Appendix 3. Table of included studies

Study #	Authors	Year	Study Design	Location	Sample Size, Data Source	Native American subsample size (% of total sample)	Risk Factor (Social ecological level)	Outcome(s)	Covariates	Quality Rating	Key Findings ([95% Confidence Intervals] unless otherwise stated
Hypertensive Disorders of Pregnancy (8)											
1178	Cameron, N et al.	2022	Cross Sectional	Nationwide	51,685,525 all live births in the US to individuals aged 15-44 years, birth vital records	492,771 (9.3%)	Maternal residence (C)	Pregnancy induced hypertension	None	Good	-The incidence of hypertensive disorders of pregnancy differed by racial and ethnic identity within both rural and urban areas. The highest age-adjusted incidence of hypertensive disorders of pregnancy was observed among individuals who identify as American Indian/ Alaskan Native. -Significant increase in the incidence of hypertension disorders of pregnancy among Native American women in rural areas compared to those in urban areas in 2007 and 2014 (2017 RR=1.21, [1.11-1.33] and 2014 RR=1.17, [1.08-1.13]) -No significant increase in the incidence of hypertension disorders of pregnancy among

											Native American women living in rural areas compared to those in urban areas was observed in 2019 (2019 RR=1.03, [0.96-1.11])
2230	England, L et al.	2013	Case Control	Anchorage, AK	1,123 singleton deliveries from 1997-2005 to AN women residing in western Alaska, hospital administrative database / 503 cases and 502 controls	1,123 (100%)	Continuous smokeless tobacco use (I) and continuous cigarette smoking (I)	Pregnancy associated hypertension, pre-eclampsia, and gestational hypertension	Parity, pre-pregnancy BMI, maternal age	Good	-No significant associations were observed between smokeless tobacco use and pregnancy-associated hypertension (aOR 0.92, [0.56–1.51]). -No significant associations were observed between smokeless tobacco use and pre-eclampsia (aOR 0.90, [0.52–1.56]). -No significant associations were observed between smokeless tobacco use and gestational hypertension (aOR 0.93, [0.42–2.03). -No significant associations were observed between continuous cigarette smoking and pregnancy-associated hypertension (aOR 0.65, [0.31–1.37]). -No significant associations were observed between

											continuous cigarette smoking and pre-eclampsia (aOR 0.69, [0.30–1.58]). -No significant associations were observed between continuous cigarette smoking and gestational hypertension (aOR 0.52, [0.14–1.90).
8141	Zamora-Kapoor, A et al.	2016	Cohort	Washington State	71,080 singleton live births from 2003-2013 to Whit and AI/AN women, linked birth-hospital discharge records	7,189 (10.1%)	Maternal race (I), BMI (I)	Pre-eclampsia	Birth year, maternal age, educational attainment, marital status, Medicaid insurance, WIC participation, prenatal smoking, BMI	Good	-AI/ANs had an increased risk of pre-eclampsia compared to Whites after controlling for all covariates except BMI (OR 1.17 [1.06–1.29]). After further adjustment for BMI, the racial disparity in pre-eclampsia risk was greatly attenuated (aOR 1.05, [0.95–1.16]). -AI/ANs who were underweight (OR 1.39, [0.64-3.02]), normal weight (OR 1.02, [0.83-1.22]), overweight (OR 1.23, [0.93, 1.36]), or obese (OR 1.00, [0.86, 1.17]) generally had relative risks of pre-eclampsia comparable, or slightly (but not statistically significantly) greater than those of their White counterparts.

1371	Chang, J et al.	2014	Cohort	Nationwide	3,113,164 singleton births between 20-44 weeks gestation without major fetal anomalies in 2010, US natality file	34,348 (1.10%)	Cigarette use during pregnancy (I), maternal age (I)	Pregnancy induced hypertension (inclusive of pre-eclampsia and eclampsia)	Prenatal care adequacy, weight gain, parity, diabetes, marital status, chronic hypertension, preeclampsia, eclampsia, tobacco use	Good	-The odds of pregnancy induced hypertension was greater in non-Hispanic American Indian women 35 years or older who smoked during pregnancy (aOR 1.29, [0.88-1.89]). -A reduced odds of PIH was evident in non-Hispanic American Indian women younger than 35 years old who smoked during pregnancy based (aOR 0.76, [0.66-0.87]).
7372	Tiwari, R et al.	2021	Cohort	Washington State	105,466 singleton live births from 22 facilities from 2018-2018, hospital administrative database	978 (0.92%)	Pre-pregnancy BMI (I)	Pre-eclampsia	Maternal age, parity, delivery hospital, government health insurance, substance abuse, nicotine use, and alcohol use	Good	-The strength of the association of overweight/obesity with preeclampsia was much greater among NH AI/AN women (aRR 5.24; [1.92–14.30]) and NH Native Hawaiian/Other Pacific Islander women than among other race/ethnicities (aRR 5.88, [1.30-36.51]).
835	Best, L et al.	2012	Case Control	Belcourt, ND	299 women tribal members of the Turtle Mountain Band of Chippewa who sought care in an IHS	299 (100%)	Age at delivery (I), nulliparity (I), BMI (I), Single nucleotide polymorphisms [NOS3, rs1799983	Pre-eclampsia	Nulliparity, BMI, age at delivery	Good	-Age at delivery (aOR 1.0823, [p=0.0185]) , nulliparity (aOR 6.8628, [p<0.001]), and obesity (aOR 1.0951, [p<0.001]) show robust independent effects associated with preeclampsia.

					hospital or clinic from 2004-2009, electronic medical records / 101 cases and 198 matched controls		(G allele recess), NOS3, rs3918227 (A allele dom), GNB3, rs5442 (A allele dom), DDAH1, rs10158674 (C allele recess), DDAH1, rs233115 (A allele recess)] (I)				-There was no significant association between any of single nucleotide polymorphisms studied and pre-eclampsia. -NOS3, rs1799983 (G allele recess) (aOR 1.4087, [p=0.2354]) -NOS3, rs3918227 (A allele dom) (aOR 0.7356, [p=0.4611]) -GNB3, rs5442 (A allele dom) (aOR 0.9147, [p=0.8655]) -DDAH1, rs10158674 (C allele recess) (aOR 1.0165, [p=0.9898]) -DDAH1, rs233115 (A allele recess) (aOR 2.2227. [p=0.1578])
836	Best, L et al.	2012	Case Control	Belcourt, ND	196 women tribal members of the Turtle Mountain Band of Chippewa who sought care in an IHS hospital or clinic from 2004-2009, electronic medical records / 66 cases and	196 (100%)	Age at delivery (I), nulliparity (I), BMI (I), single nucleotide polymorphisms [CRP_A rs3093077 (T allele additive), CRP_B rs1205 (A allele dom), CRP_C rs1130864	Pre-eclampsia, severe pre-eclampsia	Nulliparity, weight at first prenatal visit, BMI, birthweight of infant, gestational diabetes, age at delivery	Good	-Age at delivery did not show a significant association with pre-eclampsia (aOR 1.036, [p=0.398]) and severe preeclampsia (aOR 1.027, [p=0.586]). -Nulliparity (aOR 4.274, [p=0.003] and aOR 4.520, [p=0.009])) and obesity (aOR 1.093, [p=0.002] and aOR 1.094, [p=0.007]) show robust independent associations with

					130 matched controls		(T allele dom), MBL2 rs1800451 (T allele dom, IL1A rs3783550 (T allele dom), CTLA4 rs231775 (A allele dom)](I)				preeclampsia and severe pre-eclampsia. -There was no significant association between any of single nucleotide polymorphisms studied with pre-eclampsia and severe pre-eclampsia except CRP_B, rs1205, (A allele dom). -CRP_B, rs1205, (A allele dom) was the only single nucleotide polymorphism that showed a significant association with severe pre-eclampsia (aOR 0.259, [p=0.020]).
837	Best, L et al.	2013	Case Control	Belcourt, ND	410 women tribal members of the Turtle Mountain Band of Chippewa who sought care at an IHS hospital or clinic from 2004-2012, electronic medical records / 140 cases and 270 matched controls	410 (100%)	Age at delivery (I), nulliparity (I), BMI (I), gestational diabetes (I), single nucleotide polymorphisms [CRP rs3093068 (G allele add), CRP rs3093068 (G allele recess, CRP rs3093068 (G allele dom), CRP	Pre-eclampsia, severe pre-eclampsia	Nulliparity, weight at first prenatal visit, BMI, birthweight of infant, gestational diabetes	Good	-Age at delivery did not show a significant association with pre-eclampsia (aOR 1.053, [p=0.076]) and severe preeclampsia (aOR 1.052, [p=0.166]). -Gestational diabetes did not show a significant association with pre-eclampsia (aOR 1.684, [p=0.278]) and severe pre-eclampsia (aOR 2.241, [p=0.166]). -Independent effects of nulliparity (aOR 5.6, [p=0.001] and aOR 4.17, [p=0.001]) and

							rs876538 (C allele add), CRP , rs876538 (C allele recess), CRP rs876538 (C allele dom), rs3093068 (G dom) and rs876538 (C recess) add risk score] (I)				obesity (aOR 1.061, [p=0.002] and aOR 1.059, [p=0.001]) on pre-eclampsia and severe pre-eclampsia were observed. -There was no significant association between any of single nucleotide polymorphisms studied with pre-eclampsia and severe pre-eclampsia except CRP rs3093068 (G allele add) and CRP rs3093068 (G allele dom) with severe pre-eclampsia (aOR 2.587, [p=0.05] and aOR 2.587, [p=0.050]) -The rs3093068 (G dom) and rs876538 (C recess) additive risk score showed significant association with pre-eclampsia (aOR 1.779, [p=0.016]) and severe pre-eclampsia (aOR 2.035, [p=0.013]).
	Severe Maternal Morbidity and Mortality (4)										
119	Admon, L et al.	2018	Cross Sectional	Nationwide	2,523,528 all hospital deliveries that occurred between 2012-2015,	20,447 (0.810%)	No chronic conditions, any physical health condition (I), any	SMM	Age, income, payer, rural vs. urban residence, and	Good	-The incidence of severe maternal morbidity was significantly higher among deliveries to women in every racial and ethnic minatory

					National Inpatient Sample		behavioral health condition (I), multiple chronic conditions (I), maternal race (I)		hospital region.		category compared with deliveries among non-Hispanic white women. -American Indian/Alaska Native women are at increased risk of severe maternal morbidity compared to non-Hispanic white women (aRR 1.5, [1.3-1.7]) . This is not significant when blood transfusions are not included in severe maternal morbidity (aRR 0.90, [0.68-1.2]). -Among deliveries to women with comorbid physical and behavioral health conditions, significant differences in severe maternal morbidity were identified among racial and ethnic minority compared with non-Hispanic white women and the largest disparities were identified among women with multiple chronic conditions. -In comparing deliveries among American Indian/Alaskan Native women with non-Hispanic white women, the rate difference for severe maternal

											morbidity incidence increased from 66.6 [95% CI 39.9-93.3] to 101.3 [95% CI -41.0-243.5] per 10,000 delivery hospitalizations, respectively, in comparing deliveries in which no and multiple chronic conditions were identified. -American Indian/Alaskan Native women compared to non-Hispanic white women are at increased risk for severe maternal morbidity when any physical health condition is present (aRR 1.5, [1.3-1.7]), any behavioral health condition is present (aRR 1.2, [0.90-1.6]), and having multiple (2 or more) chronic conditions (aRR 1.4, [0.93-2.20]).
3421	Interrante, J et al.	2022	Cross Sectional	Nationwide	6,357,796 maternal records from childbirth hospitalizations from 2007-2015, National Inpatient Sample	43,929 (0.691%)	Primary payer type (I), maternal residence (C), maternal race (I)	SMM and Mortality (SMMM)	Maternal race and ethnicity, maternal residence, maternal age, childbirth year, bottom quartile of	Good	-Rural Indigenous Medicaid-funded births had the highest adjusted predicted rate of SMMM (224.9 per 10,000 births, [187.0-262.9]). -Among rural residents, births by Indigenous people had the greatest differences in rates

									income, hospital region, cesarean birth, substance use disorder, depression, HIV or AIDS, pulmonary hypertension, systemic lupus erythematosus, chronic kidney disease, chronic heart disease, diabetes, chronic hypertension, and chronic respiratory disease		between Medicaid-funded and privately insured births (aRD, 97.8, [50.4–145.3]). -When examining the intersection of rurality and race and ethnicity, births among Indigenous rural residents had significant additive interaction, with 40% (aAP 0.40, [0.11-0.69]) of SMMM cases in that population owing to the interaction. -When examining the intersection of urban status and race and ethnicity, births among Indigenous urban residents did not have an additive interaction (aAP 0.06, [-0.20-0.32]). -If the excess risk of SMMM associated with Medicaid could be mitigated (i.e., if the risk of SMMM among Medicaid-funded births could be decreased to the risk among the privately insured), this would not only prevent the 23 cases per 10,000 births that occur among white urban residents, but an additional 98 cases per 10,000 births

											among Indigenous rural residents.
952	Booker, W et al.	2018	Cohort	Nationwide	1,724,694 delivery hospitalizations from women aged 40-54 years between 1998-2014, National Inpatient Sample	7,107 (0.412%)	Maternal race (I)	SMM, SMM excluding blood transfusions	Year, bed size, insurance status, hospital location, income quartile, hospital region, hospital teaching status, and race	Good	-The incidence of SMM was greater among Native American women but not significant compared to Non-Hispanic white women (aRR 1.08, [0.93-1.25]). -Risk for severe morbidity excluding transfusion among Native Americans is not demonstrated because of small denominators.
4010	Kozhimannil, K et al.	2020	Cross Sectional	Nationwide	7,561,729 hospital live births from white and indigenous women between 2012-2015, National Inpatient Sample	101,943 (1.35%)	maternal residence (C), maternal race (I)	SMMM, SMMM excluding blood transfusion	Age, insurance payer, income, hospital region	Good	-The incidence of SMMM was greater among indigenous women compared with white women (aRR 1.8, [1.6–2.0]). -Within each racial group, incidence of SMMM was higher among rural compared with urban residents (2.3% for rural indigenous women vs 1.8% for urban indigenous women) (a RR 1.3, [1.0–1.6]); (1.3% for rural white women vs 1.2% for urban white women) (aRR 1.1, [1.1–1.2]). -Within indigenous women, the incidence

											of SMM (excluding transfusions) among rural compared to urban residents was not significant (aRR 0.7, [0.4-1.0)].
	Blood Transfusions (2)										
3421	Interrante, J et al.	2022	Cross Sectional	Nationwide	6,357,796 maternal records from childbirth hospitalizations from 2007-2015, National Inpatient Sample	43,929 (0.691%)	Primary payer type (I), maternal residence (C), maternal race (I)	Blood transfusions	Maternal race and ethnicity, maternal residence, maternal age, childbirth year, bottom quartile of income, hospital region, cesarean birth, substance use disorder, depression, HIV or AIDS, pulmonary hypertension, systemic lupus erythematosus, chronic kidney disease, chronic	Good	-Rural residents had greater odds of blood transfusion for both Medicaid-funded (aOR 1.15, [1.06-1.25]) and privately insured (aOR 1.20, [1.11-1.31]) hospital births compared to urban residents. -Medicaid-funded (aOR 1.71, [1.39-2.11]) and privately insured hospital (aOR 1.42, [1.05-1.92]) indigenous births had the second highest odds of blood transfusions compared to other racial/ethnic groups. This yielded an additive interaction p-value of 0.006.

									heart disease, diabetes, chronic hypertension, and chronic respiratory disease		
4010	Kozhimannil, K et al.	2020	Cross Sectional	Nationwide	7,561,729 hospital live births from white and indigenous women between 2012-2015, National Inpatient Sample	101,943 (1.35%)	maternal residence (C), maternal race (I)	Blood transfusions	Age, insurance payer, income, hospital region	Good	-The incidence of blood transfusions was greater among indigenous women compared with white women (aRR 1.8, [1.5–2.0]). -The incidence of blood transfusion among rural indigenous women compared to urban indigenous women was statistically greater (aRR 1.6, [1.2-2.0]).
	Postpartum Hemorrhage (PPH) (2)										
1331	Chalouhi, S et al	2015	Cohort	Gallup, NM	1,062 women who delivered vaginally at the Rehoboth McKinley Hospital, medical records	751 (70.7%)	Maternal race (I), age (I), parity (I), gravidity (I), birthweight (I), retained placenta (I), magnesium sulfate use (I), induction augmentation (I),	Postpartum hemorrhage	None	Good	-A significantly higher proportion of Native Americans than non-native women developed PPH (11.6% vs 7.0%, [p= 0.02]). -In multivariable logistic regression analysis, the significant predictors of PPH were Native American ethnic origin (OR 1.8, [1.1-3.0]), decreased gravidity of fewer than

							chorioamnionitis (I)				5 (OR 1.2, [1.1-1.4]), increased birth weight greater than 4500 grams (OR 1.1, [1.0-1.0]), retained placenta (OR 51.0, [9.8-288.2]), and use of magnesium sulfate (OR 3.5, [1.4-9.0]).
2944	Hadley, M et al	2021	Case Control	Anchorage, AK	384 deliveries between 2018-2019 at the Alaska Native Medical Center, medical records / 128 cases and 256 controls	384 (100%)	BMI (I), antepartum bleeding (I), routine aspirin used prescribed (I), prior uterine incision (I), prior uterine incision and vaginal delivery (I), parity (I), macrosomia, pre-eclampsia without severe features with magnesium sulfate during labor (I), pre-eclampsia with severe features and use of	Postpartum hemorrhage	Not reported	Fair	-In the bivariate analysis, the following risk factors were significantly associated with a higher likelihood of postpartum hemorrhage: BMI of 40 or more (OR 2.6, [1.4-4.5]), antepartum bleeding (OR 6.3, [1.2-31.6]), previous postpartum hemorrhage (OR 5.0, [2.6-9.8]), suspected macrosomia with estimated fetal weight of 4000 g or more (OR 2.7, [1.4-5.3]), pre-eclampsia with severe features and use of magnesium sulfate during labor (OR 4.7, [2.4-9.2], length of third stage labor longer than 20 min (OR 2.2, [1.1-4.4]), and use of oxytocin for more than 12 h (OR 5.0, [2.3-10.6]). -Residence in a rural community (OR 2.2, [1.4-3.6]) and vitamin

							magnesium sulfate (I), previous postpartum hemorrhage (I), length of 2nd stage of labor (I), length of 3rd stage of labor (I), rural residence (C), and oxytocin (I), and inpatient induction length (I)				D supplementation (OR 1.7, [1.1-2.6]) were also significantly associated with postpartum hemorrhage. -Multivariate condition logistic regression analyses found that antepartum bleeding (OR 8.8, [1.6-48.5]) , pre-eclampsia with severe features and use of magnesium sulfate (OR 5.3, [2.4-11.9]), previous postpartum hemorrhage (OR 2.7, [1.2-6.1]), third stage of labor of 20min or more (OR 2.9, [1.2-6.9]), rural residence (OR 2.0, [1.2-3.5]), fetal macrosomia (OR 4.0, [2.1-7.5]), and oxytocin use for more than 12h (OR 3.0, [1.1-8.0]) all remained significantly associated with an increased risk of hemorrhage in Native American women. -Routine aspirin use (OR 1.7, [0.9-3.4]), prior uterine incision (OR 1.0, [0.52-2.1]), prior uterine incision and vaginal delivery (OR 1.6, [0.58-4.4]), a parity of 5 or more (OR 1.8, [0.87-3.9]), pre-eclampsia without severe features without

											use of magnesium sulfate (OR 2.1, [0.98-4.4]), length of second stage of labor grater or equal to 1 hour (OR 1.6, [0.88-3.0]), and an inpatient induction length of greater or equal to 36 hours (OR 2.3, [0.4-12.8]) were not significantly associated with a higher likelihood of postpartum hemorrhage.
	Misc. Outcomes (5)										
1331	Chalouhi, S et al	2015	Cohort	Gallup, NM	1,062 women who delivered vaginally at the Rehoboth McKinley Hospital, medical records	751 (70.7%)	Maternal race (I), age (I), parity (I), gravidity (I), birthweight (I), retained placenta (I), magnesium sulfate use (I), induction augmentation (I), chorioamnionitis (I)	Uterine atony	None	Good	-Uterine atony was recorded in a significantly higher proportion of Native Americans than non-native patients (9.6% vs 4.8%; [p=0.01]). -In univariate analysis, factors predicting uterine atony were native race (p=0.01), decreasing gravidity (p=0.02), induction augmentation (p=0.1), increasing birthweight (p=0.07), and chorioamnionitis (p=0.08). -In multivariable logistic regression analysis, Native American ethnic origin

											(OR 2.0, [1.1–3.7]) and increasing birthweight (OR 1.0, [1.0 1.0]) were significant predictors of uterine atony.
1861	deRavello, L et al	2015	Cross Sectional	Nationwide	229,986 American Indian and Alaska Native (AI/AN) women aged 15–44 years seeking care at Indian Health Service (IHS), Tribal, and urban Indian health facilities during 2002–2009, Indian Health Service National Patient Information Reporting System	229,986 (100%)	Maternal age (I), IHS region (C)	Ectopic pregnancy	None	Fair	-The ectopic pregnancy (EP) rate among AI/AN women was lowest in the 15–19 years age group (5.5 EPs per 1,000 pregnancies) and highest among 35–39 year old (18.7 EPs per 1,000 pregnancies). -Compared to AI/AN women aged 15-18 years, women aged 35-39 years were 3.4 times more likely to have an EP (RR 3.4, [2.90-4.03]). Compared to AI/AN women aged 15-18 years, the risk of an EP increased with age from 1.56-3.42, except in women aged 40-44 years were the risk was less at 2.62 times (RR 2.62, [2.02-3.36]). -EP rates varied by geographic region, ranging between 6.9 and 24.4 per 1,000 pregnancies in the Northern Plains East and the East region, respectively. -Compared to AI/AN women who received

											care in the Northern Plains East region, women who received care in the East region were 3.55 times more likely to have an EP (RR 3.55, [2.75-4.57]), in the Alaska region the risk was 2.17 times (RR 2.17, [1.73-2.72]), in the Southern plains region the risk was 1.56 times (RR 1.57, [1.25-1.95]), in the West region the risk was 1.39 times (RR 1.39, [1.09-1.77]), in the Norther Plains West region the risk was 1.36 times (1.36, [1.08-1.71]), and in the Southwest region the risk was lowest at 1.33 times (RR 1.33, [1.07-1.65]). -We found relatively stable annual rates of EP among AI/AN women receiving care at IHS-affiliated facilities during 2002–2009, but considerable variation by age group and geographic region.
2230	England, L et al.	2013	Case Control	Anchorage, AK	1,123 singleton deliveries from 1997-2005 to AN women residing in	1,123 (100%)	Continuous smokeless tobacco use (I) and continuous cigarette smoking (I)	Placental abruption, placental abruption expanded definition	Parity, pre-pregnancy BMI, maternal age	Good	-Thirty-nine percent of case deliveries were also preterm (compared with 7% of controls, [p<0.001]), and 9.8% were also complicated by pregnancy

					western Alaska, hospital administrative database						associated hypertension (compared with 7% of controls. [p=0.38]). -There were no significant associations between placental abruption and continuous smokeless tobacco use (aOR 1.11, [0.53-2.33] and continuous cigarette smoking (aOR 1.19, [0.43-3.29). -An expanded definition of abruption did not change this finding. There were no significant associations between continuous smokeless tobacco use (OR 1.07, [0.63-1.83]) or continuous cigarette smoking (aOR 1.04, [0.48-2.23]).

4010	Kozhimannil, K et al.	2020	Cross Sectional	Nationwide	7,561,729 hospital live births from white and indigenous women between 2012-2015, National Inpatient Sample	101,943 (1.35%)	maternal residence (C), maternal race (C)	Disseminated intravascular coagulation (DIC), hysterectomy	Age, insurance payer, income, hospital region	Good	DIC -The incidence of DIC was greater but not significant among indigenous woman compared with white women (1.6% vs 0.9%, respectively) (aRR 1.1, [0.8-1.5]). -Within indigenous women, there was no difference between rural women and urban women (0.2% vs 0.2%, respectively) (aRR 0.8, [0.3-1.3]). Hysterectomy -The incidence of a hysterectomy was greater among indigenous woman compared with white women (0.1% vs 0.1%, respectively) (aRR 1.8, [1.0-2.6]). -Within indigenous women, there was a marginal increased risk but not significant of hysterectomy among rural women (aRR 1.3, [0.3-2.3]).