locations in the winter. Future studies


**Figure 2** Examples of photograph and description provided. A well-composed photograph indicating the location of the automated external defibrillator (AED). The participant used the free text space to also point out the location of other AEDs within the building and how to access them.

should examine the types of tasks that appeal to users, how to determine the best payment without inducing coercion and how to use this mobile workforce most effectively.

## CONCLUSION

To the best of our knowledge, this is the first report of the use of a mobile task force to complete a public health-related task. We found that using Gigwalk to confirm the location of AEDs was feasible. This low cost and rapid method of obtaining information might be used for other public health-related tasks.

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## Notes