Taxonomies of Digital Vulnerability and COVID-19 Exposure Risk Profiles

Laura Robinson
Santa Clara University

Jeremy Schulz
UC Berkeley

Aneka Khilnani
George Washington Univ.

Hiroshi Ono
Hitotsubashi Univ.

Shelia R. Cotten
Michigan State University

Noah McClain
Illinois Institute of Technology

Lloyd Levine
UC Riverside

Wenhong Chen
UT Austin

Gejun Huang
UT Austin

Antonio A. Casilli
Telecom Paris, Institut Polytechnique de Paris

Paola Tubaro
CNRS, Universite Paris-Saclay, Inria

Matías Dodel
Universidad Católica del Uruguay

Anabel Quan-Haase
Western University

Maria Laura Ruiu
Northumbria University

Massimo Ragnedda
Northumbria University

Deb Aikat
Univ of N. Carolina, Chapel Hill

Natalia Tolentino
Calif. State Polytechnic Univ.

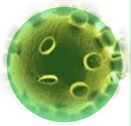
Full Text in: First Monday

COVID-19: Axes of Inequality

Pandemic is deepening key axes of social differentiation.

- Excess deaths in the U.S. disproportionately
  - Low income
  - Race and ethnicity

- Intersection of Race and Class:
  - Reliance on public transportation
  - Multigenerational housing
  - Overrepresentation in essential jobs
  - Chronic medical conditions
  - Lack of internet access--availability of public health information
  - Cooper, 2020: https://coronavirus.jhu.edu/



COVID-19 Pandemic: New Kinds of risks
these risks are unequally distributed

Research Question:

What role do digital resources play in individuals' capacity to control the risk of pathogen exposure?

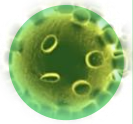
Examination:

Map out the intersection between COVID-19 risk factors and digital inequalities on vulnerable populations bearing disproportionate risks:

Social isolated, older adults, penal system subjects, digitally disadvantaged students, gig workers, and last-mile workers.

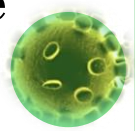
Findings:

With the exception of gig workers, and last-mile workers, those with digitally resources have tools to mitigate and manage risks associated with the pandemic.



Digital inequalities Meets COVID-19: Taxonomies of Vulnerability

- The COVID-19 pandemic is truly the first large-scale global pandemic which is taking place during the internet age.
- During this global health crisis, individuals have for the first time the capacity to minimize their exposure risk by engaging in digitized interaction with others and avoiding shared physical "contact zones" (Askins and Pain 2011).
- Individuals are constantly put at risk and called to make consequential decisions about managing risk within the existing parameters of their everyday lives (Beck et al., 1992; Giddens 1990). COVID-19 pandemic is radically altering the "landscape of risk" (Zinn and MacDonald, 2018).
- Exposure Risk Profiles (CERPs) vary according to work engagements, home environments, manner and frequency of consumption, and modes of social interaction - all of which may vary across the life course and socioeconomic status.

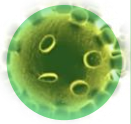


COVID-19 EXPOSURE RISK PROFILES (CERPS)

CERPs hinge on preexisting forms of social differentiation such as socioeconomic status, as individuals with more economic resources at their disposal can better insulate themselves from exposure risk.

Individuals who can more effectively digitize key parts of their lives enjoy better CERPs than individuals who cannot digitize these life realms.

Digital inequalities are implicated in both life-or-death exposure to COVID-19, as well as excess deaths attributable to the larger conditions generated by the pandemic.



COVID-19 EXPOSURE RISK PROFILE (CERP)

COVID-19 EXPOSURE RISK

EXPOSED

SHELTERED

EXPOSED & UNCONNECTED

ESSENTIAL WORKER MARK
Lives in multigenerational home in apartment building

Work
Line worker in congregate workplace (food processing etc.)

Consumption
F2F: Shops brick-and-mortar
Analog services: phone and mail-order
≠ Digital

Communication
F2F
Analog communication and media
≠ Digital

EXPOSED & CONNECTED

ER DOCTOR MARIA
Lives in brownstone w/ partner who is ER nurse on pandemic frontline

Work
Emergency room physician on pandemic frontline

Consumption
Avoids F2F
Digital: Telemedicine, shopping, and digital delivery services

Communication
F2F
Analog communication and media
Multi-modal digital

SHELTERED & UNCONNECTED

RURAL FARMER ELIJAH
Member of intentional community in remote rural area

Work
Runs farm with household as part of self-sufficient community

Consumption
F2F: Shops brick-and-mortar
Analog services: phone and mail-order
≠ Digital

Communication
F2F
Analog communication and media
≠ Digital

SHELTERED & CONNECTED

PROGRAMMER PAT
Lives with spouse who is teleworker in detached house in suburbs

Work
Software developer teleworking from home

Consumption
Avoids F2F
Digital: Telemedicine, shopping, and digital delivery services

Communication
F2F with household
Analog communication and media
Multi-modal digital

UNCONNECTED — DIGITAL RESOURCES — CONNECTED

COVID-19: Socially Isolated & Older Adults

COVID-19 risk management: mental health, well-being in addition to physical health.

82% of 65-69 year olds use the internet

Drops 44% of those aged 80 and older (Anderson and Perrin, 2017).

Similar patterns appear across Latin America (Galperin, 2017).

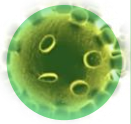
Over 40 million older adults in the U.S. experience chronic loneliness.

Both are both associated with depression and mortality (Steptoe et al., 2013).

Social connection can have protective and life-preserving effects for health.

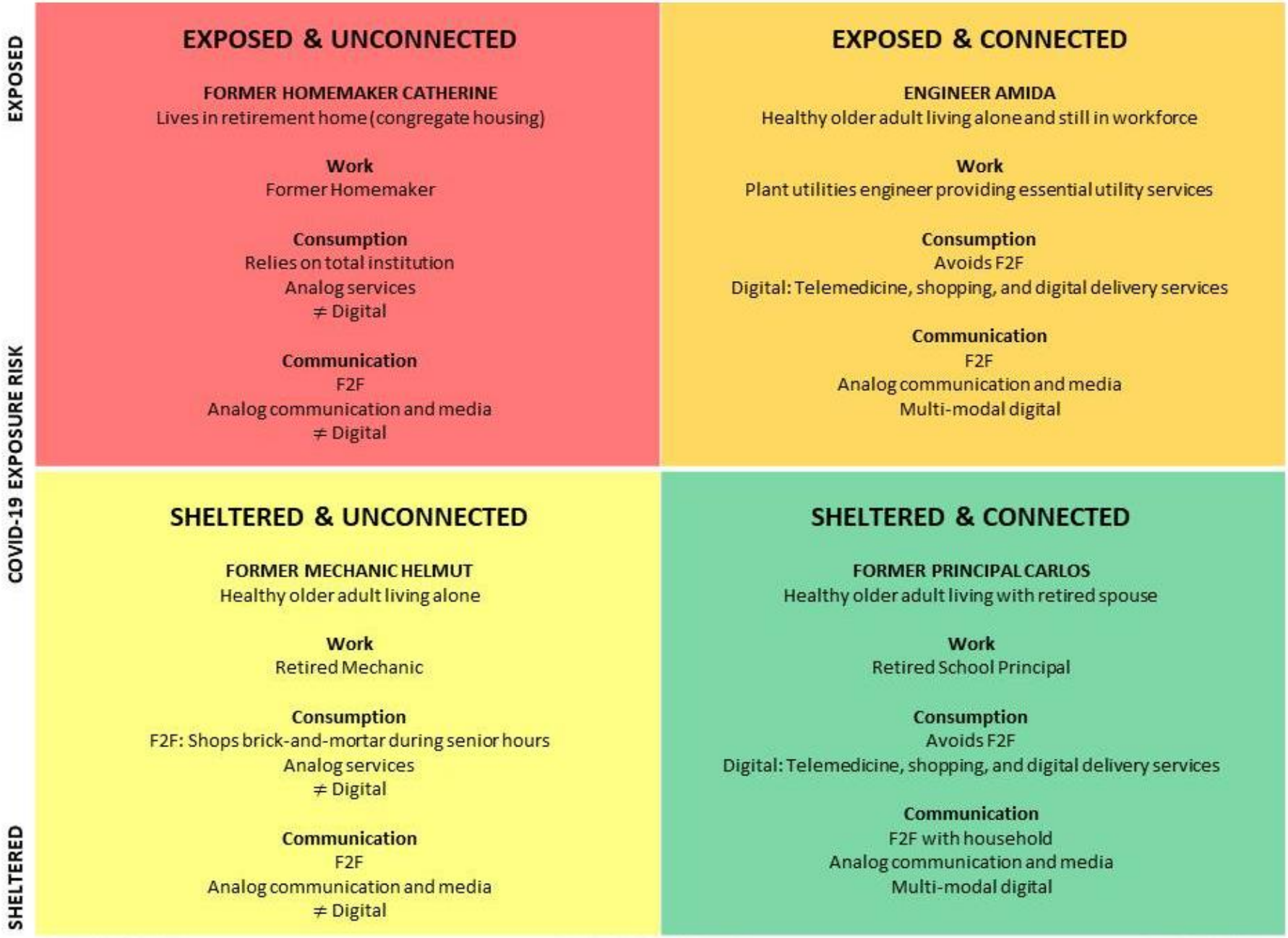
ICTs effective in promoting social connectedness: socially isolated and older adults

Those without digital resources are more likely to suffer from diminished well-being or make difficult choices between self-isolating and risking exposure to the virus to seek social interaction with others.



Key challenges: almost impossible to remotely train people to use the internet.

ADULTS


EXPOSED
COVID-19 EXPOSURE RISK
SHELTERED
EXPOSED & UNCONNECTED
FORMER HOMEMAKER CATHERINE
Lives in retirement home (congregate housing)
Work
Former Homemaker
Consumption
Relies on total institution
Analog services
≠ Digital
Communication
F2F
Analog communication and media
≠ Digital
EXPOSED & CONNECTED
ENGINEER AMIDA
Healthy older adult living alone and still in workforce
Work
Plant utilities engineer providing essential utility services
Consumption
Avoids F2F
Digital: Telemedicine, shopping, and digital delivery services
Communication
F2F
Analog communication and media
Multi-modal digital
SHELTERED & UNCONNECTED
FORMER MECHANIC HELMUT
Healthy older adult living alone
Work
Retired Mechanic
Consumption
F2F: Shops brick-and-mortar during senior hours
Analog services
≠ Digital
Communication
F2F
Analog communication and media
≠ Digital
SHELTERED & CONNECTED
FORMER PRINCIPAL CARLOS
Healthy older adult living with retired spouse
Work
Retired School Principal
Consumption
Avoids F2F
Digital: Telemedicine, shopping, and digital delivery services
Communication
F2F with household
Analog communication and media
Multi-modal digital
UNCONNECTED
DIGITAL RESOURCES
CONNECTED

COVID-19: EDUCATION

COVID-19 triggers school closures globally

Students plentiful digital resources and people as educational resources are more likely to have positive outcomes academically.

With distance learning, students with greater and more varied resources are best able to minimize exposure to COVID-19 by moving students to fully remote instruction.

In the U.S., some students experience “homework gaps” and the "summer slide" necessitating review (Thum and Hauser, 2015).

Ongoing inadequate remote instruction in response to COVID-19 school closures could generate similar or even greater "slides" if left unaddressed.

Existing digital disparities and COVID-19 lockdowns may have potentially deleterious effects for low-SES students in terms of educational trajectories and life opportunities if not effectively remediated.

CERP: STUDENTS

COVID-19 EXPOSURE RISK

EXPOSED

SHELTERED

EXPOSED & UNCONNECTED

PRIMARY STUDENT TANNER
Lives with multi-generational family in apartment with older siblings who are essential workers in sanitation

Distance Learning Resources
Analog: educational television and media
Print materials provided by school: take-home packets and books

≠ Digital devices or services for learning

Communication
F2F
Analog servicesAnalog communication and media
≠ Digital devices or services at home

EXPOSED & CONNECTED

SECONDARY STUDENT BORIS
Lives with parents in house in upscale urban townhouse with mother is an ER surgeon working on frontline of pandemic

Distance Learning Resources
Analog: educational television and media
Print materials provided by school: take-home packets and books

Digital: Khan academy, Zoom classes, FaceTime with teacher, etc.

Communication
F2F with household
Analog communication and media
Multi-modal digital

SHELTERED & UNCONNECTED

SECONDARY STUDENT ALEXIS
Lives with parents on farm in intentional community banning external travel

Distance Learning Resources
Analog: educational television and media
Print materials provided by school: take-home packets and books

≠ Digital devices or services for learning

Communication
F2F
Analog communication and media
≠ Digital devices or services at home

SHELTERED & CONNECTED

PRIMARY STUDENT JASMINE
Lives with teleworking parents in news media in house in the suburbs

Distance Learning Resources
Analog: educational television and media
Print materials provided by school: take-home packets and books

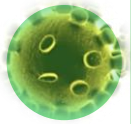
Digital: Khan academy, Zoom classes, FaceTime with teacher, etc.

Communication
F2F with household
Analog communication and media
Multi-modal digital

UNCONNECTED — DIGITAL RESOURCES — CONNECTED

COVID-19: Incarceration

- COVID-19 most communication video-visitation programs are suspended.
  - Effectively cutting the incarcerated off from the outside world
- Long-term effects on successful re-entry
  - Prison visits have been found to support the emotional health of prisoners and may decrease chances of recidivism (Cochran *et al.*, 2020).
  - Communications while incarcerated are key to securing stable work and housing and avoiding re-incarceration (Cobbina *et al.*, 2012).



CERP: Penal System Subjects

EXPOSED

COVID-19 EXPOSURE RISK

SHELTERED

EXPOSED & UNCONNECTED

PHIL
Lives in prison in shared cell with other prisoners
(congregate setting)

Work (suspended during COVID-19)
Employed in prison library

Consumption
Limited by total institution
≠ digital

Communication
F2F
Analog communication and media (suspended during COVID-19)
≠ Digital not permitted by prison

EXPOSED & CONNECTED

JANE
Lives in transitional living facility with other prisoners
(congregate setting) and is an essential worker

Work
Shelf stocker for grocery store

Consumption
Brick-and-mortar shopping for essentials
Analog services permitted by facility
Limited digital services permitted by facility

Communication
F2F
Analog communication and media
Limited digital services permitted by facility

SHELTERED & UNCONNECTED

MACKENZIE
Awaiting trial and incarcerated w/ home detention & electronic monitoring in detached house with spouse who is sheltering in place

Work
Unemployed

Consumption
Analog services permitted by court
≠ Digital not permitted by court

Communication
F2F with household
Analog communication and media permitted by court
≠ Digital not permitted by court

SHELTERED & CONNECTED

WILSON
Incarcerated w/ home detention & electronic monitoring in detached house with household who are sheltering in place

Work (pre incarceration)
Former Politician

Consumption
Essential digital consumption permitted by court
telemedicine, groceries, and digital delivery services for Rx

Communication
F2F with household
Essential analog communication and media permitted by court
Essential digital communication permitted by court

UNCONNECTED — DIGITAL RESOURCES — CONNECTED

COVID-19: Telework

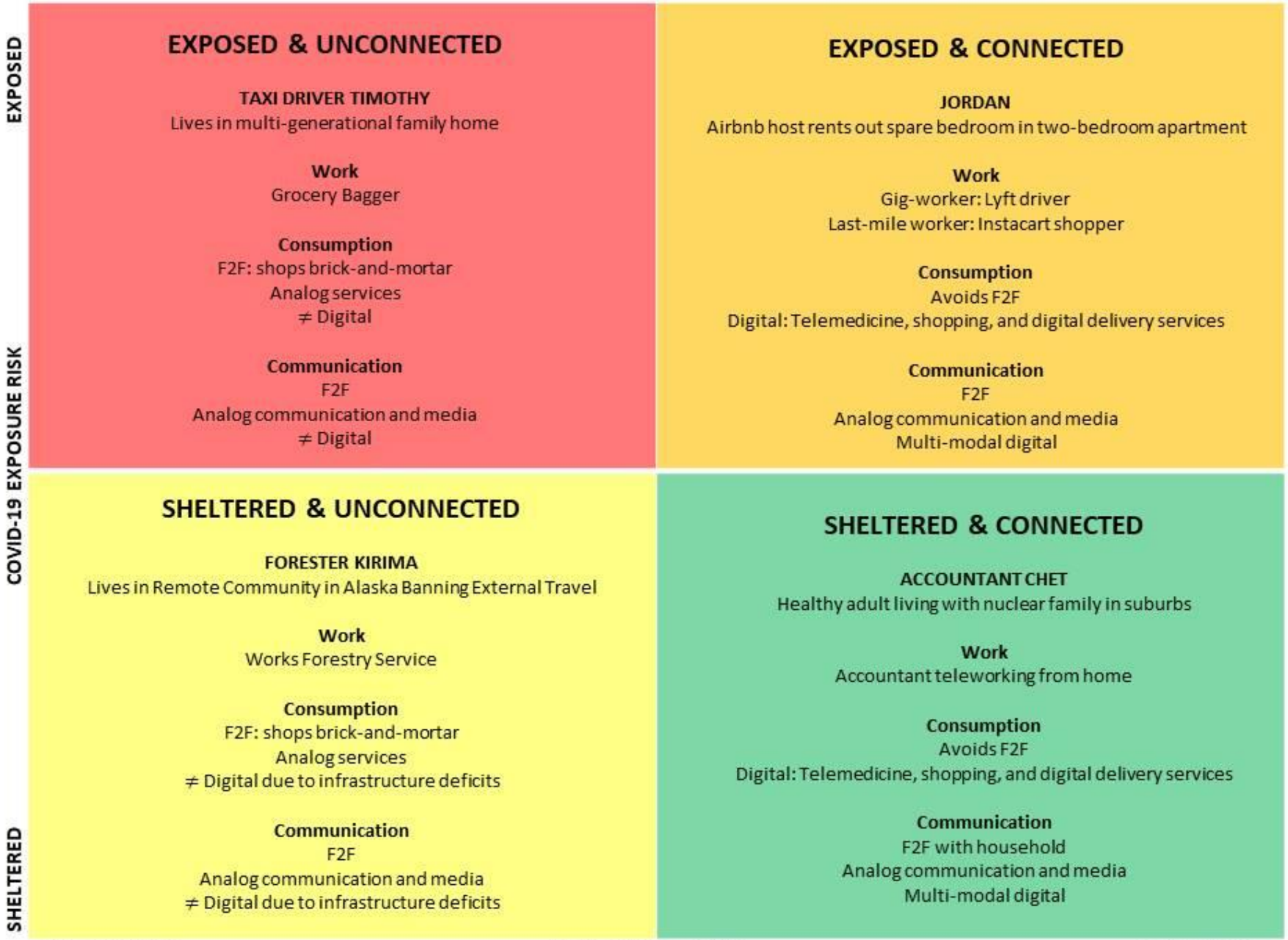
With lockdowns due to the pandemic, up to 50% of workers in the U.S. were expected to telework at home (Guyot and Sawhill, 2020).

U.S., from 28% to 51% of jobs are "teleworkable" Less than 25 percent of jobs in Mexico, Turkey, and much of Latin America (Dingel and Neiman, 2020).

Correlation: telework and occupational status and income
Telework: workers must "pay to work"
High-quality digital devices and access to broadband internet

Connections between telework, socio-economic disadvantage, and potential risk exposure to COVID-19 for those in the labor force (Reeves and Rothwell 2020).

CERP: Teleworkers and Gig Workers



COVID-19: Gig, Platform-, & Last-Mile Workers

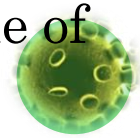
Middle and upper-classes can mostly work safely at home, while working class and precarious "last-mile workers" are forced into out-of-home occupations, both essential and non-essential.

Platform, gig, micro and more generally last-mile workers shoulder a disproportionate share of the risk by delivering to those sheltering in place.

While their exposure to risk allows others to be safer, their contribution has been relatively little recognized via pay, healthcare, or job projections if sickened on the job.

Across the U.S. and Europe, workers in Amazon fulfillment centers have launched walkouts over health risks and outbreaks in distribution facilities, with tech workers organizing "virtual walkouts" in solidarity.

The COVID-19 pandemic gives unprecedented visibility to last-mile workers but without increased social security in the ongoing battle of classification as “employees” versus contractors.



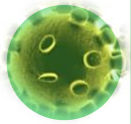
Implications: Disproportionate Risk

While recognizing the risk mitigation offered by digital resources for some, we also argue that some of these benefits are only possible due to the costs paid by others.

Unequal risks and costs created by COVID-19 have potentially lethal consequences for those serving in public-facing jobs: gig and last-mile workers.

Significantly, location-based gig and last-mile workers come disproportionately from low SES backgrounds - the very populations that are already suffering in greater numbers from the ravages of the pandemic - and yet their service simultaneously augments their risk while allowing for the reduction of risk to others.

It is, therefore, vital to understand the costs, who is paying them, and who is benefitting from them to fully understand the implications of CERPs.



Taxonomies of Digital Vulnerability and COVID-19 Exposure Risk Profiles

Laura Robinson
Santa Clara University

Jeremy Schulz
UC Berkeley

Aneka Khilnani
George Washington Univ.

Hiroshi Ono
Hitotsubashi Univ.

Shelia R. Cotten
Michigan State University

Noah McClain
Illinois Institute of Technology

Lloyd Levine
UC Riverside

Wenhong Chen
UT Austin

Gejun Huang
UT Austin

Antonio A. Casilli
Telecom Paris, Institut Polytechnique de Paris

Paola Tubaro
CNRS, Universite Paris-Saclay, Inria

Matías Dodel
Universidad Católica del Uruguay

Anabel Quan-Haase
Western University

Maria Laura Ruiu
Northumbria University

Massimo Ragnedda
Northumbria University

Deb Aikat
Univ of N. Carolina, Chapel Hill

Natalia Tolentino
Calif. State Polytechnic Univ.