

# Commentary: Do you live in a distressed community? How do you know? What does this mean? What are the risks? How do you get help?



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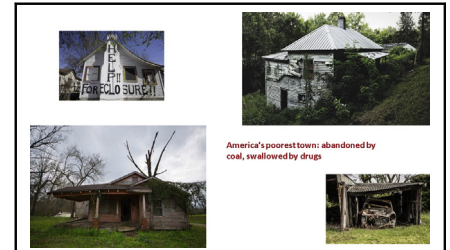
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In this issue of the *Journal*, there is an article by Mehaffey and colleagues<sup>1</sup> that describes an incremental gap in coronary artery bypass grafting outcomes between distressed community residents and residents of less distressed communities. For purposes of their analysis, Mehaffey and colleagues<sup>1</sup> used a popular indicator of distressed communities, called the Distressed Communities Index (DCI). They took liberties with the DCI and converted a continuous variable with values between 0 and 100 into a dichotomous variable with DCI values below 75 and greater than or equal to 75. Higher DCI values imply worse distress, whereas low DCI values suggest no distress. There are well-known problems with converting a continuous variable into a dichotomous variable.<sup>2</sup> In this case, dichotomization of DCI blurs the definition of inhabitants of distressed communities, and limits certainty of results. The main problems with dichotomizing a continuous variable are 5-fold:

- There is loss of statistical power (ie, the certainty that a negative observation is really negative).<sup>2</sup>
- Dichotomization is equivalent to discarding a third of the data.<sup>3</sup>
- There is an increased chance of serious underestimation of the extent of variation associated with dichotomization.<sup>4</sup>
- Dichotomization increases the risk of a positive result being a false-positive result, especially in a logistic regression.<sup>5</sup>
- So-called “optimal” cut point selection (ie, selecting a cut point that gives the smallest *P* value) risks finding spuriously significant results.<sup>2</sup>

Given the problems with creating dichotomous populations that are categorized as living in a distressed community or not, it is simplistic to make inferences about this population, and the real possibility exists that these inferences may be wrong or misleading. Perhaps the most



Distressed communities have shifted to rural poverty.

### Central Message

Living in a distressed community may limit cardiac surgical care alternatives, but more information about this relationship is required. Who lives in distressed communities?

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important caveat about the study population included in this article is that the population living in distressed communities as defined by Mehaffey and colleagues<sup>1</sup> is likely to have some overlap with people living in nondistressed communities. It thus is not clear exactly who lives in the “distressed communities” described by Mehaffey and colleagues.<sup>1</sup>

### HOW DO YOU KNOW IF YOU LIVE IN A DISTRESSED COMMUNITY?

It is important to explore the DCI in greater detail, both to learn about the index and to become aware of DCI strengths and weaknesses. The DCI was created by the Economic Innovation Group (EIG). The EIG is a bipartisan public policy group with a mission “to advance solutions that empower entrepreneurs and investors to forage a more dynamic economy throughout America” (<https://eig.org/about-us>). Does that definition sound anything like a predictor of cardiac surgical outcomes? The DCI created by the EIG group was never intended to measure community distress that affects coronary artery bypass grafting outcomes and is primarily a measure of economic prosperity.

The DCI combines 7 complementary metrics into a single measure of economic well-being in geographic areas, reflected by zip codes, counties, or cities. According to the DCI, places in the United States are sorted into quintiles labeled *prosperous*, *comfortable*, *mid-tier*, *at risk*, and *distressed*. When Mehaffey and colleagues<sup>1</sup> in the current

article suggest that distressed communities account for 25% of a measured population, this adds confusion to the meaning and measurement of the DCI. Because of this simplification of the DCI into a dichotomous variable, it is reasonable to ask who actually lives in distressed communities. The answer about who lives in distressed communities is elusive, but there are some important facts that help to understand who lives in these distressed areas. It is likely that something like 75% to 80% of the world's population live in distressed communities.<sup>6,7</sup> US citizens who live in distressed communities are a much smaller percentage of the population, and this fraction is shrinking. The EIG group suggests that the number of people living in America's most distressed zip codes is shrinking as the nature of distress becomes more rural. Importantly, evidence suggests that the gaps between prosperous areas and distressed communities have grown wider (<https://eig.org/dci>). This widening gap in prosperity has resulted in a reshuffling of prosperity to the point that more Americans enjoy a prosperous lifestyle than ever before while the fraction of US citizens in distressed communities has decreased to record lows. In distressed communities, however, there are increasing housing vacancies, worsening education levels, increasing homelessness, decreasing access to health care, and worsening outcomes from most common medical disorders (Table 1). Most, but not all, common medical and surgical disorders have worse outcomes in patients from distressed communities (Table 1).<sup>8-21</sup>

**DOES LIVING IN A DISTRESSED COMMUNITY CAUSE WORSE OUTCOMES FROM SURGICAL PROCEDURES?**

Table 1 suggests that living in a distressed community is associated with worse outcomes from many medical disorders and from surgical interventions. Importantly, this does not prove that living in these communities *causes* worse treatment outcomes. Mehaffey and colleagues<sup>1</sup> in the accompanying article suggest that the dichotomized DCI is a multivariate predictor of adverse cardiac surgical outcomes in patients from distressed communities. This contention must be considered “hypothesis generating,” rather than proof that the mere presence of patients from distressed communities in the operating room is a causative factor determining adverse cardiac surgical outcomes. There are too many assumptions and uncertainties within the analysis of Mehaffey and colleagues<sup>1</sup> to accept at face value that just living in distressed communities causes adverse cardiac surgical outcomes.

The DCI itself, much less the dichotomized version of the DCI, was never meant to be a multivariate predictor of cardiac surgical outcomes. So, questions remain. How does socioeconomic status alter surgical outcomes? Is access to care important? Is postoperative follow-up an important

**TABLE 1. Do people in distressed communities have worse surgical outcomes? (2018 and 2019 results)**

Worse outcomes	No difference in outcomes
Esophageal cancer outcomes <sup>8</sup>	TAVR <sup>9</sup>
Cervical spine injury <sup>10</sup>	Hip fractures <sup>11</sup>
Gastric cancer outcomes <sup>12</sup>	Postmastectomy care <sup>13</sup>
Urolithiasis <sup>14</sup>	
Kidney transplant <sup>15</sup>	
Breast cancer initial treatment <sup>16</sup>	
Lower extremity revascularization <sup>17</sup>	
Pancreatic cancer <sup>18</sup>	
CABG readmissions <sup>19</sup>	
Cholecystectomy <sup>20</sup>	
Hepatocellular cancer <sup>21</sup>	

TAVR, Transcatheter aortic valve replacement; CABG, coronary artery bypass grafting.

contributor to adverse outcomes? Are the extent and character of surgical diseases in distressed communities different than those in nondistressed communities? Are there key elements in distressed communities that relate to cardiac surgical outcomes to a greater extent than to other surgical or medical problems? Are subcomponents of the DCI more important than the entire index itself? The list of questions could go on and on. What seems apparent from the attempt of Mehaffey and colleagues<sup>1</sup> at sorting out the relationship between DCI and cardiac surgical outcomes is that a more nuanced and critical approach to the impact of community stressors on cardiac surgical outcomes is required. The article by Mehaffey and colleagues<sup>1</sup> is a commendable start to this process, but more work needs to be done.

**DOES LIVING IN A DISTRESSED COMMUNITY MEAN THAT YOU ARE “DOOMED” TO POOR HEALTH?**

It should be obvious that the health-related impact of living in distressed communities depends on the definitions of the nature and makeup of distressed communities, and on the metrics used to measure health outcomes in this at-risk population. As pointed out previously, the exact definition of “distressed communities” is a slippery slope that needs better definition and detail. The fact that this issue has surfaced to the consciousness of cardiothoracic surgeons is a promising development that needs a very nuanced approach. Certainly, more work in this area should follow the publication of the article from Mehaffey and colleagues.<sup>1</sup> It will be a refreshing development to see more publications that expand on this issue. There certainly seems to be hope for citizens living in distressed communities, and the fact that this topic appears in front of

cardiothoracic surgeons is encouraging. There is hope for progress in this area, and patients from these communities are not “doomed” to poor health.

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