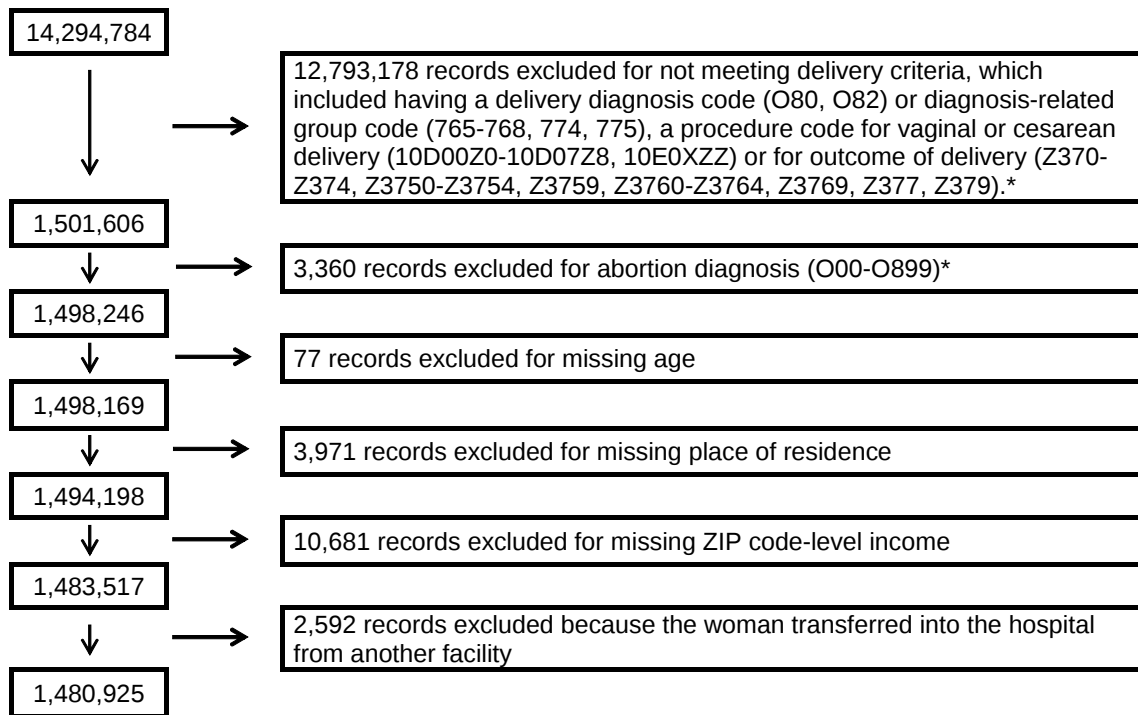


Appendix 1. Study sample selection.



* Codes based on the International Classification of Diseases, Tenth Revision, Clinical Modification and Procedure Coding System (ICD-10).

Appendix 2. Centers for Disease Control and Prevention Severe Maternal Morbidity Indicator List and Associated ICD-10 Codes

Indicator	ICD-10 Codes
Diagnoses	
Acute myocardial infarction	I21.XX, I22.X
Aneurysm	I71.XX; I79.0
Acute renal failure	N17.X, O90.4
Adult respiratory distress syndrome	J80, J95.1, J95.2, J95.3, J95.82X, J96.0X, J96.2X R09.2
Amniotic fluid embolism	O88.1X
Cardiac arrest or ventricular fibrillation	I46.X, I49.0X
Disseminated intravascular coagulation	D65, D68.8, D68.9, O72.3
Eclampsia	O15. X
Heart failure or arrest during surgery or procedure	I97.12X, I97.13X, I97.710, I97.711
Puerperal cerebrovascular disorders	I60.XX- I68.XX, O22.51, O22.52, O22.53, I97.81X, I97.82X, O87.3
Pulmonary edema or Acute heart failure	J81.0, I50.1, I50.20, I50.21, I50.23, I50.30, I50.31, I50.33, I50.40, I50.41, I50.43, I50.9
Severe anesthesia complications	O74.0 , O74.1 , O74.2, O74.3, O89.0X, O89.1, O89.2
Sepsis	A40.X, A41.X, A32.7, O85, O86.04, T80.211A, T81.4XXA, T81.44XX, R65.20
Shock	O75.1, R57.X, R65.21, T78.2XXA, T88.2 XXA, T88.6 XXA, T81.10XA , T81.11XA, T81.19XA
Sickle cell disease with crisis	D57.0X, D57.21X, D57.41X, D57.81X
Air and thrombotic embolism	I26.X, O88.0X, O88.2X, O88.3X, O88.8X
Procedures	
Conversion of cardiac rhythm	5A2204Z, 5A12012
Blood products transfusion *	30230X0, 30230X1, 30233X0, 30233X1, 30240X0, 30240X1, 30243X0, 30243X1, 30250X0, 30250X1, 30253X0, 30253X1, 30260X0, 30260X1, 30263X0, 30263X1
Hysterectomy	OUT90ZZ, OUT94ZZ, OUT97ZZ, OUT98ZZ, OUT9FZZ
Temporary tracheostomy	OB110Z, OB110F, OB113, OB114
Ventilation	5A1935Z, 5A1945Z, 5A1955Z

Information available at <https://www.cdc.gov/reproductivehealth/maternalinfanthealth/smm/severe-morbidity-ICD.htm>.

* The “X” in the blood transfusion codes only includes 6th digits equal to H, K, L, M, N, P, R, or T. This indicator is the indicator excluded from the Severe Maternal Morbidity excluding Blood Transfusion measure.

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Appendix 3. Comorbidity List and Associated ICD-10 Codes

Comorbidity	ICD-10 Codes*
Acquired immune deficiency syndrome	B20
Alcohol Abuse	F1010, F1011, F10120, F10121, F10129, F1014, F10150, F10151, F10159, F10180, F10181, F10182, F10188, F1019, F1020, F1021, F10220, F10221, F10229, F10230, F10231, F10232, F10239, F1024, F10250, F10251, F10259, F1026, F1027, F10280, F10281, F10282, F10288, F1029, F10921, F1094, F10950, F10951, F10959, F1096, F1097, F10980, F10981, F10982, F10988, F1099
Anemia Deficiencies	D501, D508, D509, D510, D511, D512, D513, D518, D519, D520, D521, D528, D529, D530, D531, D532, D538, D539, D630, D631, D638, D649
Rheumatoid arthritis or collagen vascular diseases	L900, L940, L941, L943, M0500, M05011, M05012, M05019, M05021, M05022, M05029, M05031, M05032, M05039, M05041, M05042, M05049, M05051, M05052, M05059, M05061, M05062, M05069, M05071, M05072, M05079, M0509, M0510, M05111, M05112, M05119, M05121, M05122, M05129, M05131, M05132, M05139, M05141, M05142, M05149, M05151, M05152, M05159, M05161, M05162, M05169, M05171, M05172, M05179, M0519, M0520, M05211, M05212, M05219, M05221, M05222, M05229, M05231, M05232, M05239, M05241, M05242, M05249, M05251, M05252, M05259, M05261, M05262, M05269, M05271, M05272, M05279, M0529, M0530, M05311, M05312, M05319, M05321, M05322, M05329, M05331, M05332, M05339, M05341, M05342, M05349, M05351, M05352, M05359, M05361, M05362, M05369, M05371, M05372, M05379, M0539, M0540, M05411, M05412, M05419, M05421, M05422, M05429, M05431, M05432, M05439, M05441, M05442, M05449, M05451, M05452, M05459, M05461, M05462, M05469, M05471, M05472, M05479, M0549, M0550, M05511, M05512, M05519, M05521, M05522, M05529, M05531, M05532, M05539, M05541, M05542, M05549, M05551, M05552, M05559, M05561, M05562, M05569, M05571, M05572, M05579, M0559, M0560, M05611, M05612, M05619, M05621, M05622, M05629, M05631, M05632, M05639, M05641, M05642, M05649, M05651, M05652, M05659, M05661, M05662, M05669, M05671, M05672, M05679, M0569, M0570, M05711, M05712, M05719, M05721, M05722, M05729, M05731, M05732, M05739, M05741, M05742, M05749, M05751, M05752, M05759, M05761, M05762, M05769, M05771, M05772, M05779, M0579, M0580, M05811, M05812, M05819, M05821, M05822, M05829, M05831, M05832, M05839, M05841, M05842, M05849, M05851, M05852, M05859, M05861, M05862, M05869, M05871, M05872, M05879, M0589, M059, M0600, M06011, M06012, M06019, M06021, M06022, M06029,

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	M06031, M06032, M06039, M06041, M06042, M06049, M06051, M06052, M06059, M06061, M06062, M06069, M06071, M06072, M06079, M0608, M0609, M061, M0620, M06211, M06212, M06219, M06221, M06222, M06229, M06231, M06232, M06239, M06241, M06242, M06249, M06251, M06252, M06259, M06261, M06262, M06269, M06271, M06272, M06279, M0628, M0629, M0630, M06311, M06312, M06319, M06321, M06322, M06329, M06331, M06332, M06339, M06341, M06342, M06349, M06351, M06352, M06359, M06361, M06362, M06369, M06371, M06372, M06379, M0638, M0639, M064, M0680, M06811, M06812, M06819, M06821, M06822, M06829, M06831, M06832, M06839, M06841, M06842, M06849, M06851, M06852, M06859, M06861, M06862, M06869, M06871, M06872, M06879, M0688, M0689, M069, M0800, M08011, M08012, M08019, M08021, M08022, M08029, M08031, M08032, M08039, M08041, M08042, M08049, M08051, M08052, M08059, M08061, M08062, M08069, M08071, M08072, M08079, M0808, M0809, M081, M0820, M08211, M08212, M08219, M08221, M08222, M08229, M08231, M08232, M08239, M08241, M08242, M08249, M08251, M08252, M08259, M08261, M08262, M08269, M08271, M08272, M08279, M0828, M0829, M083, M0840, M08411, M08412, M08419, M08421, M08422, M08429, M08431, M08432, M08439, M08441, M08442, M08449, M08451, M08452, M08459, M08461, M08462, M08469, M08471, M08472, M08479, M0848, M0880, M08811, M08812, M08819, M08821, M08822, M08829, M08831, M08832, M08839, M08841, M08842, M08849, M08851, M08852, M08859, M08861, M08862, M08869, M08871, M08872, M08879, M0888, M0889, M0890, M08911, M08912, M08919, M08921, M08922, M08929, M08931, M08932, M08939, M08941, M08942, M08949, M08951, M08952, M08959, M08961, M08962, M08969, M08971, M08972, M08979, M0898, M0899, M1200, M12011, M12012, M12019, M12021, M12022, M12029, M12031, M12032, M12039, M12041, M12042, M12049, M12051, M12052, M12059, M12061, M12062, M12069, M12071, M12072, M12079, M1208, M1209, M320, M3210, M3211, M3212, M3213, M3214, M3215, M3219, M328, M329, M3300, M3301, M3302, M3303, M3309, M3310, M3311, M3312, M3313, M3319, M3320, M3321, M3322, M3329, M3390, M3391, M3392, M3393, M3399, M340, M341, M342, M3481, M3482, M3483, M3489, M349, M3500, M3501, M3502, M3503, M3504, M3509, M351, M353, M355, M358, M359, M360, M368, M450, M451, M452, M453, M454, M455, M456, M457, M458, M459, M4600, M4601, M4602, M4603, M4604, M4605, M4606, M4607, M4608, M4609, M461, M4650, M4651, M4652, M4653, M4654, M4655, M4656, M4657, M4658, M4659, M4680, M4681, M4682, M4683, M4684, M4685, M4686, M4687, M4688, M4689, M4690, M4691, M4692, M4693, M4694, M4695, M4696, M4697, M4698, M4699, M488X1, M488X2, M488X3, M488X4, M488X5, M488X6, M488X7,
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	M488X8, M488X9, M4980, M4981, M4982, M4983, M4984, M4985, M4986, M4987, M4988, M4989
Blood loss anemia	D500, O9081, O99011, O99012, O99013, O99019, O9902, O9903
Congestive heart failure	I0981, I501, I5020, I5021, I5022, I5023, I5030, I5031, I5032, I5033, I5040, I5041, I5042, I5043, I50810, I50811, I50812, I50813, I50814, I5082, I5083, I5084, I5089, I509
Chronic pulmonary disease	J40, J410, J411, J418, J42, J430, J431, J432, J438, J439, J440, J441, J449, J4520, J4521, J4522, J4530, J4531, J4532, J4540, J4541, J4542, J4550, J4551, J4552, J45901, J45902, J45909, J45990, J45991, J45998, J470, J471, J479, J60, J61, J620, J628, J630, J631, J632, J633, J634, J635, J636, J64, J660, J661, J662, J668, J670, J671, J672, J673, J674, J675, J676, J677, J678, J679, J684
Coagulation deficiency	D65, D66, D67, D680, D681, D682, D68311, D68312, D68318, D6832, D684, D688, D689, D691, D693, D6941, D6942, D6949, D6951, D6959, D696, D7582, O99111, O99112, O99113, O99119, O9912, O9913
Depression	F320, F321, F322, F323, F328, F3281, F3289, F329, F330, F331, F332, F333, F338, F339, F341, F4321
Diabetes without chronic complications	E0800, E0801, E0810, E0811, E089, E0900, E0901, E0910, E0911, E099, E1010, E1011, E109, E1100, E1101, E1110, E1111, E119, E1300, E1301, E1310, E1311, E139, O24011, O24012, O24013, O24019, O2402, O2403, O24111, O24112, O24113, O24119, O2412, O2413, O24311, O24312, O24313, O24319, O2432, O2433, O24811, O24812, O24813, O24819, O2482, O2483, O24911, O24912, O24913, O24919, O2492, O2493
Diabetes with chronic complications	E0821, E0822, E0829, E08311, E08319, E08321, E083211, E083212, E083213, E083219, E08329, E083291, E083292, E083293, E083299, E08331, E083311, E083312, E083313, E083319, E08339, E083391, E083392, E083393, E083399, E08341, E083411, E083412, E083413, E083419, E08349, E083491, E083492, E083493, E083499, E08351, E083511, E083512, E083513, E083519, E083521, E083522, E083523, E083529, E083531, E083532, E083533, E083539, E083541, E083542, E083543, E083549, E083551, E083552, E083553, E083559, E08359, E083591, E083592, E083593, E083599, E0836, E0837X1, E0837X2, E0837X3, E0837X9, E0839, E0840, E0841, E0842, E0843, E0844, E0849, E0851, E0852, E0859, E08610, E08618, E08620, E08621, E08622, E08628, E08630, E08638, E08641, E08649, E0865, E0869, E088, E0921, E0922, E0929, E09311, E09319, E09321, E093211, E093212, E093213, E093219, E09329, E093291, E093292, E093293, E093299, E09331, E093311, E093312, E093313, E093319, E09339, E093391, E093392, E093393, E093399, E09341, E093411, E093412, E093413, E093419, E09349, E093491, E093492, E093493, E093499, E09351, E093511, E093512, E093513, E093519, E093521, E093522, E093523, E093529, E093531, E093532, E093533, E093539, E093541, E093542, E093543, E093549, E093551, E093552, E093553, E093559, E09359, E093591, E093592, E093593, E093599, E0936, E0937X1, E0937X2, E0937X3, E0937X9, E0939,

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	E0940, E0941, E0942, E0943, E0944, E0949, E0951, E0952, E0959, E09610, E09618, E09620, E09621, E09622, E09628, E09630, E09638, E09641, E09649, E0965, E0969, E098, E1021, E1022, E1029, E10311, E10319, E10321, E103211, E103212, E103213, E103219, E10329, E103291, E103292, E103293, E103299, E10331, E103311, E103312, E103313, E103319, E10339, E103391, E103392, E103393, E103399, E10341, E103411, E103412, E103413, E103419, E10349, E103491, E103492, E103493, E103499, E10351, E103511, E103512, E103513, E103519, E103521, E103522, E103523, E103529, E103531, E103532, E103533, E103539, E103541, E103542, E103543, E103549, E103551, E103552, E103553, E103559, E10359, E103591, E103592, E103593, E103599, E1036, E1037X1, E1037X2, E1037X3, E1037X9, E1039, E1040, E1041, E1042, E1043, E1044, E1049, E1051, E1052, E1059, E10610, E10618, E10620, E10621, E10622, E10628, E10630, E10638, E10641, E10649, E1065, E1069, E108, E1121, E1122, E1129, E11311, E11319, E11321, E113211, E113212, E113213, E113219, E11329, E113291, E113292, E113293, E113299, E11331, E113311, E113312, E113313, E113319, E11339, E113391, E113392, E113393, E113399, E11341, E113411, E113412, E113413, E113419, E11349, E113491, E113492, E113493, E113499, E11351, E113511, E113512, E113513, E113519, E113521, E113522, E113523, E113529, E113531, E113532, E113533, E113539, E113541, E113542, E113543, E113549, E113551, E113552, E113553, E113559, E11359, E113591, E113592, E113593, E113599, E1136, E1137X1, E1137X2, E1137X3, E1137X9, E1139, E1140, E1141, E1142, E1143, E1144, E1149, E1151, E1152, E1159, E11610, E11618, E11620, E11621, E11622, E11628, E11630, E11638, E11641, E11649, E1165, E1169, E118, E1321, E1322, E1329, E13311, E13319, E13321, E133211, E133212, E133213, E133219, E13329, E133291, E133292, E133293, E133299, E13331, E133311, E133312, E133313, E133319, E13339, E133391, E133392, E133393, E133399, E13341, E133411, E133412, E133413, E133419, E13349, E133491, E133492, E133493, E133499, E13351, E133511, E133512, E133513, E133519, E133521, E133522, E133523, E133529, E133531, E133532, E133533, E133539, E133541, E133542, E133543, E133549, E133551, E133552, E133553, E133559, E13359, E133591, E133592, E133593, E133599, E1336, E1337X1, E1337X2, E1337X3, E1337X9, E1339, E1340, E1341, E1342, E1343, E1344, E1349, E1351, E1352, E1359, E13610, E13618, E13620, E13621, E13622, E13628, E13630, E13638, E13641, E13649, E1365, E1369, E138, P702
Drug abuse	F1110, F1111, F11120, F11121, F11122, F11129, F1114, F11150, F11151, F11159, F11181, F11182, F11188, F1119, F1120, F1121, F11220, F11221, F11222, F11229, F1123, F1124, F11250, F11251, F11259, F11281, F11282, F11288, F1129, F1210, F1211, F12120, F12121, F12122, F12129, F12150, F12151, F12159, F12180, F12188, F1219, F1220, F1221, F12220, F12221, F12222, F12229, F1223, F12250, F12251, F12259, F12280, F12288, F1229, F1310, F1311, F13120, F13121, F13129, F1314, F13150, F13151, F13159,

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	F13180, F13181, F13182, F13188, F1319, F1320, F1321, F13220, F13221, F13229, F13230, F13231, F13232, F13239, F1324, F13250, F13251, F13259, F1326, F1327, F13280, F13281, F13282, F13288, F1329, F1410, F1411, F14120, F14121, F14122, F14129, F1414, F14150, F14151, F14159, F14180, F14181, F14182, F14188, F1419, F1420, F1421, F14220, F14221, F14222, F14229, F1423, F1424, F14250, F14251, F14259, F14280, F14281, F14282, F14288, F1429, F1510, F1511, F15120, F15121, F15122, F15129, F1514, F15150, F15151, F15159, F15180, F15181, F15182, F15188, F1519, F1520, F1521, F15220, F15221, F15222, F15229, F1523, F1524, F15250, F15251, F15259, F15280, F15281, F15282, F15288, F1529, F1610, F1611, F16120, F16121, F16122, F16129, F1614, F16150, F16151, F16159, F16180, F16183, F16188, F1619, F1620, F1621, F16220, F16221, F16229, F1624, F16250, F16251, F16259, F16280, F16283, F16288, F1629, F1810, F1811, F18120, F18121, F18129, F1814, F18150, F18151, F18159, F1817, F18180, F18188, F1819, F1820, F1821, F18220, F18221, F18229, F1824, F18250, F18251, F18259, F1827, F18280, F18288, F1829, F1910, F1911, F19120, F19121, F19122, F19129, F1914, F19150, F19151, F19159, F1916, F1917, F19180, F19181, F19182, F19188, F1919, F1920, F1921, F19220, F19221, F19222, F19229, F19230, F19231, F19232, F19239, F1924, F19250, F19251, F19259, F1926, F1927, F19280, F19281, F19282, F19288, F1929, F550, F551, F552, F553, F554, F558, O99320, O99321, O99322, O99323, O99324, O99325
Unsp pre-existing hypertension complicating the puerperium	I10, O10011, O10012, O10013, O10019, O1002, O1003, O10911, O10912, O10913, O10919, O1092, O1093
Hypertensive encephalopathy	I160, I161, I169, I674
Hypothyroidism	E000, E001, E002, E009, E018, E02, E030, E031, E032, E033, E038, E039, E890
Liver disease	B180, B181, B182, I8500, I8501, I8510, I8511, K700, K702, K7030, K7031, K7040, K7041, K709, K7210, K7211, K7290, K7291, K730, K731, K732, K738, K739, K740, K741, K742, K743, K744, K745, K7460, K7469, K754, K7581, K760, K766, K7689, K769, Z944
Lymphoma	C8100, C8101, C8102, C8103, C8104, C8105, C8106, C8107, C8108, C8109, C8110, C8111, C8112, C8113, C8114, C8115, C8116, C8117, C8118, C8119, C8120, C8121, C8122, C8123, C8124, C8125, C8126, C8127, C8128, C8129, C8130, C8131, C8132, C8133, C8134, C8135, C8136, C8137, C8138, C8139, C8140, C8141, C8142, C8143, C8144, C8145, C8146, C8147, C8148, C8149, C8170, C8171, C8172, C8173, C8174, C8175, C8176, C8177, C8178, C8179, C8190, C8191, C8192, C8193, C8194, C8195, C8196, C8197, C8198, C8199, C8200, C8201, C8202, C8203, C8204, C8205, C8206, C8207, C8208, C8209, C8210, C8211, C8212, C8213, C8214, C8215, C8216, C8217, C8218, C8219, C8220, C8221, C8222, C8223, C8224, C8225, C8226, C8227, C8228, C8229, C8230, C8231, C8232, C8233, C8234, C8235, C8236, C8237, C8238, C8239,

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	C8240, C8241, C8242, C8243, C8244, C8245, C8246, C8247, C8248, C8249, C8250, C8251, C8252, C8253, C8254, C8255, C8256, C8257, C8258, C8259, C8260, C8261, C8262, C8263, C8264, C8265, C8266, C8267, C8268, C8269, C8280, C8281, C8282, C8283, C8284, C8285, C8286, C8287, C8288, C8289, C8290, C8291, C8292, C8293, C8294, C8295, C8296, C8297, C8298, C8299, C8300, C8301, C8302, C8303, C8304, C8305, C8306, C8307, C8308, C8309, C8310, C8311, C8312, C8313, C8314, C8315, C8316, C8317, C8318, C8319, C8330, C8331, C8332, C8333, C8334, C8335, C8336, C8337, C8338, C8339, C8350, C8351, C8352, C8353, C8354, C8355, C8356, C8357, C8358, C8359, C8370, C8371, C8372, C8373, C8374, C8375, C8376, C8377, C8378, C8379, C8380, C8381, C8382, C8383, C8384, C8385, C8386, C8387, C8388, C8389, C8390, C8391, C8392, C8393, C8394, C8395, C8396, C8397, C8398, C8399, C8400, C8401, C8402, C8403, C8404, C8405, C8406, C8407, C8408, C8409, C8410, C8411, C8412, C8413, C8414, C8415, C8416, C8417, C8418, C8419, C8440, C8441, C8442, C8443, C8444, C8445, C8446, C8447, C8448, C8449, C8460, C8461, C8462, C8463, C8464, C8465, C8466, C8467, C8468, C8469, C8470, C8471, C8472, C8473, C8474, C8475, C8476, C8477, C8478, C8479, C8490, C8491, C8492, C8493, C8494, C8495, C8496, C8497, C8498, C8499, C84A0, C84A1, C84A2, C84A3, C84A4, C84A5, C84A6, C84A7, C84A8, C84A9, C84Z0, C84Z1, C84Z2, C84Z3, C84Z4, C84Z5, C84Z6, C84Z7, C84Z8, C84Z9, C8510, C8511, C8512, C8513, C8514, C8515, C8516, C8517, C8518, C8519, C8520, C8521, C8522, C8523, C8524, C8525, C8526, C8527, C8528, C8529, C8580, C8581, C8582, C8583, C8584, C8585, C8586, C8587, C8588, C8589, C8590, C8591, C8592, C8593, C8594, C8595, C8596, C8597, C8598, C8599, C860, C861, C862, C863, C864, C865, C866, C880, C882, C883, C884, C888, C889, C9000, C9001, C9002, C9010, C9011, C9012, C9020, C9021, C9022, C9030, C9031, C9032, C960, C962, C9620, C9621, C9622, C9629, C964, C969, C96A, C96Z, D47Z9
Fluid and electrolyte disorders	E860, E861, E869, E870, E871, E872, E873, E874, E875, E876, E8770, E8771, E8779, E878
Metastatic cancer	C770, C771, C772, C773, C774, C775, C778, C779, C7800, C7801, C7802, C781, C782, C7830, C7839, C784, C785, C786, C787, C7880, C7889, C7900, C7901, C7902, C7910, C7911, C7919, C792, C7931, C7932, C7940, C7949, C7951, C7952, C7960, C7961, C7962, C7970, C7971, C7972, C7981, C7982, C7989, C799, C7B00, C7B01, C7B02, C7B03, C7B04, C7B09, C7B1, C7B8, C800, C801, R180
Other neurological disorders	E7500, E7501, E7502, E7509, E7510, E7511, E7519, E7523, E7525, E7526, E7529, E754, F842, G10, G110, G111, G112, G113, G114, G118, G119, G120, G121, G1220, G1221, G1222, G1223, G1224, G1225, G1229, G128, G129, G132, G138, G20, G214, G2401, G2402, G2409, G242, G248, G254, G255, G2581, G300, G301, G308, G309, G3101, G3109, G311, G312, G3181, G3182, G3183, G3184, G3185, G3189, G319, G3281, G35, G361, G368, G369, G370, G371, G372, G373, G374, G375, G378, G379, G40001, G40009, G40011, G40019, G40101, G40109, G40111, G40119, G40201,

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	G40209, G40211, G40219, G40301, G40309, G40311, G40319, G40401, G40409, G40411, G40419, G40501, G40509, G40801, G40802, G40803, G40804, G40811, G40812, G40813, G40814, G40821, G40822, G40823, G40824, G4089, G40901, G40909, G40911, G40919, G40A01, G40A09, G40A11, G40A19, G40B01, G40B09, G40B11, G40B19, G47411, G47419, G47421, G47429, G803, G890, G910, G911, G912, G913, G914, G918, G919, G937, G9389, G939, G94, O99350, O99351, O99352, O99353, O99354, O99355, P9160, P9161, P9162, P9163, R410, R4182, R4701, R5600, R5601, R561, R569
Obesity	E6601, E6609, E661, E662, E668, E669, O99210, O99211, O99212, O99213, O99214, O99215, R939, Z6830, Z6831, Z6832, Z6833, Z6834, Z6835, Z6836, Z6837, Z6838, Z6839, Z6841, Z6842, Z6843, Z6844, Z6845, Z6854
Paralysis	G041, G800, G801, G802, G804, G808, G809, G8100, G8101, G8102, G8103, G8104, G8110, G8111, G8112, G8113, G8114, G8190, G8191, G8192, G8193, G8194, G8220, G8221, G8222, G8250, G8251, G8252, G8253, G8254, G830, G8310, G8311, G8312, G8313, G8314, G8320, G8321, G8322, G8323, G8324, G8330, G8331, G8332, G8333, G8334, G834, G835, G8381, G8382, G8383, G8384, G8389, G839, I69031, I69032, I69033, I69034, I69039, I69041, I69042, I69043, I69044, I69049, I69051, I69052, I69053, I69054, I69059, I69061, I69062, I69063, I69064, I69065, I69069, I69131, I69132, I69133, I69134, I69139, I69141, I69142, I69143, I69144, I69149, I69151, I69152, I69153, I69154, I69159, I69161, I69162, I69163, I69164, I69165, I69169, I69231, I69232, I69233, I69234, I69239, I69241, I69242, I69243, I69244, I69249, I69251, I69252, I69253, I69254, I69259, I69261, I69262, I69263, I69264, I69265, I69269, I69331, I69332, I69333, I69334, I69339, I69341, I69342, I69343, I69344, I69349, I69351, I69352, I69353, I69354, I69359, I69361, I69362, I69363, I69364, I69365, I69369, I69831, I69832, I69833, I69834, I69839, I69841, I69842, I69843, I69844, I69849, I69851, I69852, I69853, I69854, I69859, I69861, I69862, I69863, I69864, I69865, I69869, I69931, I69932, I69933, I69934, I69939, I69941, I69942, I69943, I69944, I69949, I69951, I69952, I69953, I69954, I69959, I69961, I69962, I69963, I69964, I69965, I69969, R532
Peripheral vascular disease	I700, I701, I70201, I70202, I70203, I70208, I70209, I70211, I70212, I70213, I70218, I70219, I70221, I70222, I70223, I70228, I70229, I70231, I70232, I70233, I70234, I70235, I70238, I70239, I70241, I70242, I70243, I70244, I70245, I70248, I70249, I7025, I70261, I70262, I70263, I70268, I70269, I70291, I70292, I70293, I70298, I70299, I70301, I70302, I70303, I70308, I70309, I70311, I70312, I70313, I70318, I70319, I70321, I70322, I70323, I70328, I70329, I70331, I70332, I70333, I70334, I70335, I70338, I70339, I70341, I70342, I70343, I70344, I70345, I70348, I70349, I7035, I70361, I70362, I70363, I70368, I70369, I70391, I70392, I70393, I70398, I70399, I70401, I70402, I70403, I70408, I70409, I70411, I70412, I70413, I70418, I70419, I70421, I70422, I70423, I70428, I70429, I70431, I70432, I70433, I70434, I70435, I70438, I70439, I70441, I70442, I70443, I70444, I70445,

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	I70448, I70449, I7045, I70461, I70462, I70463, I70468, I70469, I70491, I70492, I70493, I70498, I70499, I70501, I70502, I70503, I70508, I70509, I70511, I70512, I70513, I70518, I70519, I70521, I70522, I70523, I70528, I70529, I70531, I70532, I70533, I70534, I70535, I70538, I70539, I70541, I70542, I70543, I70544, I70545, I70548, I70549, I7055, I70561, I70562, I70563, I70568, I70569, I70591, I70592, I70593, I70598, I70599, I70601, I70602, I70603, I70608, I70609, I70611, I70612, I70613, I70618, I70619, I70621, I70622, I70623, I70628, I70629, I70631, I70632, I70633, I70634, I70635, I70638, I70639, I70641, I70642, I70643, I70644, I70645, I70648, I70649, I7065, I70661, I70662, I70663, I70668, I70669, I70691, I70692, I70693, I70698, I70699, I70701, I70702, I70703, I70708, I70709, I70711, I70712, I70713, I70718, I70719, I70721, I70722, I70723, I70728, I70729, I70731, I70732, I70733, I70734, I70735, I70738, I70739, I70741, I70742, I70743, I70744, I70745, I70748, I70749, I7075, I70761, I70762, I70763, I70768, I70769, I70791, I70792, I70793, I70798, I70799, I708, I7090, I7091, I7092, I7100, I7101, I7102, I7103, I711, I712, I713, I714, I715, I716, I718, I719, I720, I721, I722, I723, I724, I725, I726, I728, I729, I731, I7381, I7389, I739, I742, I743, I744, I76, I771, I7770, I7771, I7772, I7773, I7774, I7775, I7776, I7777, I7779, I790, I791, I798, K551, K558, K559, Z95820, Z95828
Psychoses	F200, F201, F202, F203, F205, F2081, F2089, F209, F22, F23, F24, F250, F251, F258, F259, F28, F29, F3010, F3011, F3012, F3013, F302, F303, F304, F308, F309, F310, F3110, F3111, F3112, F3113, F312, F3130, F3131, F3132, F314, F315, F3160, F3161, F3162, F3163, F3164, F3170, F3171, F3172, F3173, F3174, F3175, F3176, F3177, F3178, F3181, F3189, F319, F324, F325, F3340, F3341, F3342, F348, F3481, F3489, F349, F39, F4489, F843
Pulmonary circulation disorders	I2601, I2602, I2609, I2690, I2692, I2693, I2694, I2699, I270, I271, I2781, I2782, I2783, I2789, I279, I289, T800XXA, T82817A, T82818A
Renal failure	N183, N184, N185, N186, N189, N19, Z4901, Z4902, Z4931, Z4932, Z9115, Z940, Z992
Solid tumor without metastasis	C000, C001, C002, C003, C004, C005, C006, C008, C009, C01, C020, C021, C022, C023, C024, C028, C029, C030, C031, C039, C040, C041, C048, C049, C050, C051, C052, C058, C059, C060, C061, C062, C0680, C0689, C069, C07, C080, C081, C089, C090, C091, C098, C099, C100, C101, C102, C103, C104, C108, C109, C110, C111, C112, C113, C118, C119, C12, C130, C131, C132, C138, C139, C140, C142, C148, C153, C154, C155, C158, C159, C160, C161, C162, C163, C164, C165, C166, C168, C169, C170, C171, C172, C173, C178, C179, C180, C181, C182, C183, C184, C185, C186, C187, C188, C189, C19, C20, C210, C211, C212, C218, C220, C221, C222, C223, C224, C227, C228, C229, C23, C240, C241, C248, C249, C250, C251, C252, C253, C254, C257, C258, C259, C260, C261, C269, C300, C301, C310, C311, C312, C313, C318, C319, C320, C321, C322, C323, C328, C329, C33, C3400, C3401, C3402, C3410, C3411, C3412, C342, C3430, C3431, C3432, C3480, C3481, C3482, C3490, C3491, C3492, C37, C380, C381, C382, C383, C384, C388, C390, C399, C4000, C4001, C4002, C4010, C4011, C4012, C4020, C4021,

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	C4022, C4030, C4031, C4032, C4080, C4081, C4082, C4090, C4091, C4092, C410, C411, C412, C413, C414, C419, C430, C4310, C4311, C43111, C43112, C4312, C43121, C43122, C4320, C4321, C4322, C4330, C4331, C4339, C434, C4351, C4352, C4359, C4360, C4361, C4362, C4370, C4371, C4372, C438, C439, C450, C451, C452, C457, C470, C4710, C4711, C4712, C4720, C4721, C4722, C473, C474, C475, C476, C478, C479, C480, C481, C482, C488, C490, C4910, C4911, C4912, C4920, C4921, C4922, C493, C494, C495, C496, C498, C499, C49A0, C49A1, C49A2, C49A3, C49A4, C49A5, C49A9, C4A0, C4A10, C4A11, C4A111, C4A112, C4A12, C4A121, C4A122, C4A20, C4A21, C4A22, C4A30, C4A31, C4A39, C4A4, C4A51, C4A52, C4A59, C4A60, C4A61, C4A62, C4A70, C4A71, C4A72, C4A8, C4A9, C50011, C50012, C50019, C50021, C50022, C50029, C50111, C50112, C50119, C50121, C50122, C50129, C50211, C50212, C50219, C50221, C50222, C50229, C50311, C50312, C50319, C50321, C50322, C50329, C50411, C50412, C50419, C50421, C50422, C50429, C50511, C50512, C50519, C50521, C50522, C50529, C50611, C50612, C50619, C50621, C50622, C50629, C50811, C50812, C50819, C50821, C50822, C50829, C50911, C50912, C50919, C50921, C50922, C50929, C510, C511, C512, C518, C519, C52, C530, C531, C538, C539, C540, C541, C542, C543, C548, C549, C55, C561, C562, C569, C5700, C5701, C5702, C5710, C5711, C5712, C5720, C5721, C5722, C573, C574, C577, C578, C579, C58, C600, C601, C602, C608, C609, C61, C6200, C6201, C6202, C6210, C6211, C6212, C6290, C6291, C6292, C6300, C6301, C6302, C6310, C6311, C6312, C632, C637, C638, C639, C641, C642, C649, C651, C652, C659, C661, C662, C669, C670, C671, C672, C673, C674, C675, C676, C677, C678, C679, C680, C681, C688, C689, C6900, C6901, C6902, C6910, C6911, C6912, C6920, C6921, C6922, C6930, C6931, C6932, C6940, C6941, C6942, C6950, C6951, C6952, C6960, C6961, C6962, C6980, C6981, C6982, C6990, C6991, C6992, C700, C701, C709, C710, C711, C712, C713, C714, C715, C716, C717, C718, C719, C720, C721, C7220, C7221, C7222, C7230, C7231, C7232, C7240, C7241, C7242, C7250, C7259, C729, C73, C7400, C7401, C7402, C7410, C7411, C7412, C7490, C7491, C7492, C750, C751, C752, C753, C754, C755, C758, C759, C760, C761, C762, C763, C7640, C7641, C7642, C7650, C7651, C7652, C768, C7A00, C7A010, C7A011, C7A012, C7A019, C7A020, C7A021, C7A022, C7A023, C7A024, C7A025, C7A026, C7A029, C7A090, C7A091, C7A092, C7A093, C7A094, C7A095, C7A096, C7A098, D030, D0310, D0311, D03111, D03112, D0312, D03121, D03122, D0320, D0321, D0322, D0330, D0339, D034, D0351, D0352, D0359, D0360, D0361, D0362, D0370, D0371, D0372, D038, D039, E3121, E3122, E3123
Chronic peptic ulcer disease	K254, K255, K256, K257, K259, K264, K265, K266, K267, K269, K274, K275, K276, K277, K279, K284, K285, K286, K287, K289
Valvular disease	A5203, I050, I051, I052, I058, I059, I060, I061, I062, I068, I069, I070, I071, I072, I078, I079, I080, I081, I082, I083, I088, I089, I091, I0989, I340, I341, I342, I348, I349, I350, I351, I352, I358, I359, I360, I361, I362, I368, I369,

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	I370, I371, I372, I378, I379, I38, I39, Q230, Q231, Q232, Q233, Z952, Z953, Z954
Weight loss	E40, E41, E42, E43, E440, E441, E45, E46, E640, R634, R636

ICD-10=International Classification of Diseases, Tenth Revision, Clinical Modification and Procedure Coding System

* Elixhauser comorbidity measures are determined based on the algorithm provided in the Healthcare Cost and Utilization Project Elixhauser codes for ICD-10. Codes are listed without a decimal and come from the link below. It should be noted that the measures are determined using a complex algorithm that is based on other factors, including Diagnostic Related Groups as well as presence of other comorbidities from the list.

https://www.hcup-us.ahrq.gov/toolssoftware/comorbidityicd10/comorbidity_icd10.jsp#overview

† Comorbidity excluded due to overlap with the Centers for Disease Control and Prevention Severe Maternal Morbidity indicators list at the link below. Any individual with a code for HTNCX was excluded from the hypertension comorbidity indicator.

<https://www.cdc.gov/reproductivehealth/maternalinfanthealth/smm/severe-morbidity-ICD.htm>

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Appendix 4. Adjusted Logistic Regressions for Associations Between Patient-Level and Hospital-Level Characteristics and Severe Maternal Morbidity*, by Number of Comorbidities

Independent Variable	0 Comorbidities (unweighted n=978,896; weighted n=4,894,474)	1 Comorbidity (unweighted n=296,491; weighted n=1,482,454)	2 Comorbidities (unweighted n=145,503; weighted n=727,515)	3+ Comorbidities (unweighted n=60,035; weighted n=300,175)
Patient Characteristics	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Age, years				
<20	1.6 (1.4-1.8)	1.8 (1.6-1.9)	1.5 (1.3-1.6)	1.2 (1.0-1.5)
20-29	Ref	Ref	Ref	Ref
30-39	1.0 (0.9-1.1)	0.9 (0.9-1.0)	1.0 (1.0-1.1)	1.1 (1.0-1.1)
40+	1.5 (1.3-1.7)	1.4 (1.2-1.5)	1.3 (1.1-1.5)	1.5 (1.3-1.7)
Race and ethnicity				
Non-Hispanic White	Ref	Ref	Ref	Ref
Non-Hispanic Black	1.6 (1.5-1.8)	1.5 (1.4-1.6)	1.5 (1.4-1.6)	1.4 (1.2-1.5)
Non-Hispanic Asian	1.7 (1.5-1.9)	1.8 (1.6-2.0)	1.6 (1.4-1.8)	1.4 (1.2-1.7)
Hispanic	1.3 (1.2-1.5)	1.6 (1.5-1.7)	1.4 (1.3-1.5)	1.3 (1.1-1.4)
Other or Missing	1.3 (1.2-1.4)	1.5 (1.4-1.7)	1.3 (1.2-1.4)	1.2 (1.1-1.4)
Expected primary payer				
Private	Ref	Ref	Ref	Ref
Medicaid	1.2 (1.1-1.3)	1.1 (1.0-1.1)	1.1 (1.1-1.2)	1.2 (1.1-1.3)
Medicare	2.2 (1.7-2.9)	1.0 (0.8-1.3)	1.2 (0.9-1.5)	1.6 (1.3-2.0)
Other or Missing	1.1 (0.9-1.2)	1.2 (1.1-1.4)	1.0 (1.0-1.3)	1.4 (1.2-1.7)
Delivery type				
Vaginal	Ref	Ref	Ref	Ref
Cesarean Section	3.2 (3.0-3.4)	2.6 (2.5-2.8)	2.6 (2.5-2.8)	2.7 (2.5-2.9)
Median household income				

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	Quartile 1	1.3 (1.2-1.4)	1.2 (1.1-1.3)	1.1 (1.0-1.2)	1.1 (0.9-1.2)
	Quartile 2	1.2 (1.1-1.3)	1.0 (1.0-1.1)	1.0 (0.9-1.1)	1.0 (0.9-1.2)
	Quartile 3	1.1 (1.0-1.2)	1.0 (0.9-1.1)	1.0 (0.9-1.1)	1.0 (0.9-1.1)
	Quartile 4	Ref	Ref	Ref	Ref
Location of Residence					
	Large metropolitan	1.1 (1.0-1.2)	1.2 (1.1-1.3)	1.1 (1.0-1.2)	1.1 (1.0-1.3)
	Small or medium metropolitan	Ref	Ref	Ref	Ref
	Micropolitan	1.2 (1.0-1.4)	1.2 (1.1-1.4)	1.2 (1.0-1.3)	1.4 (1.2-1.7)
	Rural (noncore)	1.2 (1.0-1.4)	1.2 (1.1-1.4)	1.2 (1.1-1.5)	1.3 (1.1-1.6)
Hospital Characteristics					
Region					
	Northeast	1.7 (1.5-2.0)	1.5 (1.4-1.7)	1.5 (1.4-1.8)	1.2 (1.0-1.4)
	Midwest	Ref	Ref	Ref	Ref
	South	1.3 (1.1-1.5)	1.2 (1.1-1.3)	1.3 (1.1-1.4)	1.1 (0.9-1.2)
	West	1.3 (1.2-1.5)	1.1 (1.0-1.2)	1.3 (1.2-1.5)	1.1 (1.0-1.3)
Ownership					
	Public	1.4 (1.2-1.6)	1.5 (1.3-1.8)	1.2 (1.0-1.4)	1.0 (0.8-1.1)
	Private non-profit	1.1 (0.9-1.2)	1.2 (1.1-1.3)	0.9 (0.8-1.1)	0.9 (0.8-1.1)
	Private for-profit	Ref	Ref	Ref	Ref
Location and Teaching status					
	Rural	1.1 (0.9-1.3)	1.3 (1.1-1.5)	1.0 (0.8-1.2)	0.8 (0.6-1.0)
	Urban non-teaching	Ref	Ref	Ref	Ref
	Urban teaching	1.1 (1.0-1.3)	1.0 (1.0-1.1)	1.0 (0.9-1.1)	1.0 (0.9-1.2)

OR=odds ratio; CI=confidence interval; ref=reference category

* Identified using the Centers for Disease Control and Prevention (CDC) severe maternal morbidity indicator list.

† Number of comorbidities calculated among 25 Elixhauser comorbidity measures.

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Multivariable regressions adjusted age (years), race and ethnicity, primary expected payer, number of comorbidities), delivery type (i.e., vaginal or cesarean), median household income quartile, and location of residence (large metropolitan, small or median metropolitan, micropolitan, or rural), hospital region, hospital ownership, and hospital location and teaching status (rural, urban non-teaching, urban teaching).

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Appendix 5. Adjusted Logistic Regressions for Associations Between Patient-Level And Hospital-Level Characteristics and Severe Maternal Morbidity*, Excluding Blood Transfusion Only, by Number of Comorbidities†

Independent Variable	0 Comorbidities (unweighted n=978,896; weighted n=4,894,474)	1 Comorbidity (unweighted n=296,491; weighted n=1,482,454)	2 Comorbidities (unweighted n=145,503; weighted n=727,515)	3+ Comorbidities (unweighted n=60,035; weighted n=300,175)
Patient Characteristics	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Age, years				
<20	1.8 (1.4-2.2)	1.6 (1.3-1.9)	1.1 (0.9-1.4)	1.5 (1.2-2.0)
20-29	Ref	Ref	Ref	Ref
30-39	1.1 (0.9-1.2)	1.4 (1.3-1.5)	1.5 (1.3-1.6)	1.3 (1.1-1.5)
40+	2.0 (1.6-2.4)	2.3 (1.9-2.7)	2.0 (1.6-2.4)	1.8 (1.4-2.2)
Race and ethnicity				
Non-Hispanic White	Ref	Ref	Ref	Ref
Non-Hispanic Black	1.5 (1.3-1.8)	1.7 (1.4-1.9)	1.5 (1.3-1.8)	1.4 (1.2-1.6)
Non-Hispanic Asian	1.5 (1.3-1.9)	1.7 (1.4-2.0)	1.5 (1.2-1.8)	1.5 (1.1-1.9)
Hispanic	1.2 (1.1-1.4)	1.3 (1.1-1.5)	1.3 (1.1-1.5)	1.3 (1.1-1.5)
Other or Missing	1.2 (1.0-1.4)	1.3 (1.1-1.5)	1.2 (1.0-1.5)	1.3 (1.1-1.6)
Expected primary payer				
Private	Ref	Ref	Ref	Ref
Medicaid	1.2 (1.0-1.3)	1.2 (1.1-1.3)	1.1 (1.0-1.3)	1.2 (1.0-1.4)
Medicare	2.4 (1.5-3.8)	1.7 (1.2-2.5)	1.4 (0.9-2.1)	2.0 (1.5-2.7)
Other or Missing	0.9 (0.7-1.2)	1.3 (1.0-1.6)	1.2 (0.9-1.5)	1.5 (1.1-1.9)
Delivery type				
Vaginal	Ref	Ref	Ref	Ref
Cesarean Section	4.9 (4.4-5.5)	3.6 (3.2-3.9)	3.5 (3.2-4.0)	3.5 (3.1-4.0)
Median household income				

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	Quartile 1	1.2 (1.1-1.5)	1.1 (0.9-1.2)	1.1 (0.9-1.3)	1.1 (0.9-1.3)
	Quartile 2	1.3 (1.1-1.5)	1.1 (0.9-1.3)	1.0 (0.9-1.2)	1.1 (1.0-1.4)
	Quartile 3	1.1 (0.9-1.2)	0.9 (0.8-1.1)	1.1 (0.9-1.3)	1.1 (0.9-1.3)
	Quartile 4	Ref	Ref	Ref	Ref
Location of Residence					
	Large metropolitan	1.0 (0.9-1.1)	1.1 (1.0-1.3)	1.1 (1.0-1.2)	1.1 (1.0-1.3)
	Small or medium metropolitan	Ref	Ref	Ref	Ref
	Micropolitan	1.7 (1.3-2.2)	1.9 (1.5-2.4)	1.6 (1.2-2.1)	1.7 (1.3-2.1)
	Rural (noncore)	1.2 (0.9-1.6)	1.5 (1.2-2.0)	1.4 (1.1-1.9)	1.5 (1.2-2.0)
Hospital Characteristics					
Region					
	Northeast	1.5 (1.3-1.8)	1.1 (1.0-1.3)	1.1 (0.9-1.3)	0.9 (0.7-1.0)
	Midwest	Ref	Ref	Ref	Ref
	South	1.1 (1.0-1.3)	1.0 (0.9-1.2)	0.9 (0.8-1.0)	0.8 (0.7-1.0)
	West	1.2 (1.0-1.4)	1.2 (1.0-1.4)	1.2 (1.0-1.4)	1.0 (0.9-1.2)
Ownership					
	Public	1.3 (1.1-1.6)	1.6 (1.3-1.9)	1.3 (1.1-1.7)	1.1 (0.8-1.4)
	Private non-profit	1.0 (0.8-1.2)	1.3 (1.1-1.5)	1.1 (0.9-1.3)	1.0 (0.8-1.2)
	Private for-profit	Ref	Ref	Ref	Ref
Location and Teaching status					
	Rural	0.5 (0.3-0.6)	0.4 (0.3-0.6)	0.4 (0.3-0.6)	0.4 (0.3-0.6)
	Urban non-teaching	Ref	Ref	Ref	Ref
	Urban teaching	1.5 (1.3-1.7)	1.4 (1.2-1.6)	1.5 (1.3-1.7)	1.3 (1.1-1.5)

OR=odds ratio; CI=confidence interval; ref=reference category

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* Identified using the Centers for Disease Control and Prevention (CDC) severe maternal morbidity (SMM) indicator list. SMM excluding blood transfusion indicates that a delivery to a women with only a blood transfusion indicator, and no other SMM indicator was identified as not having SMM.

† Number of comorbidities calculated among 25 Elixhauser comorbidity measures.

Multivariable regressions adjusted age (years), race and ethnicity, primary expected payer, number of comorbidities), delivery type (i.e., vaginal or cesarean), median household income quartile, and location of residence (large metropolitan, small or median metropolitan, micropolitan, or rural), hospital region, hospital ownership, and hospital location and teaching status (rural, urban non-teaching, urban teaching).

Appendix 6. Sensitivity Analysis: Adjusted Logistic Regressions for Associations Between Patient-Level and Hospital-Level Characteristics and Maternal Morbidity Measures (Unweighted n=1,401,819; Weighted n=7,009,087), Excluding Deliveries With Missing Racial Information

Independent Variable		Severe Maternal Morbidity*	Severe Maternal Morbidity, excluding blood transfusion only*
Patient Characteristics		OR (95% CI)	OR (95% CI)
Age, years			
	<20	1.6 (1.5-1.7)	1.5 (1.4-1.7)
	20-29	Ref	Ref
	30-39	1.0 (1.0-1.0)	1.3 (1.2-1.4)
	40+	1.4 (1.3-1.5)	2.0 (1.8-2.2)
Race and ethnicity			
	Non-Hispanic White	Ref	Ref
	Non-Hispanic Black	1.5 (1.4-1.6)	1.5 (1.4-1.6)
	Non-Hispanic Asian	1.7 (1.5-1.8)	1.5 (1.4-1.7)
	Hispanic	1.4 (1.4-1.5)	1.3 (1.2-1.4)
	Other or Missing	1.4 (1.3-1.5)	1.3 (1.1-1.4)
Payer			
	Private	Ref	Ref
	Medicaid	1.1 (1.1-1.2)	1.2 (1.1-1.2)
	Medicare	1.4 (1.2-1.6)	1.8 (1.5-2.2)
	Other or Missing	1.2 (1.1-1.2)	1.1 (1.0-1.3)
Number of comorbidities†			
	0	Ref	Ref
	1	4.3 (4.1-4.5)	3.0 (2.8-3.2)
	2	6.5 (6.2-6.9)	4.8 (4.4-5.1)
	3+	9.1 (8.6-9.6)	9.5 (8.8-10.3)
Delivery type			
	Vaginal	Ref	Ref
	Cesarean Section	2.8 (2.7-2.9)	3.9 (3.7-4.1)
Median household income			
	Quartile 1	1.2 (1.1-1.2)	1.1 (1.0-1.2)
	Quartile 2	1.1 (1.0-1.1)	1.1 (1.0-1.2)
	Quartile 3	1.0 (1.0-1.1)	1.0 (0.9-1.1)
	Quartile 4	Ref	Ref
Location of Residence			

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	Large metropolitan	1.1 (1.0-1.2)	1.1 (1.0-1.2)
	Small or medium metropolitan	Ref	Ref
	Micropolitan	1.2 (1.1-1.3)	1.7 (1.5-2.0)
	Rural (noncore)	1.2 (1.1-1.3)	1.4 (1.2-1.6)
Hospital Characteristics			
Region			
	Northeast	1.5 (1.4-1.7)	1.1 (1.0-1.2)
	Midwest	Ref	Ref
	South	1.2 (1.1-1.3)	0.9 (0.9-1.0)
	West	1.2 (1.1-1.4)	1.1 (1.0-1.3)
Ownership			
	Public	1.3 (1.2-1.5)	1.3 (1.2-1.5)
	Private non-profit	1.1 (1.0-1.2)	1.1 (1.0-1.2)
	Private for-profit	Ref	Ref
Location and Teaching status			
	Rural	1.1 (1.0-1.2)	0.4 (0.4-0.5)
	Urban non-teaching	Ref	Ref
	Urban teaching	1.0 (1.0-1.1)	1.4 (1.3-1.5)

OR=odds ratio; CI=confidence interval; ref=reference category

* Identified using the Centers for Disease Control and Prevention (CDC) severe maternal morbidity (SMM) indicator list. SMM excluding blood transfusion indicates that a delivery to a women with only a blood transfusion indicator, and no other SMM indicator was identified as not having SMM.

† Number of comorbidities calculated among 25 Elixhauser comorbidity measures.

Multivariable regressions adjusted age (years), race and ethnicity, primary expected payer, number of comorbidities), delivery type (i.e., vaginal or cesarean), median household income quartile, and location of residence (large metropolitan, small or median metropolitan, micropolitan, or rural), hospital region, hospital ownership, and hospital location and teaching status (rural, urban non-teaching, urban teaching).