CONTACT TRACING WORKFORCE ESTIMATOR

The Contact Tracing Workforce Estimator (CT Estimator) is a tool for state and local leaders to prepare for COVID-19 contact tracing in order to safely reopen and protect the health of communities.

The CT Estimator uses a baseline of 15 CTs per 100,000 population and increases the number of CTs, as needed, to contact trace the 14-day number of new COVID-19 cases for each county over the course of a week (JHU CSSE). Preset case contacts and CT work capacity (e.g. the number of case interviews, contact notifications, and contact follow-ups a CT can conduct daily) were set according to available data and expert opinion. The preset parameters assume number of case contacts *with* social distancing and work capacity to include some social needs evaluation and case management.

As the dynamics of the pandemic vary regionally, users can adjust variables according to the circumstances and needs of their location. Local factors, such as in-person vs. telephone or technology supported contact tracing and community social or language needs, can affect the CT workload. Users can also set the daily cases at the county or state level to plan for future CT workforce needs. There remain several uncertainties and unknowns with COVID-19. As more is learned about staffing structures and efficiencies for contact tracing and as new data becomes available, users of the CT Estimator are encouraged to reevaluate and update their assumptions over time.

Experts recommend continuing physical (social) distancing measures until a number of criteria are met, including decreasing cases in the context of increasing testing, all cases can be interviewed for contact elicitation, and contacts are elicited for at least 90% of cases. The number of reported cases will depend on testing capacity. Counties and states with less testing capacity may be reporting fewer cases due to limited testing. As testing capacity increases, the number of cases may also increase, further increasing the number of CTs needed. Counties and states requiring high numbers of CTs or lacking the number needed to manage their 14-day caseloads may want to reconsider moving from mitigation to containment strategies.

Contact Tracing

Contact tracing is a principle of disease control and its implementation and scale-up is needed both to relax mitigation efforts and to prevent further spread of COVID-19. While the methods of contact tracing are not new, the disease acuity, route of disease transmission, number of

contacts, social situation, and use of technology all factor into the resources needed to supply an adequate contact tracing workforce.

Current estimates for a contact tracing workforce vary widely in the US from 100,000 to 300,000 and were largely developed using population-based ratios from other settings (Table 1). While this strategy allows for broad estimates, it does not account for regional outbreaks and case variability currently seen in the United States. Similarly, participation with contact tracing by a population and efficiencies within a health department also vary regionally affecting workforce needs.

Table 1: Contact Tracing Workforce Ratios

Location	Number of Contact Tracers	Population	Contact Tracers per 100,000 People
Wuhan, China	9,000	11.1 million	81.1
Iceland	50	364,134	13.7
New Zealand	190	4.9 million	3.9
New York City	1,000	8.4 million	11.9
New York State	6,400 – 17,000	19.5 million	32.8 – 87.2
Massachusetts	1,000	6.9 million	14.5
California	20,000	39.5 million	50.6

Contact Tracing Workforce

Contact tracing begins with the identification of a positive case. A *case investigator* is assigned to contact each new case, complete a case form, and collect information on contacts. According to the CDC, contacts are defined as "someone who was within 6 feet of an infected person for at least 15 minutes starting from 48 hours before illness onset until the time the patient is isolated." Once information is obtained on the contacts for each case, a *contact tracer* reaches out to each contact, provides information and advises the contact that they need to get tested if symptomatic and/or quarantine. Ideally, the contacts should be reached within 24 hours to limit further spread. Daily follow-up checks to monitor for the development of fever or symptoms should occur for 14 days from the last contact with an infected person.

The CT Estimator focuses largely on the *case investigator* and *contact tracer* roles. These roles may be filled by different types of workers or individuals may function in both roles. The CT Estimator provides the number of FTE needed in each of three roles (case interviews, contact notification, and contact follow-up) to allow planning for different staffing models. Additionally, ASTHO experts indicate a *supervisor* to CT ratio of 1:10 is standard. In some locations, the case investigator may supervise a team of contact tracers, and social workers, nurses and other staff may be needed as part of the contact staff team or through referral to assist those with barriers to quarantining or obtaining a test, or with medical needs.

The CT Estimator does not account for the existing public health workforce. Each locality may use a combination of different strategies - including reassigning existing public health staff (e.g. school nurses, community health workers), partnering with local health care organizations, hiring new CTs, or recruiting volunteers). Re-deploying the existing workforce has the benefit of experienced workers, however, these workers will eventually need to return to their primary positions. Hiring new CTs will require training and support.

Educational resources to expedite the training process have been developed with ASTHO launching an online training program and Bloomberg philanthropies announcing plans to build an online curriculum and training program to support New York State.

Variables Affecting Workforce Need

Baseline Contact Tracer Estimates
In non-emergency situations, NACCHO recommends a baseline of 15 contact tracers per 100,000 people. This has been set as the default baseline in the CT Estimator regardless of case load.

Minimum Contact Tracers per Population
Based on the 15 CTs per 100,000 population minimum, smaller counties may not meet the population threshold for one full-time equivalent worker. As a default, the CT Estimator sets a minimum of one contact tracer per county. Contact tracing will need to be led at the local level, through states and local health departments (LHDs). However, some LHDs will need additional support - 439 LHDs serve populations less than 10,000 and are on average staffed by 4 FTE. Smaller counties may require state or regional level planning to ensure sufficient contact tracing workforce.

Number of Contacts per Case
The number of contacts per case will vary depending on the level of physical distancing. Experts advise that the number of contacts are 10 with social distancing and increase to 19 without social distancing. In some places, contacts may even be less than five with stay-at-home orders (Table 2). The number of contacts may also vary based on population density.

Table 2: Contacts per Case

Location	Contacts per Case
Massachusetts (enforced stay-at-home)	<5
Massachusetts (without stay-at-home)	10
Harris County, Texas	20
Tulsa County, Oklahoma	36

Case Investigator Effort
The time required for a case investigator to interview each positive case varies. Washington State estimates each investigator can interview seven cases per day. Assuming an eight-hour

workday, this equals approximately 70 minutes per case. NACCHO experts indicate this may vary from 30 minutes to one hour plus additional time needed for data entry. The European Centers for Disease Control (ECDC) estimates [two hours plus one hour for data entry for each case](#) equaling about three case interviews per day. The CT Estimator presets this to six case interviews per day (Table 3).

Contact Tracer Effort

Washington state estimates [21 contacts will be reached each day](#). Based on an eight-hour day, this equals 23 minutes per contact. The ECDC estimates [45 minutes for the initial contact interview plus 15 minutes for data entry](#). This would equal eight new contact interviews per day. Additional follow-up interviews with contacts to monitor symptoms will require 10 minutes per day according to the ECDC or 48 contact follow-ups per day. The CT Estimator is preset to support some social needs evaluation and case management and is preset to 12 contact notifications per day and 32 contact follow-ups per day (Table 3).

Table 3: Daily Case Load (based on an 8-hour workday)

Source	Index Case Interview	Initial Contact Notifications	Contact Follow-ups
ECDC	3	8	48
Washington State	7	21	--
CT Estimator (Presets)	6	12	32

Additional Factors to Consider

Role of Technology

Much attention recently has focused on the role of technology in contact tracing. While [Apple and Google have launched a joint effort](#) utilizing Bluetooth technology to identify contacts, the effects on workload for contact tracing remain unknown. The technology may assist in the identification of new contacts however it may also overestimate the number of contacts for an individual case. The San Francisco Department of Public Health is utilizing [text messaging to follow up with contacts for daily symptom checks](#) which may reduce the effort required for contact follow up.

Resources for Vulnerable Populations

Social situations will vary among contacts and may require additional resources. Massachusetts has developed an additional role, a **care resource coordinator**, who can identify vulnerable patients and connect them with additional resources as needed. The CT Estimator includes demographic factors such as the percent population over age 65 and percent population in poverty as well as the [CDC's Social Vulnerability Index](#) for each locality to help users plan for additional time or resources needed for these populations.