APPENDIX

Appendix A: App design and operation

The flu@home app can be used on an iPhone, iPad, Android smartphone, or Android tablet. The app is available in English for the study. However, the app supports development and release of other languages as needed. The entire app experience uses a touch-sensitive dynamic interface on the device. The app ensures the proper test procedure is followed through clear instructions and timers that prevent the participant from moving forward in the test process (e.g., when the test strip must remain in the test fluid for ten minutes to be certain the strip has enough time to process before reading the result). The app attempts to keep participants engaged during wait times by providing flu-related informational facts (during an initial one-minute timer when the nasal swab is processing in the RDT vial) and asking the participant to answer a set of demographic and illness-related survey questions (during the ten-minute timer). Field-level validation is employed to ensure participants answer specific required questions in the survey.

The app was built using React Native, a JavaScript framework used to create mobile applications for iOS and Android. The app communicates with the Google Cloud Platform (Firebase) to queue survey data and Firebase storage to queue images captured from the RDT flow. These are pulled by a NodeJS service into a PostgreSQL database hosted on an AWS Relational Database Service (RDS), which allows for operation and scale of a relational database in the cloud.

The flu@home Australia app is available for personal devices which are expected to be under control of an individual who uses a passcode to access the device. All supported devices use encryption to protect app data resident on the device. This encryption is afforded by the device itself, not a specific application. In the event that a device is stolen, the device's onboard locking feature is the front-line defense against access to data on the device. The flu@home application does not collect the user's name, email, or other key identifiable information in the app. It focuses on data collection of symptoms, disease presentation, and demographics. The level of data protection offered by the flu@home app is the same level of protection afforded to most other health applications, email, messaging, etc. available on a mobile device.

App data is stored in Amazon Web Services (AWS S3 and AWS RDS). Amazon Simple Store Service (S3) provides a straightforward web services interface that is used to store and retrieve data, such as PCR data from the swab taken as part of the ASPREN study and used for comparison to the RDT test results. Access to S3 requires user authentication. From the time data leaves the client, all data is encrypted both at rest and over communication links. We use AWS Key Management Service (KMS) to encrypt data at rest in AWS, and Google Cloud Platform automatically encrypts its data using Advanced Encryption Standard (AES). All connections to the app occur over Secure Sockets Layer (SSL), a standard security technology that establishes an encrypted link between a web server and browser, ensuring all data traversing the web server and browser remains private.

For near real-time reporting, Metabase is run in an Elastic Container Service (ECS) in the same AWS project referencing the same app data.

The app uses Firebase caching and analytics to track each participant page view, including a timestamp for each page view. Firebase is also used to track changed answers if a participant navigates back in the app flow.

Appendix B: Australia Sentinel Practices Research Network (ASPREN) Protocol

The protocol for ASPREN clinical sites requires GPs to sample the first three ILI patients each week during flu season (May – October 2019 inclusive), and the first ILI patient of the week from November 2019– April 2020 inclusive. For the flu@home study, GPs will be allowed to recruit all adult patients presenting to the clinic with ILI symptoms, in order to meet recruitment goals. Participating clinical sites will obtain a nasal or nasopharyngeal swab which will be transported to SA Pathology, Adelaide, South Australia for testing using RT-PCR for influenza A, influenza B, as well as RSV, enterovirus, adenovirus, mycopneumoniae, human metapneumovirus, parainfluenza 1, 2, 3 and pertussis. Samples positive for influenza A will be further subtyped. All original clinical samples testing positive for influenza will be referred to the WHO-CCRRI (Melbourne, Australia) for antigenic and phylogenetic characterization. For clinical sites in tropical regions, due to the decreased seasonality of influenza, the systematic sample involves the first three ILI patients of each week, all year round. In addition to this, in all sites all ILI patients ages 65 years and over are tested all year round.

Appendix C: Flu@home Participant Questionnaire

Symptom Survey

*Questions marked with an * are required.*

Symptom	*Which of the following were present during your illness?	*How long ago did symptoms start? (Select the time frame that best applies)	*Were these symptoms present in the last 48 hours?	*How severe were your symptoms? (Select the level of discomfort you felt at the worst point)
Fever	YES/NO	1 day, 2 days, 3 days, 4+ days	YES/NO	mild, moderate, severe
Cough	YES/NO	1 day, 2 days, 3 days, 4+ days	YES/NO	mild, moderate, severe
Feeling more tired than usual	YES/NO	1 day, 2 days, 3 days, 4+ days	YES/NO	mild, moderate, severe
Chills or sweats	YES/NO	1 day, 2 days, 3 days, 4+ days	YES/NO	mild, moderate, severe
Sore throat	YES/NO	1 day, 2 days, 3 days, 4+ days	YES/NO	mild, moderate, severe
Headache	YES/NO	1 day, 2 days, 3 days, 4+ days	YES/NO	mild, moderate, severe
Muscle or body aches	YES/NO	1 day, 2 days, 3 days, 4+ days	YES/NO	mild, moderate, severe
Runny or stuffy nose	YES/NO	1 day, 2 days, 3 days, 4+ days	YES/NO	mild, moderate, severe
Shortness of breath	YES/NO	1 day, 2 days, 3 days, 4+ days	YES/NO	mild, moderate, severe
Vomiting	YES/NO	1 day, 2 days, 3 days, 4+ days	YES/NO	mild, moderate, severe

General exposure

In the next section, the questions are going to be about being **in contact** with people who seemed to have a cold or the flu. **In contact** means being within two meters of them for at least two minutes or physical contact for any amount of time.

For reference, two meters is about the distance between you and someone sitting two rows ahead of you on the bus.

In the past week, have you been in contact with a person who seemed to have a cold or flu?

- Yes
- No
- Don't know

[If YES] Were they coughing or sneezing?

- Yes
- No
- Don't know

In the past week, have you been in contact with any children under five years old for over an hour?

- No contact with children under 5 yrs
- 1 child
- 2-5 children
- More than 5 children
- Don't know

Are there any children under 18 years old in your household?

- Yes
- No
- Don't know

[If YES] Do any children in your household attend a school, childcare setting, or play group with at least three other children for a total of three or more hours per week?

- Yes
- No
- Don't know

How many people live in your household (including you)?

- 1-2
- 3-4
- 5-7
- 8+

How many bedrooms are in your home?

- 0-1
- 2
- 3
- 4
- 5+

Influenza vaccination

We would like to ask you some questions about your influenza vaccination history. This information will be used to determine how effective the vaccine is.

Did you receive an influenza vaccination this year (2019*)?

- Yes
- No
- Do not know
- I've never received an influenza vaccination.

[If YES] what was the approximate date of your influenza vaccination?

- Choose month and year starting from January 2019* up to the current month

[If YES] Did you receive a free influenza vaccination under the National Immunisation Program in 2019*?

- Yes
- No
- Do not know

[If YES] What medical condition(s) do you have that made you eligible for a free influenza vaccination?

- Free text field

[If Answer to above is something other than: "I've never received an influenza vaccination"] Did you receive an influenza vaccination last year (2018*)?

- Yes
- No
- Do not know

General health

Next we'd like to ask you some questions about your overall health:

Have you ever been told by a doctor that you have one of the following medical conditions? (SELECT ALL THAT APPLY)

- Asthma
- COPD/emphysema
- Diabetes
- Heart disease
- None of these
- Do not know

Are you a healthcare (or aged care) worker (i.e. do you directly work with patients/aged care residents in your job)?

- Yes
- No
- Do not know

Do you smoke tobacco?

- Yes
- No

Does anyone in your household smoke tobacco?

- Yes
- No

Is your illness preventing you from going to work or school, going to social events, or exercising/working out?

- Yes
- No

Are you currently taking antibiotics (e.g. Amoxil, penicillin, azithromycin, co-trimoxazole (Bactrim), co-amoxiclav (Augmentin)) or antivirals (e.g. Tamiflu, Xofluza, Relenza) prescribed by a doctor (GP or hospital) for this illness?

- Yes
- No
- Do not know

How old are you?

- 18 to 19
- 20 to 24
- 25 to 29
- 30 to 34
- 35 to 39
- 40 to 44
- 45 to 49
- 50 to 54
- 55 to 59
- 60 to 64
- 65 to 69
- 70 to 74
- 75 to 79
- 80 to 84
- 85 to 89
- 90 and older

What is the sex on your medical records?

- Male
- Female
- Indeterminate/Other
- Prefer not to say

How would you describe your race? Please select all that apply.

- Aboriginal
- Torres Strait Islander
- Pacific Islander
- North or East Asian
- African
- European
- White Australian

- South or Central American
- Middle East/North African
- Indian subcontinent
- Other

[The next question is asked after the flu rapid test is complete]

Nice job! Do you feel you performed all of the steps in the flu test correctly? Select the most applicable option

- It was easy to follow and I think I completed the test correctly
- It was a little confusing but I think I did the test correctly
- It was very confusing and I'm not sure I completed the test correctly
- During the test, I realized I did something incorrectly

* *All questions with an asterisk listed by the year will be updated in the mobile app in January 2020 (i.e. questions referring to "this year" will list 2020 instead of 2019.)*

Appendix D: Follow-Up Survey Variables

Category	Questions asked
Health behaviors and attitudes	I believe taking an active role in my own care is the most important factor in determining my health.*
	I am confident that I can identify when it is necessary to get medical care versus when I can handle the problem myself.*
	I often think carefully about whether health information makes sense in my particular situation.*
	I acknowledge that I have a key role in the day-to-day management of my health.*
	I often need someone to help me when I receive written information from my GP, nurse or pharmacist.*
	In general, I believe the state of my health is:**
	I am confident that I can tell my GP concerns I have even when he/she does not ask about them.*
	I like to find out a lot of information about health online.*
	I am confident that I can follow through on medical treatments I need to do at home.*
	I value my health more than anything else.*
	My health needs are always met from available healthcare resources.*
	As well as seeing my GP, I regularly monitor (check for) changes in my health.*
	I do what is necessary to keep myself healthy.*
	My GP and I work together to make decisions about what's best for my health.***
Experience/	The purpose of using flu@home was to: Yes No

<table>
<tr><td rowspan="10">usability</td><td>
<table>
<tr><td>Test for flu</td><td>○</td><td>○</td></tr>
<tr><td>Give me information about flu and medicine</td><td>○</td><td>○</td></tr>
<tr><td>Test different flu medicines</td><td>○</td><td>○</td></tr>
<tr><td>Participate in a research study about the flu</td><td>○</td><td>○</td></tr>
</table>
</td></tr>
<tr><td>I am satisfied with how easy it was to use flu@home (nasal swab test and app).*</td></tr>
<tr><td>I had the skills needed to perform swab testing using flu@home.*</td></tr>
<tr><td>I was able to understand the results from the flu@home app.*</td></tr>
<tr><td>The instructions for using flu@home were helpful in providing me with what I needed to perform the test.*</td></tr>
<tr><td>Using flu@home <u>app</u> was:****</td></tr>
<tr><td>Doing the flu@home <u>nasal swab test</u> was:****</td></tr>
<tr><td>Entering my information into the flu@home app was: ****</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td rowspan="4">Impact/ perceived value</td><td>I would recommend flu@home to a friend or family member.*</td></tr>
<tr><td>My GP was very supportive of me using flu@home.*</td></tr>
<tr><td>It saves time to do a home-based test like flu@home before visiting a healthcare provider.*</td></tr>
<tr><td>I feel that flu@home could help me better manage my illness.*</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td>Intention to Act</td><td>If flu@home testing indicated you had the flu, which of the following would you consider doing as next steps?
<table>
<tr><td></td><td colspan="2">I would consider</td></tr>
<tr><td></td><td>Yes</td><td>No</td></tr>
<tr><td>A virtual consultation with a provider (telemedicine visit)</td><td>○</td><td>○</td></tr>
<tr><td>Sharing my results anonymously with a national flu tracking system</td><td>○</td><td>○</td></tr>
</table>
</td></tr>
</table>

	Reading flu@home tips on how to prevent flu spread	○	○
	Encouraging others in my household to use flu@home for testing	○	○
	I would use the flu@home kit in the future if I have symptoms.*		
	I would do the flu@home test if I could purchase the test kit online to send to my home, rather than see my healthcare provider for diagnosis.*		

* Responses on Likert scale anchored with 'Strongly Disagree' and 'Strongly Agree'
** Responses on Likert scale anchored with 'Very Poor' and 'Excellent'
*** Responses on Likert scale anchored with 'Never' and 'Always'
**** Responses on Likert scale anchored with 'Very Easy' and 'Very Difficult'