Inadequate Data on Manufacturers of Critical Medical Supplies Weakens U.S. Capabilities for Pandemic Response

Erica R.H. Fuchs, Valerie J. Karplus, Nikhil Kalathil, M. Granger Morgan
Department of Engineering and Public Policy, Carnegie Mellon University
Contact: erhf@andrew.cmu.edu

Key message:
U.S. policymakers lack an accurate, complete, and evolving picture of the present state of critical manufacturing of medical supplies to respond effectively to COVID-19 and other pandemic emergencies. This information is essential to guide decisions to coordinate and mobilize additional capacity. To correct this problem, we recommend Congress task the Department of Commerce with developing a strategy for monthly assessment of U.S.-headquartered and U.S.-located manufacturing capability of medical supplies for the duration of an emergency. Aggregate information on gaps between capacity and demand as well as on common challenges or bottlenecks should be communicated through a real-time dashboard to inform public and private sector activities.

Analytical Support:
- **No existing public or proprietary data sources capture in real time the evolving universe of firms involved in supplying the U.S. medical supply market,** despite the criticality of these supplies in mounting an effective response.
- Existing surveys such as the U.S. Annual Survey of Manufacturers and the Economic Census provide snap-shots of U.S. capabilities, these data lack the timeliness, frequency, and adaptability necessary to provide critical information during a rapidly evolving situation such as the COVID-19 pandemic.
- While the White House and entities like the International Trade Commission can make direct requests for information from companies, they are currently poorly equipped to do large-scale data collection with high frequency.
- Our analysis of data on Thomasnet, a leading North American Manufacturing industrial sourcing platform, aims to filter firms that self-identify as having domestic manufacturing of masks, respirators, and their intermediate inputs.
- Among the Thomasnet firms, we attempt to identify firms with U.S.-based production, by complementing scraped data with searches on firm websites, firm Security Exchange Commission (SEC) filings, data from DB Hoovers, and emails, phone calls, and interviews directly with companies.
- Our limited view from firms self-reporting on Thomasnet suggests that **small and medium sized enterprises may be playing an important, and poorly documented, role** in responding to mask and respirator shortages associated with the pandemic.
- We find that, as of September 8, 2020, 40 Thomasnet-listed firms produced a product of interest at a domestic manufacturing facility: 29 firms manufactured respirators and/or face masks, six manufactured non-woven fabrics used in medical-grade masks, and five made non-latex elastics (see Figures 1 and 2). **Of the 29 facilities producing respirators and/or face masks domestically, only three are one of the five large**

firms (3M, Owens and Minor, Honeywell, Moldex, and Prestige America) used in White House estimates of production capacity in the early phase of the pandemic.
- Comparing self-reported capacity numbers for eight of the companies on Thomasnet with White House capacity estimates suggests substantial overlooked capacity.
- Multiple (three of eight) of the Thomasnet companies for which we were able to find online capacity information had recently purchased equipment to make masks or respirators domestically in the U.S.

Recommendation for Timely and Adaptive Data Collection on Domestic Manufacturers for the Duration of the Pandemic
- Congress should task the Department of Commerce with collecting real-time data on U.S. headquartered and U.S.-located manufacturing companies regarding final products and intermediate inputs relevant to COVID medical supply shortages.
- The data collection effort should pursue information on these companies'
    - current and potential future production capacity in those products,
    - how these capabilities have evolved since the start of the pandemic,
    - challenges the companies have faced in their response,
    - interest and capabilities to further respond to medical supply shortages, and
    - what support would be helpful in enabling them to effectively respond.
- By identifying gaps between domestic production capabilities and demand, such data will enable informed demand- (e.g. government procurement guarantees) and supply-side (e.g. shared training and IP through the Defense Production Act) policies to address this gap. It will also increase transparency, thus providing critical information to both public and private actors, on where innovations may be most valuable.
- The Department of Commerce might for example, make use of
    - Automated, large-scale data collection and analysis via market intermediaries of registered transactions,
    - The U.S. Census Bureau's survey capabilities as well as its Registrar of Businesses, with a similar approach and (most importantly) speed as was achieved for the COVID-19 Small Business Pulse Survey,
    - A public-private partnership that partnered large-scale data collection and analysis capabilities in academia and/or industry (such as at Google, Microsoft, or Amazon) with government entities with access to and also seeking to act on this information, and/or
    - The National Institute of Standards and Technology (NIST), given NIST's existing role leading Manufacturing USA (the National Network of Manufacturing Innovation Institutes) as well as governing the Manufacturing Extension Program.
- The data collection and analysis activity must have a sunset clause such that it ends at the end of the pandemic.
- As part of the sunset clause, those leading the effort should be required to systematically document "lessons learned" for future crises (pandemics, natural disasters, war) and more broadly (international capabilities in critical technologies) where timely and adaptive collection and analysis of data may be essential to inform government decisions.

Appendix:

Figure 1 displays results of our Thomasnet data collection and categorization algorithm. The faintest bar in Figure 1 is the total number of Thomasnet listed manufacturing entities for our target products. The faded bar is the number of those listed manufacturing entities that self-identify on Thomasnet as serving the medical market or meeting technical requirements for hospital grade masks/respirators. The outlined section with the darkest coloring and a number shows the subset of firms self-identifying on Thomasnet as producing standard products for FDA approved, hospital grade masks.

Number of Potential Domestic Manufacturing Entities by Product Type
Source: Thomasnet, 09/08/20. Manufacturers Self-Identifying as:
Producing Standard Products for FDA Approved, Hospital Grade Masks/Respirators
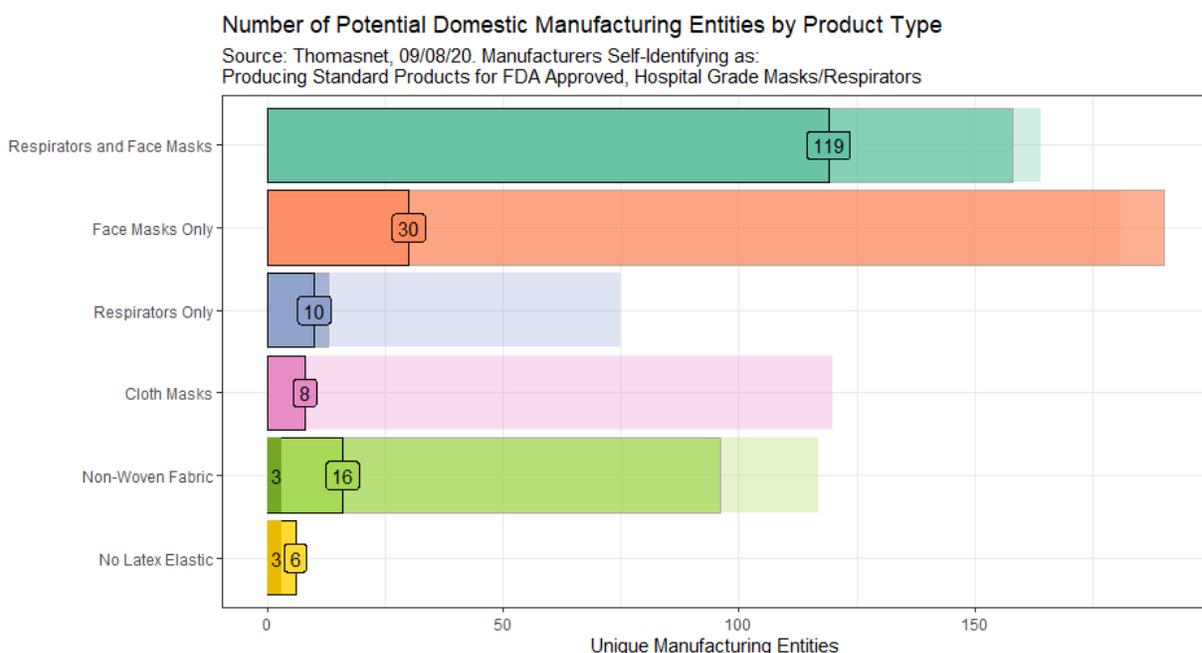
Figure 1: Thomasnet-Listed Manufacturers of Masks and Respirators and Intermediate Inputs Self-Identify as Producing Standard Products for FDA Approved, Hospital Grade Masks/Respirators. "Unique Manufacturing Entities" on the x-axis represents firms that self-identify on ThomasNet as a manufacturer. The data in Figure 1 is a snapshot of Thomasnet data on August 31, 2020. We are collecting this data weekly. Note: Company locations listed in Thomasnet may not be their manufacturing plant locations in general, or for our target product.

In our preliminary data cleaning we triangulate the Thomasnet data against the information on the companies' own websites and with direct interviews, calls, and emails with the companies to identify whether the companies are producing our targeted product in the U.S. This data cleaning has revealed the diversity of entities that are operating as Thomasnet listed manufacturers self-identifying as producing standard products for FDA approved, hospital grade masks. The blue portion of the bar is the

number of firms with confirmed production facilities in the U.S.The black portion of the bar is the number of firms confirmed as a non-domestic or non-manufacturing entity.[1]
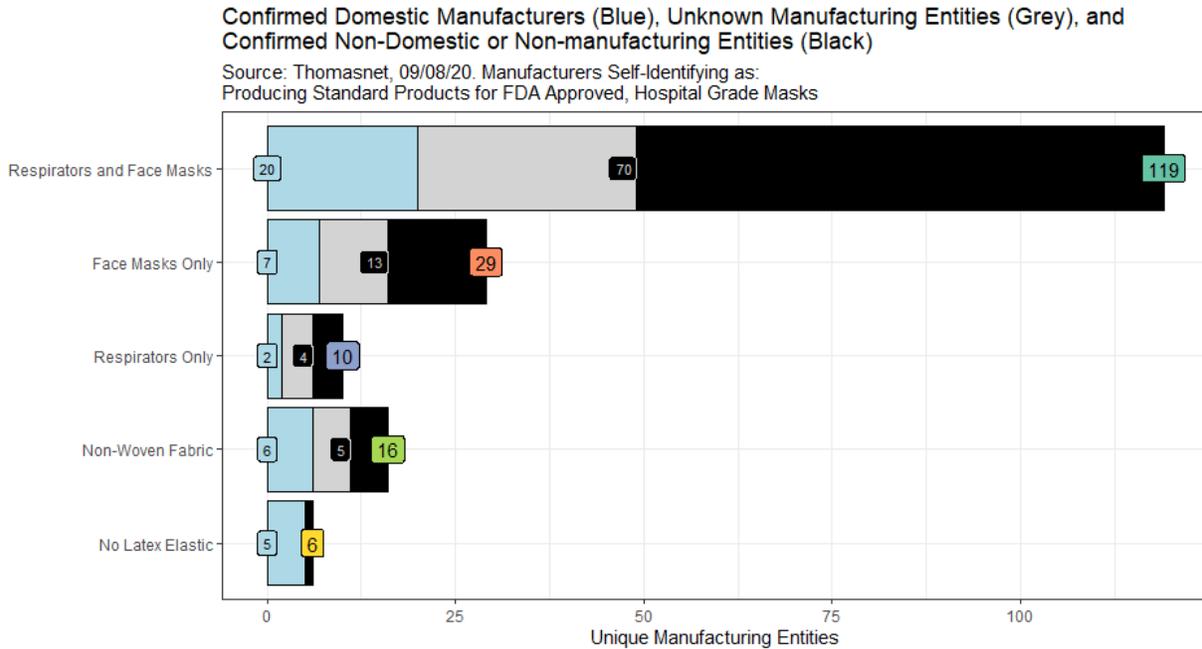
Figure 2: Domestic Manufacturing Breakdown of Thomasnet Listed Manufacturers of Standard FDA Approved Hospital Grade Masks/Respirators. "Unique Manufacturing Entities" on the x-axis represents firms that self-identify on ThomasNet as a manufacturer of standard FDA approved hospital grade masks/respirators. The colored square at the end of each bar represents all manufacturers fitting this definition, and matches the number and color in Figure 1.

---

[1] Note: Two additional domestic manufacturers of face masks exist, but are not included in our count of 29 "face-mask only" companies or our count of confirmed domestic manufacturers of "face-masks only," due to definitional issues. These manufacturers used terms in Thomasnet that caused our algorithm to categorize them as a self-described manufacturer of standard FDA approved products on an earlier date, but updated their supplier descriptions subsequently such that our algorithm doesn't automatically categorize them as producing a standard product for FDA approved masks on 09/08/2020. According to website and interview data outside of Thomasnet, both companies, as of 09/08/2020, were still domestically manufacturing a medical-grade mask.