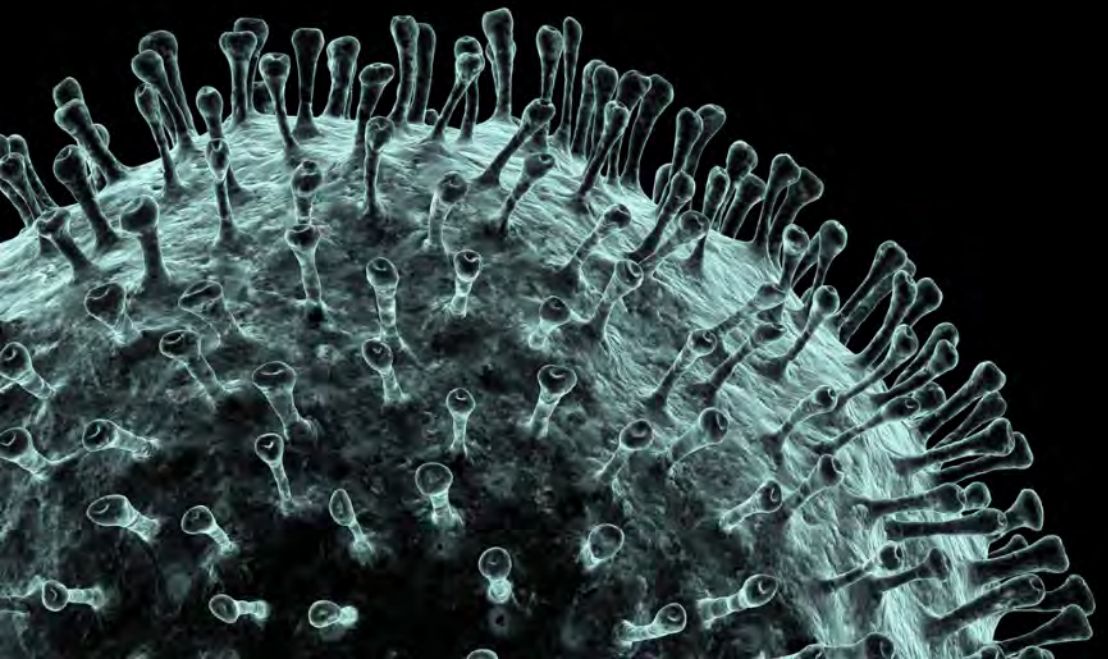
COVID-19 Conversations

Julie Swann

Department Head, Edward P. Fitts Department of Industrial and Systems Engineering
North Carolina State University



COVID19Conversations.org
#COVID19Conversations

APHA
AMERICAN PUBLIC HEALTH ASSOCIATION
For science. For action. For health.

50 years NATIONAL ACADEMY of MEDICINE

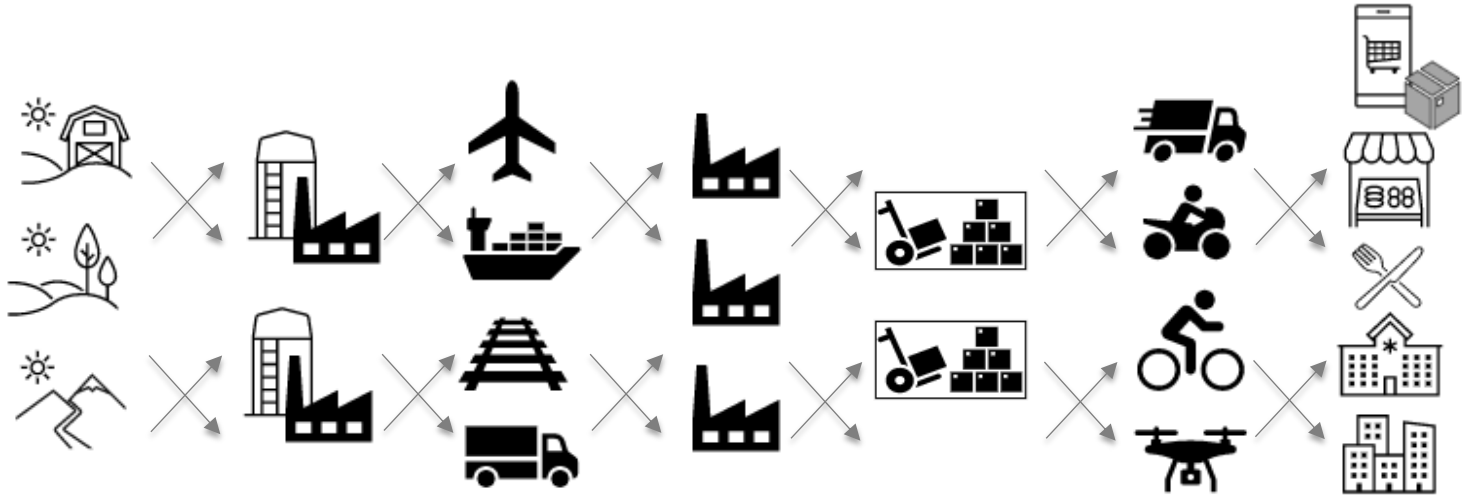
COVID-19 Vaccines: The Realities of the Next Steps

Logistics and Supply Chains

Julie Swann, PhD
Allison Distinguished Professor and Department Head
ISE, North Carolina State University
Affiliate, UNC-Chapel Hill

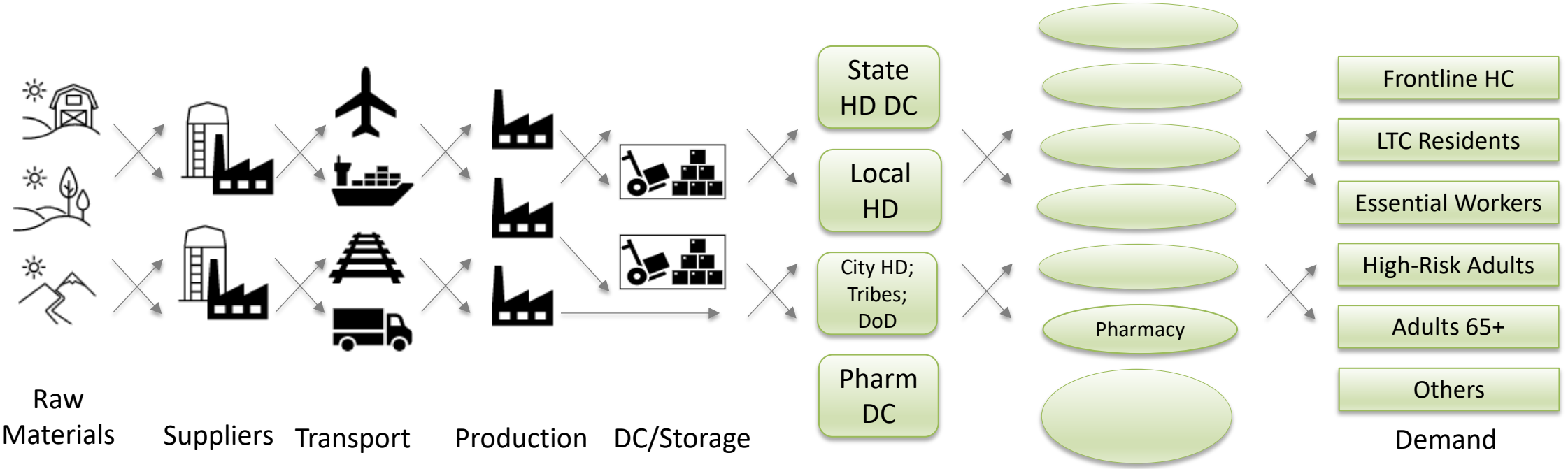
Dec 9, 2020

Supply Chain Management



- **Interconnected systems with autonomous decision-makers**
- **System plans and manages flow (of product, information, people)**

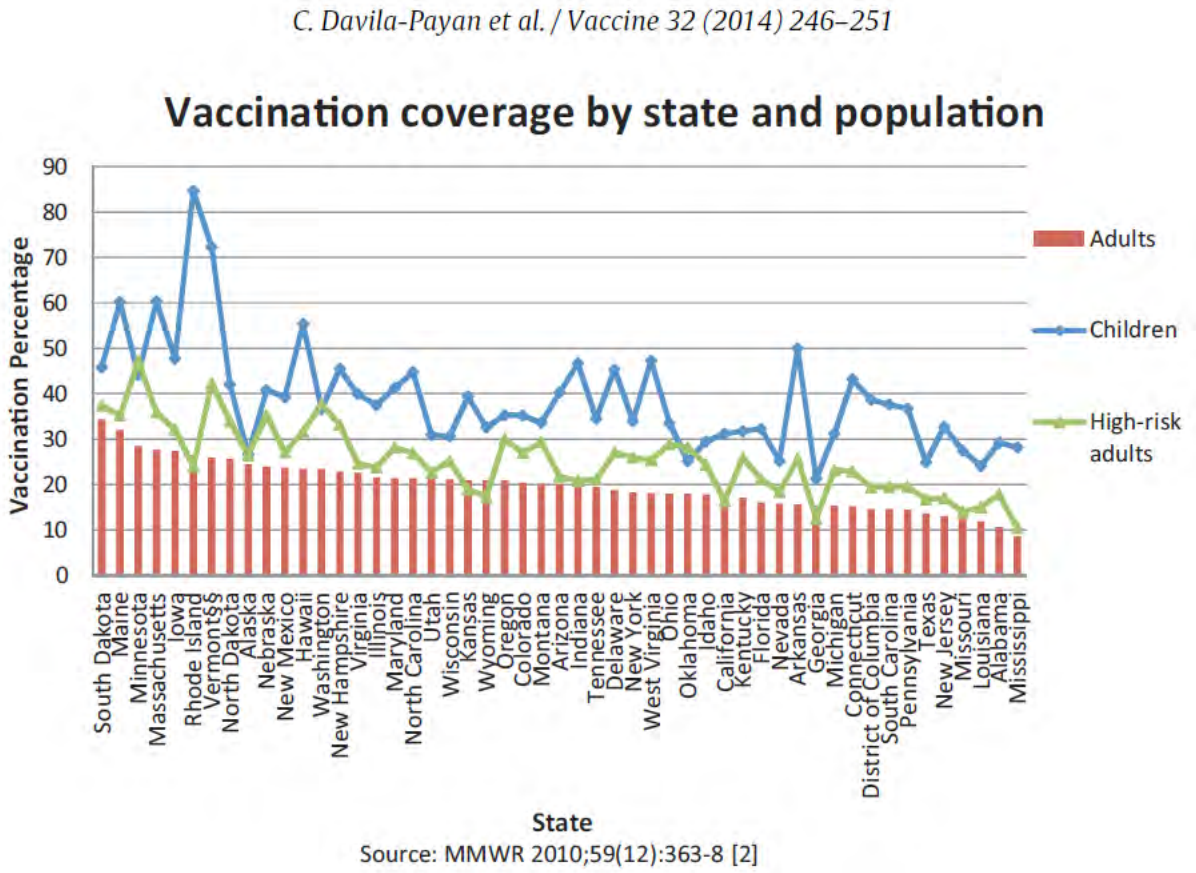
Supply Chain Management



- **Interconnected systems with autonomous decision-makers**
- **System plans and manages flow (of product, information, people)**

Typical goal: Right Product, Right Place, Right Time, Right Customer, Right Cost

Learnings from H1N1 Distribution



- Vaccine coverage higher with
  - Shorter leadtime of "Allocation to Shipment" from DC
  - More vaccine to locations with broad access (e.g., pharmacy, clinics)

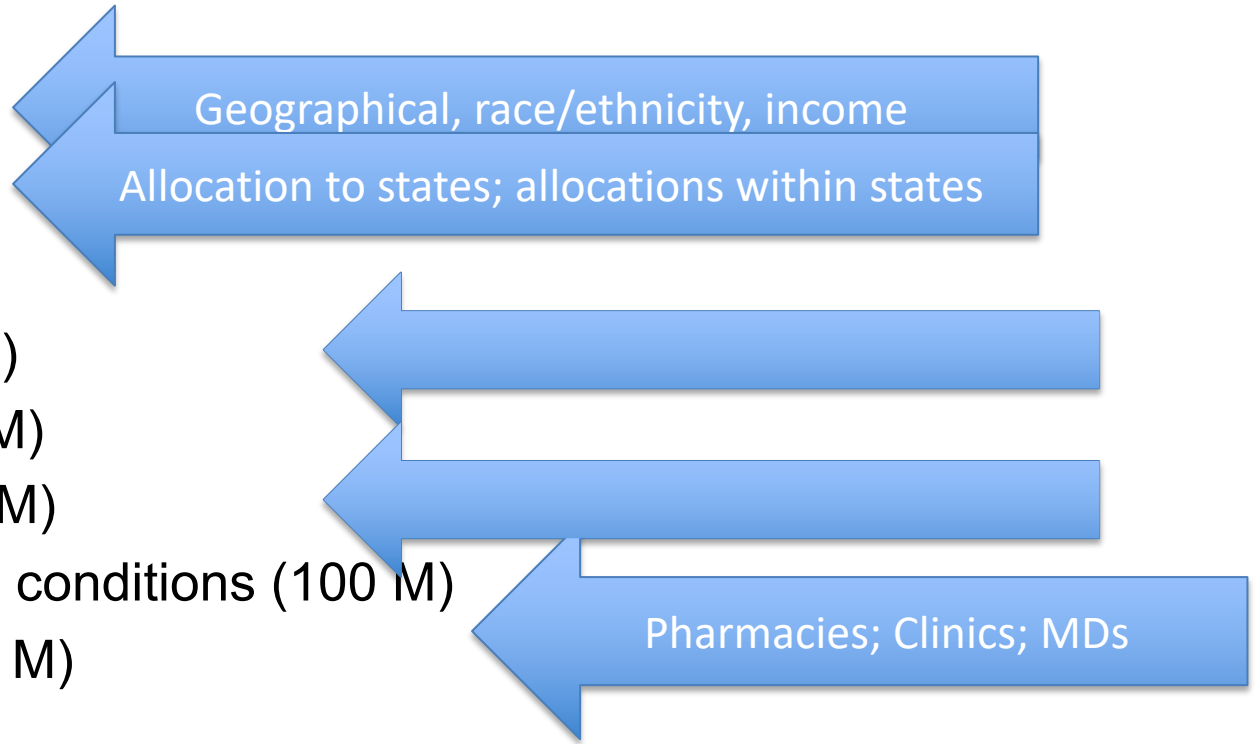
- System can also benefit from inventory visibility

Davila-Payan et al. Vaccine

Li et al / PLoS One 2018 Oct 25;13(10):e0206293. doi: 10.1371/journal.pone.0206293. eCollection 2018.

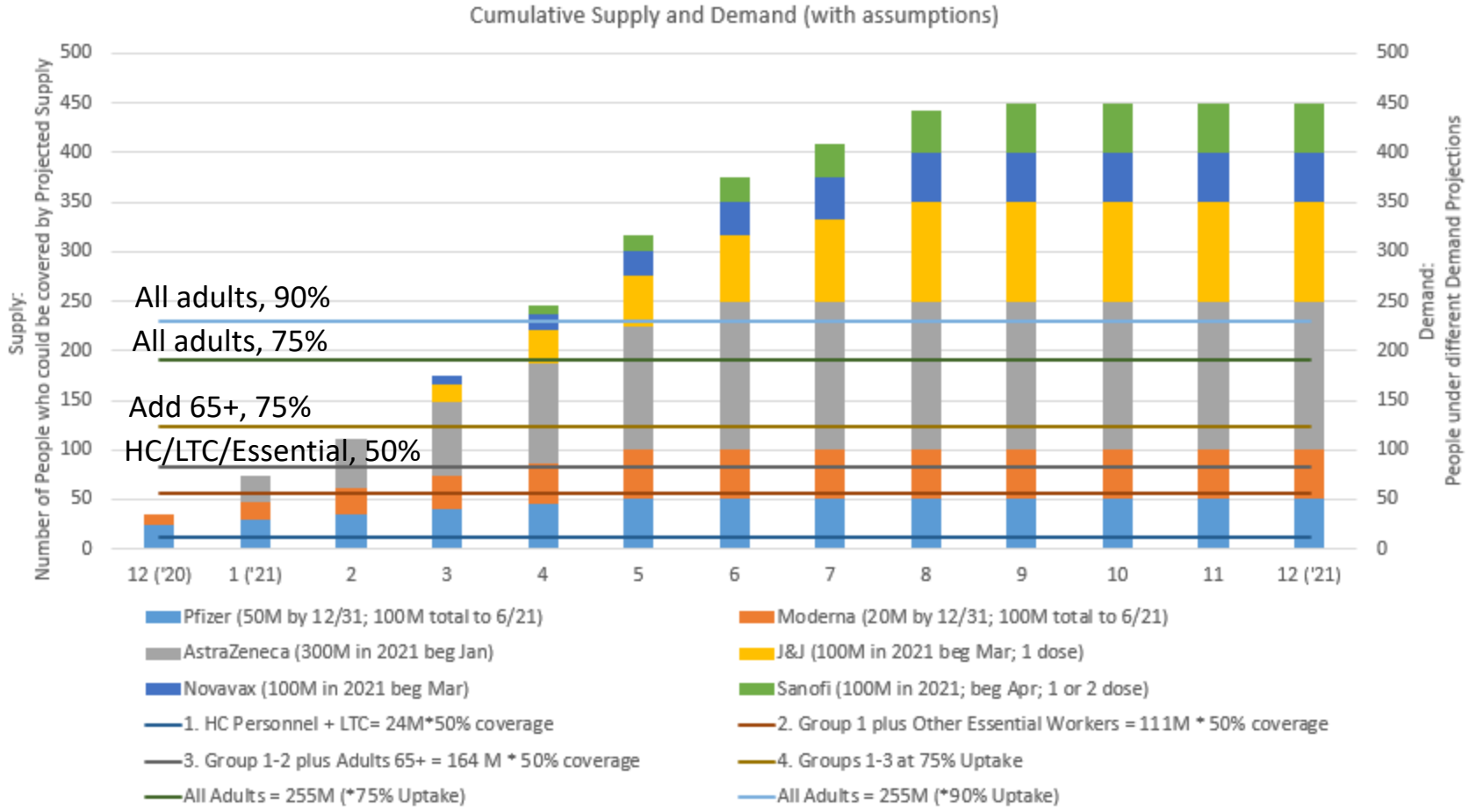
Vaccine Allocation Planning (ACIP, 11/27/2020)

- Principles
  - Maximize benefits and minimize harms
  - Promote justice
  - Mitigate health inequities
  - Promote transparency
- Example groups
  - Health care personnel (21 M)
  - Long-term care residents (3M)
  - Other essential workers (87 M)
  - Adults with high-risk medical conditions (100 M)
  - Adults aged >= 65 years (53 M)



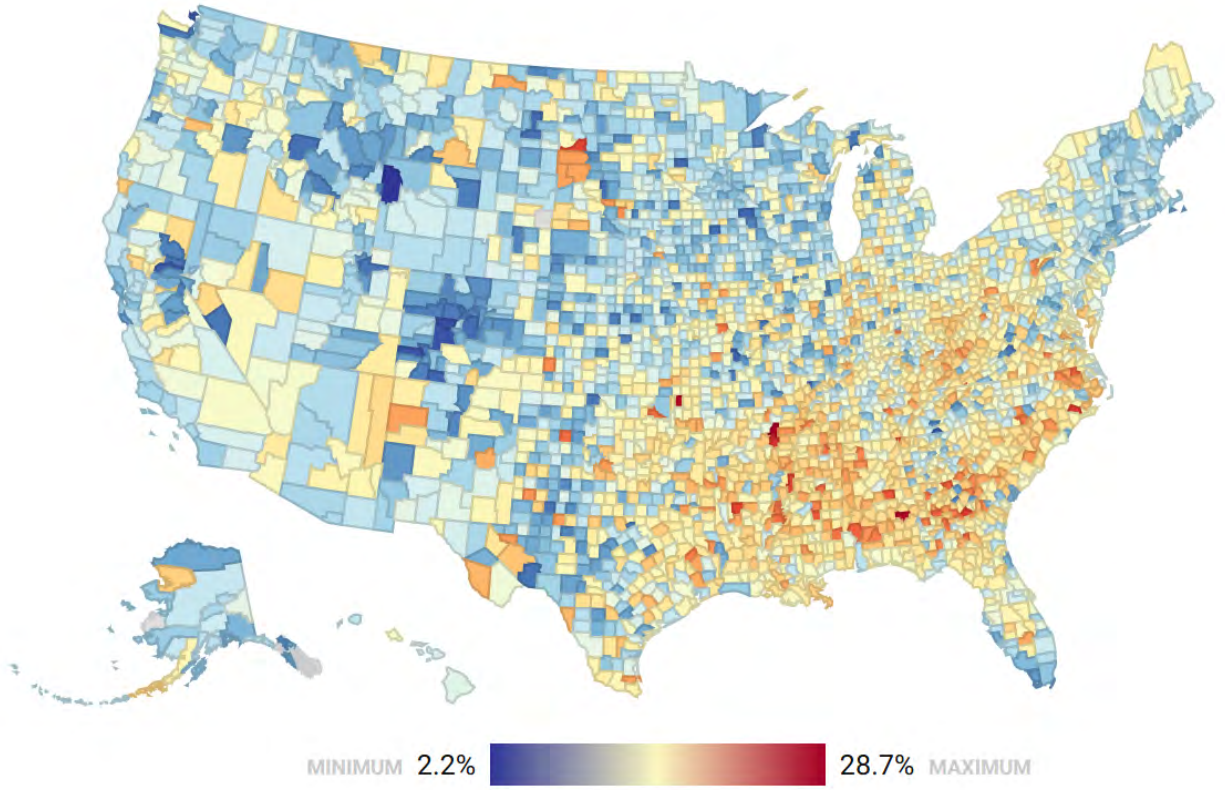
Supply and Demand in Person Coverage (Projections)

- Supply:
  - Vaccine commitments by US, over 6 months, start date estimated
  - Adjusted by coverage doses
- Demand:
  - Priority groups, varying uptake



Logistics and Distribution to Reduce Inequities

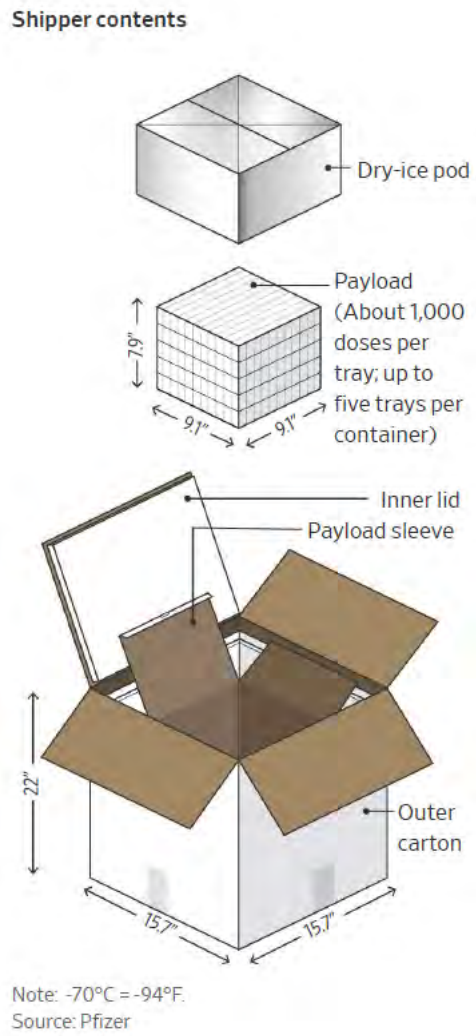
- Map shows diabetes prevalence by county
- Wide range of county values
- High rates among communities of color
- Vaccine hesitancy could be high in same areas



https://www.usnews.com/news/healthiest-communities/coronavirus-data/diabetes-prevalence?chart_type=map (from CDC)

Vaccine Specifications

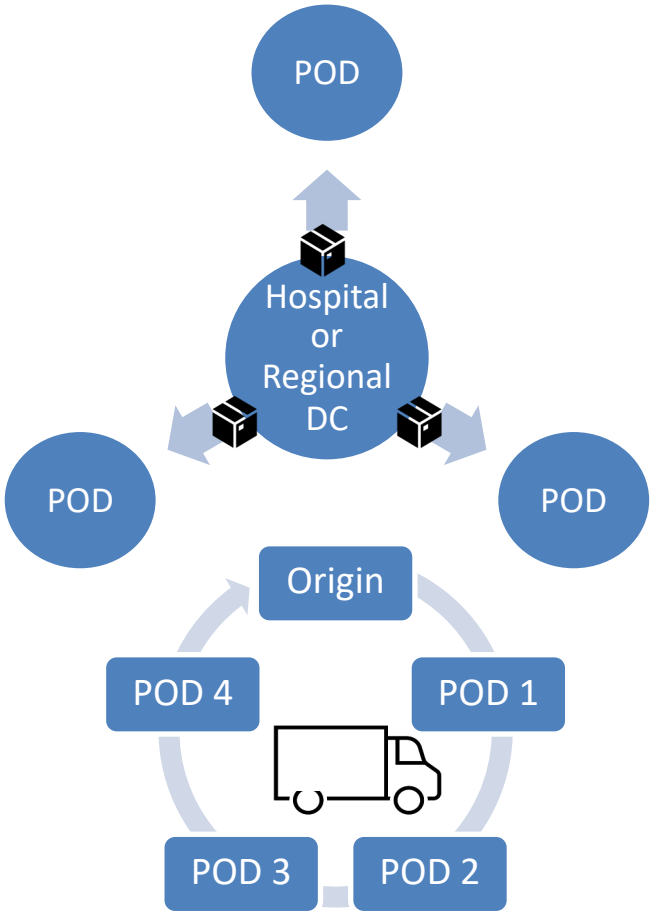
Vaccine	Storage Temp (Celsius)	Dosing (preliminary)	Other	Shipment
	Store at -70 C; 10 days in box; re-ice every 5 days; total of 30 days		1st to ship; Box holds ~1000 to 5000 doses	Pfizer to providers
	4-8 C			
Johnson & Johnson	4-8 C	1 dose only		" "



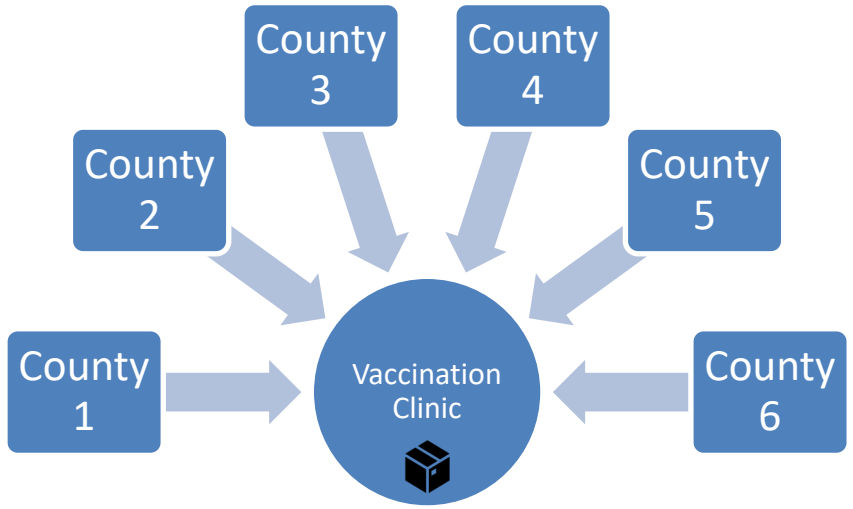
WSJ, 10/21/2020

Strategies additional to Direct-to-Provider

PUSH supply out to Points of Distribution



PULL people in to central location



PARTNER with commercial pharmacies

Walgreens Locations (CVS similar)

COVID-19 Simulation Integrated Model (CovSim) to Inform State and Local Levels

- Dr. Julie Swann, jlswann@ncsu.edu
- http://go.ncsu.edu/covsim
- Modeling and Public Health Team
  - NC State, UNC-Chapel Hill, Georgia Tech

Modeling team has support from NC TraCS system & NC State ORIED; NSF RAPIDs, CDC/CSTE for state modeling