Findings Brief
NC Rural Health Research Program
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Using the Updated Financial Distress Index to Describe Relative Risk of Hospital Financial Distress

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OVERVIEW

In a 2017 article, we first presented the Financial Distress Index (FDI).[1] The original FDI model used historical data about hospital financial performance, government reimbursement, organizational characteristics, and market characteristics to predict the probability of rural hospital financial distress within two years. The model assigned every rural[2] hospital to one of four financial risk categories: high, mid-high, mid-low, or low.

Since the original model was developed, there have been many changes in the operating environment that may have affected the risk of financial distress among rural hospitals, thus prompting the need for model revision. Recent changes affecting rural hospitals include the following:

1) *More patients are insured by Medicare Advantage plans*. Medicare Advantage plans are projected to enroll a majority of nonmetropolitan beneficiaries by 2025, and the rate of growth continues to be greater in nonmetropolitan counties (10.5% growth per year) than in metropolitan counties (7.2% growth per year).[3]

2) *More rural hospitals are being acquired by systems*. A recent study found that, between 2010 and 2018, 17% of rural hospitals merged, most commonly with organizations from outside their local geographic market.[4]

3) *A greater percentage of patient revenue comes from outpatient sources*. For the average rural hospital, the percent of revenue coming from outpatient services increased from 66.5% in 2011 to 74.2% in 2019.[5]

4) *Reported uncompensated care is decreasing*. Previous research has found that Medicaid expansion in many states has resulted in decreased uncompensated care among rural hospitals;[6] as of April 2024, 10 states have not expanded Medicaid eligibility.[7] Furthermore, recent increases and eligibility expansions for Health Insurance Marketplace subsidies have contributed to falling uninsurance rates.[8]

5) *COVID-19*. The financial performance and condition of rural hospitals in recent years were influenced by the pandemic and related Public Health Emergency (PHE) funding distributed during this time. The temporary nature of PHE funds presents methodological challenges that we address in the methods section of this brief.

KEY FINDINGS

Using an updated version of the UNC Financial Distress Index, this study found that:

- Among 2,063 rural hospitals and selected urban hospitals with a Medicare special payment designation in 2021, 72 (3.5%) were predicted to be at highest relative risk of financial distress in 2023, 294 (14.3%) at mid-highest risk, 638 (30.9%) at mid-lowest risk, and 1,059 (51.3%) at lowest risk.
- Over 60% of hospitals at highest relative risk of financial distress are in seven states: Texas (9 hospitals at highest relative risk), Oklahoma (8), Tennessee (8), Alabama (6), Kansas (5), Mississippi (5), and Georgia (4).
- Compared to the full sample of rural hospitals and urban hospitals with a special payment designation, hospitals at highest relative risk of financial distress are more likely to be Prospective Payment System (PPS)-only hospitals, Medicare Dependent Hospitals (MDHs), and for-profit hospitals. In contrast, hospitals at highest relative risk of financial distress are less likely to be Critical Access Hospitals (CAHs), Rural Referral Centers (RRCs), and nonprofit hospitals.

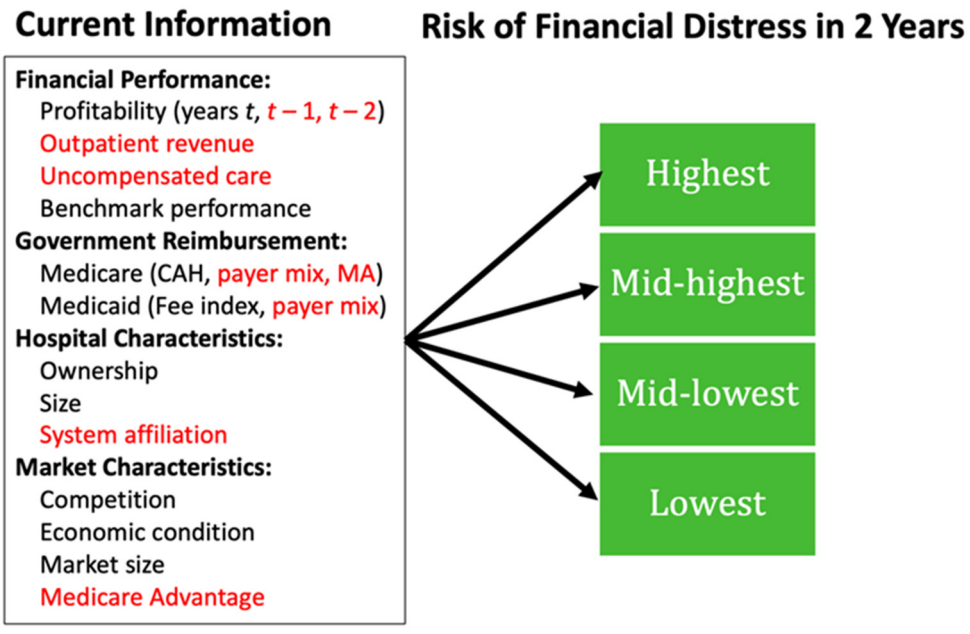
Using a recent revision of the FDI model, this study aimed to describe the relative risk of experiencing financial distress for rural hospitals and selected urban hospitals (urban CAHs, urban MDHs, and urban Sole Community Hospitals [SCHs] earning $500,000,000 or less in net patient revenue).[9] Urban CAHs, MDHs, and SCHs must be located a minimum travel distance from other hospitals and/or have limits on the maximum number of beds,[10,11] and thus have key similarities with hospitals located in rural areas. In contrast, we decided to exclude hospitals earning more than $500,000,000 in net patient revenue and facilities solely designated as RRCs from our sample under the rationale that these large hospitals are fundamentally different than most rural hospitals (we note that urban hospitals *jointly* designated as a RRC and MDH or SCH were retained in our sample given the aforementioned requirements of MDH or SCH status).

The Updated FDI Model

The updated model recognizes recent changes in the operating environment and uses financial performance, government reimbursement, organizational characteristics, and market characteristics to predict the relative risk of rural hospital financial distress two years hence (Figure 1). Variables that were included in the original FDI model are shown in Figure 1 with black text and have been previously defined;[12] new variables in the updated model are shown in red text. Among the new financial performance variables, we measured *profitability* (years t – 1 and t – 2) as total margin, *outpatient revenue* as outpatient revenue / total revenue, and *uncompensated care* as uncompensated care / operating expense. Among the new government reimbursement variables, we measured *outpatient Medicare payer mix* as hospital outpatient Medicare charges / hospital total outpatient charges, *inpatient Medicare Advantage m*ix as (Medicare Advantage + cost plan days[13]) / traditional Medicare days, and *Medicaid payer mix* as Medicaid charges / total patient charges. Among hospital characteristics, we measured *system affiliation* as a binary variable (yes = 1, and no = 0). Among the market characteristics, we measured *market Medicare Advantage penetration* using Medicare Advantage penetration data provided by the Centers for Medicare & Medicaid Services (CMS).

A core construct of the original FDI model was the categorization of a continuous measure of distress into intuitive categories – high risk, mid-high risk, mid-low risk, and low risk. These labels connote an *absolute* measure of risk; a hospital is either at high (low) risk of financial distress or it is not. However, the FDI is a measure of *relative* risk: it says that, in comparison with other hospitals, these hospitals are at highest (lowest) risk of financial distress. For this reason, we decided to amend the labels for the updated FDI categories to better reflect relative risk: highest, mid-highest, mid-lowest, and lowest. The number of hospitals that the updated FDI model classifies as "highest" ("lowest") risk could differ from other financial distress measurement schemes such as the tool used by the Chartis Center for Rural Health[14] and the Center for Healthcare Quality and Payment Reform;[15] this is at least partially a question of semantics and not necessarily due to major differences in assessment of the financial health of rural hospitals.

Figure 1. Updated Model of Rural Hospital Financial Distress

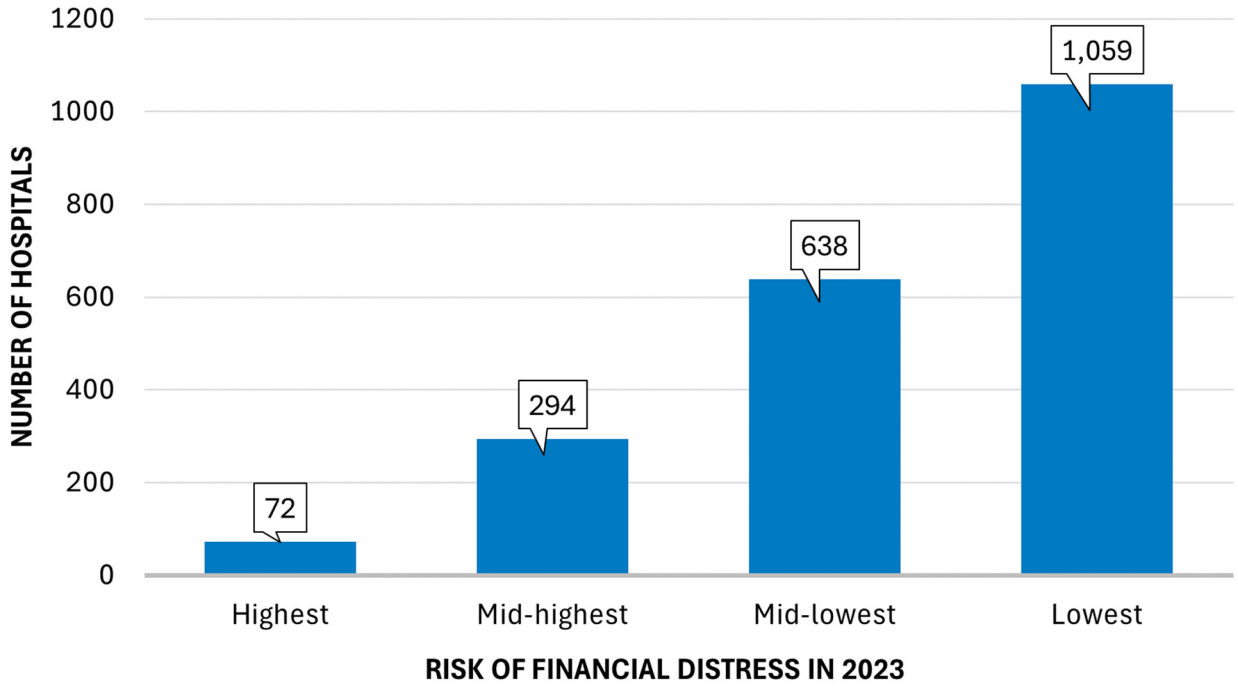


Variables from original FDI model listed in black text. New variables included in updated model listed in red text.

Relative Risk of Experiencing Financial Distress in 2023

The number of hospitals in each category of relative risk of financial distress is shown in Figure 2. Seventy-two hospitals (3.5% of 2,063 rural hospitals and selected urban hospitals with a special payment designation) were predicted to be at highest relative risk of financial distress, 294 (14.3%) at mid-highest risk, 638 (30.9%) at mid-lowest risk, and 1,059 (51.3%) at lowest risk.

Figure 2. Relative Risk of Experiencing Financial Distress in 2023



Note: Hospitals include (1) rural hospitals and (2) selected urban hospitals with a Medicare special payment designation.

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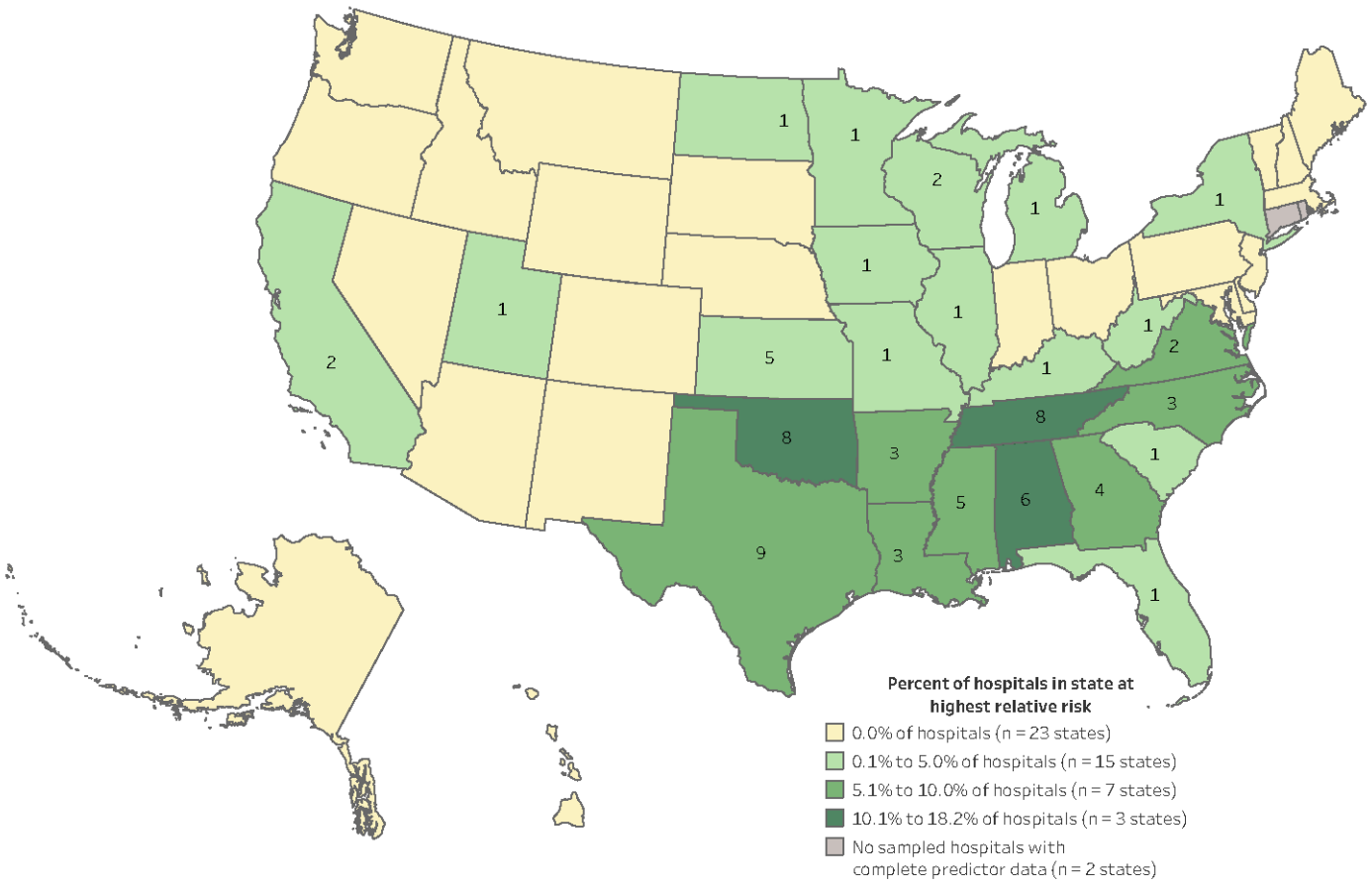
Hospitals at Highest Relative Risk of Financial Distress by State

Figure 3 shows the number of hospitals predicted to be at highest relative risk of financial distress by state. The states with more than three hospitals predicted to be at highest relative risk of financial distress are Texas (9 hospitals at highest relative risk), Oklahoma (8), Tennessee (8), Alabama (6), Kansas (5), Mississippi (5), and Georgia (4). More than 60% of hospitals at highest risk of financial distress are in these seven states. The states with the largest percentage of hospitals predicted to be at highest risk are Tennessee (18.2% of rural hospitals and selected urban hospitals with a special payment designation), Alabama (13.0%), Oklahoma (11.8%), Mississippi (7.9%), and Virginia (7.1%). Twenty-five states have no hospitals predicted to be at highest risk of financial distress in 2023 (or no rural hospitals with complete predictor data or selected urban hospitals with special payment designations and complete predictor data). The Appendix shows the number of hospitals in each category of relative risk of financial distress by state.

Figure 3. Number and Percent of Hospitals[a] within Each State at Highest Relative Financial Distress Risk in 2023



[a] Includes (1) rural hospitals and (2) selected urban hospitals with a Medicare special payment designation.

Characteristics of Hospitals at Highest Relative Risk of Financial Distress

Table 1 shows various characteristics of rural hospitals and selected urban hospitals with a special payment designation by category of financial distress risk. Among 72 hospitals at highest relative risk of financial distress:

- 97% (70/72) are in rural areas, and 3% (2/72) are in urban areas;[16]
- 36% (26/72) are CAHs, 28% (20/72) are PPS with no special payment designations, and 36% (26/72) are PPS with a special payment designation;
- 40% (29/72) are nonprofit, 36% (26/72) are government-owned, and 24% (17/72) are for-profit organizations;
- 60% (43/72) are system-affiliated, and 40% (29/72) are independent;
- 15% (11/72) provide long-term care (LTC),[17] and 85% (61/72) do not provide LTC;
- 58% (42/72) operate a Rural Health Clinic (RHC), and 42% (30/72) do not operate a RHC.

Table 1. Characteristics of Hospitals[a] by Relative Risk of Financial Distress in 2023

		Highest	Mid-highest	Mid-lowest	Lowest	Total
Location	Rural	70	279	612	998	1,959
	Urban	2	15	26	61	104
Medicare Payment Designation	CAH	26	156	401	647	1,230
	PPS-only[b]	20	42	60	105	227
	MDH	15	33	33	49	130
	SCH	11	41	92	114	258
	RRC	0	8	16	45	69
	MDH/RRC	0	4	6	15	25
	SCH/RRC	0	10	30	84	124
Ownership	Nonprofit	29	145	325	676	1,175
	Government	26	95	265	312	698
	For-profit	17	54	48	71	190
Affiliation	System-affiliated	43	158	268	513	982
	Independent	29	136	370	546	1,081
Long-term Care	Provides LTC	11	59	127	182	379
	Does not provide LTC	61	235	511	877	1,684
Rural Health Clinic	Operates a RHC	42	192	417	545	1,196
	Does not operate RHC	30	102	221	514	867
Total		72	294	638	1,059	2,063

[a] Includes (1) rural hospitals and (2) selected urban hospitals with a Medicare special payment designation.
[b] PPS hospital with no special payment designations.

Table 2 directly compares the hospitals at highest relative risk of financial distress to the full sample of rural hospitals and selected urban hospitals with a special payment designation by each characteristic. For brevity, we highlight the characteristics with the largest percentage point difference between the hospitals at highest relative risk and the full sample. Compared to the full sample, hospitals at highest risk of financial distress are more likely to be:

- PPS-only hospitals (27.8% of highest risk hospitals vs. 11.0% of hospitals in the full sample),
- MDHs (20.8% of highest risk hospitals vs. 6.3% of hospitals in the full sample),
- For-profit hospitals (23.6% of highest risk hospitals vs. 9.2% of hospitals in the full sample).

In contrast, hospitals at highest risk of financial distress are less likely to be:

- CAHs (36.1% of highest risk hospitals vs. 59.6% of hospitals in the full sample),
- Nonprofit hospitals (40.3% of highest risk hospitals vs. 57.0% of hospitals in the full sample).

Table 2. Hospitals[a] at the Highest Relative Risk of Financial Distress in 2023 Compared to the Full Sample

		Highest Relative Risk		Full Sample	
		Number	Percent	Number	Percent
Location	Rural	70	97.2%	1,959	95.0%
	Urban	2	2.8%	104	5.0%
Medicare Payment Designation	CAH	26	36.1%	1,230	59.6%
	PPS-only[b]	20	27.8%	227	11.0%
	MDH	15	20.8%	130	6.3%
	SCH	11	15.3%	258	12.5%
	RRC	0	0.0%	69	3.3%
	MDH/RRC	0	0.0%	25	1.2%
	SCH/RRC	0	0.0%	124	6.0%
Ownership	Nonprofit	29	40.3%	1,175	57.0%
	Government	26	36.1%	698	33.8%
	For-profit	17	23.6%	190	9.2%
Affiliation	System-affiliated	43	59.7%	982	47.6%
	Independent	29	40.3%	1,081	52.4%
Long-term Care	Provides LTC	11	15.3%	379	18.4%
	Does not provide LTC	61	84.7%	1,684	81.6%
Rural Health Clinic	Operates a RHC	42	58.3%	1,196	58.0%
	Does not operate RHC	30	41.7%	867	42.0%
Total		72	100.0%	2,063	100.0%

[a] Includes (1) rural hospitals and (2) selected urban hospitals with a Medicare special payment designation.
[b] PPS hospital with no special payment designations.

DISCUSSION

Using a recent revision of the FDI model, the aim of this study was to describe the relative risk of financial distress among rural hospitals and selected urban hospitals with a special payment designation. The study found that 72 of 2,063 (3.5%) of rural hospitals and selected urban hospitals with a special payment designation were at highest risk of financial distress in 2023. Over 60% of hospitals at highest risk are in seven states: Texas (9 hospitals at highest relative risk), Oklahoma (8), Tennessee (8), Alabama (6), Kansas (5), Mississippi (5), and Georgia (4).

Compared to the full sample of rural hospitals and selected urban hospitals with a special payment designation, hospitals at highest risk of financial distress are more likely to be PPS-only hospitals, MDHs, and for-profit hospitals. In contrast, hospitals at highest risk of financial distress are less likely to be CAHs, RRCs, and nonprofit hospitals. These findings are consistent with a previous study of rural hospital profitability that found: (1) compared to other hospitals, RRCs and urban hospitals had the highest profitability in every year between 2016 and 2018; (2) In 2018, PPS-only hospitals with 0-25 beds and MDHs had the lowest profitability compared to urban hospitals and other rural hospitals.[18] Another study also found relatively lower profitability among MDHs and relatively higher profitability among RRCs.[19]

Prediction of financial distress is a challenging task. In addition to the financial and non-financial measures included in the FDI model, other factors such as labor costs, reimbursement shortfalls, and government policies could be contributing to the number of rural hospitals predicted to be at highest risk of financial distress.[20] Nevertheless, the FDI

model shows important differences in relative risk of financial distress among rural hospitals and urban hospitals with a special payment designation. These differences can be used to screen and identify hospitals for closer monitoring.

METHODS

Full methodological details for the development and validation of the updated FDI model will be provided in a future companion article. We provide a summary of the methods below.

We used rural hospital observations from 2013 – 2019 to construct the updated version of the FDI model. We identified the rurality of each hospital using criteria outlined by the Federal Office of Rural Health Policy (FORHP) in the Health Resources & Services Administration (HRSA).[21] In addition, we obtained hospital-level information on hypothesized predictors of financial distress (e.g., financial performance, government reimbursement, organizational characteristics, and market characteristics) using the CMS Hospital Cost Report Information System ("Medicare Cost Reports"), Provider of Services data, the Medicaid-to-Medicare fee index,[22] U.S. Census population demographic data, U.S. Department of Housing and Urban Development (HUD) United States Postal Service (USPS) geographic crosswalk files, and CMS Medicare Advantage penetration data. To define the market for each hospital, we used a multi-step procedure that involved (1) using Medicare Fee-for-Service claims data to generate a conditional logit model of patients' hospital choice for inpatient and emergency care; (2) using the model results from step #1 with CMS hospital utilization data and HUD USPS ZIP-to-County crosswalk files to estimate hospital utilization for patients from each ZIP code; and (3) identifying the fewest amount of ZIP codes that collectively contributed at least 50% of the hospital's total patient volume. For a given hospital, the set of ZIP codes from step #3 were identified as the hospital's market.

We also considered using rural hospital observations from 2020 – 2022 to assist with model construction. However, the financial performance and condition of rural hospitals in 2020 – 2021 and 2021 – 2022 were influenced by Public Health Emergency (PHE) funding distributed during the COVID-19 pandemic and thus may not be generalizable to future years.[23] The PHE funds were an important financial lifeline for many rural hospitals and likely contributed to the reduction in the number of rural hospital closures (relative to the average annual rate from preceding years),[24] with only three recorded closures in the year 2021 and seven in the year 2022. That said, the PHE funds were temporary. Long-term financial pressures remain, and profitability of rural hospitals may be returning to pre-pandemic levels.[25] For this reason, FDI model development used pre-COVID data. Future iterations of the FDI model will consider statistical controls for COVID years.

Once we had gathered data for all rural hospital observations of interest, we randomly split the observations into two subsamples of approximately equal size, a training set and a test set. We used the training set to estimate the model parameters and the test set to verify the predictive accuracy of the updated model. Once verified, we were able to use the updated model with more recent data to estimate the relative risk of financial distress. To generate the results in this report, we used historical data from 2021 and earlier to predict the probability of hospital financial distress in 2023. Hospitals in the sample for this report included rural hospitals and selected urban hospitals with a special payment designation (urban CAHs, urban MDHs, urban SCHs, and urban hospitals jointly designated as MDH/RRC or SCH/RRC earning $500,000,000 or less in annual net patient revenue). Although the model training set was restricted to rural hospital observations, we were still able to calculate FDI risk scores for urban hospitals with complete data on all relevant predictor variables. Predictions for these urban hospitals could be less accurate than predictions for hospitals located in rural areas. Furthermore, the influence of PHE funding in 2021 – 2022 could affect the accuracy of current model predictions. However, given that the PHE funds are now fully distributed, we expect this source of confounding to be minimized in future years.

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APPENDIX: Risk of Financial Distress in 2023 by State

	State	Highest	Mid-highest	Mid-lowest	Lowest	Total
States with Multiple Hospitals at Highest Risk	TX	9	30	46	48	133
	OK	8	19	27	14	68
	TN	8	10	15	11	44
	AL	6	14	14	12	46
	KS	5	23	44	30	102
	MS	5	20	29	9	63
	GA	4	16	21	26	67
	AR	3	5	23	17	48
	LA	3	11	16	19	49
	NC	3	7	15	26	51
	CA	2	4	19	25	50
	VA	2	8	4	14	28
	WI	2	5	12	55	74
States with 1 Hospital at Highest Risk	FL	1	4	10	9	24
	IL	1	6	21	44	72
	IA	1	2	27	65	95
	KY	1	12	18	31	62
	MI	1	8	15	33	57
	MN	1	4	26	62	93
	MO	1	4	29	26	60
	NY	1	9	27	15	52
	ND	1	4	13	18	36
	SC	1	5	6	9	21
	UT	1	0	3	17	21
	WV	1	5	10	10	26
States with 0 Hospitals at Highest Risk	AK	0	1	1	9	11
	AZ	0	1	3	16	20
	CO	0	2	10	30	42
	CT	0	0	0	0	0
	DE	0	0	0	2	2
	HI	0	3	2	4	9
	ID	0	1	4	23	28
	IN	0	7	12	35	54
	ME	0	1	4	11	16
	MD	0	0	1	4	5
	MA	0	0	1	4	5
	MT	0	9	13	26	48
	NE	0	4	14	52	70
	NV	0	1	6	6	13
	NH	0	0	2	12	14
	NJ	0	0	1	1	2
	NM	0	3	8	12	23
	OH	0	6	13	53	72
	OR	0	3	7	19	29
	PA	0	6	6	21	33
	RI	0	0	0	0	0
	SD	0	5	12	28	45
	VT	0	0	3	10	13
	WA	0	4	16	23	43
	WY	0	2	9	13	24