



Michigan Medicaid Part Three Diabetes during Pregnancy 2016 - 2019

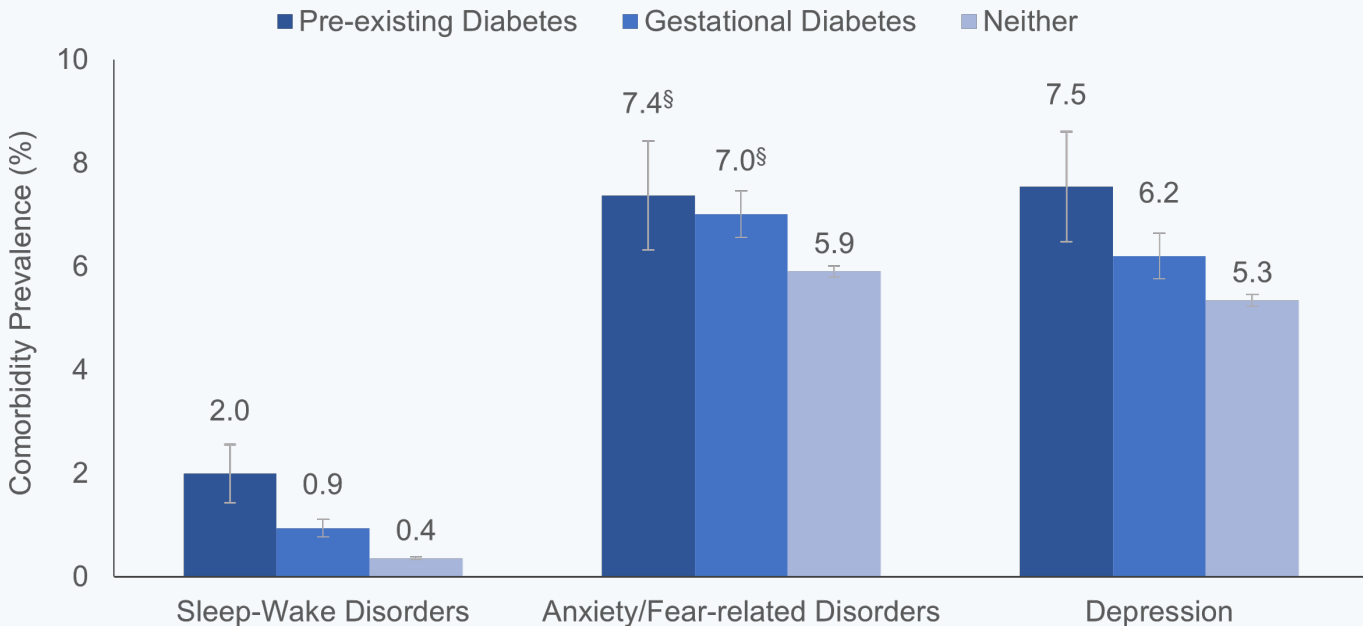
This brief reports comorbid conditions during pregnancy: depressive disorders, anxiety/fear-related disorders, sleep wake disorders, hypertension, asthma, obesity, thyroid disorders, and kidney disease. Public health professionals and providers can use this brief to inform support for diabetes care services for mothers (people who gave birth).

Background

- Type 1 or type 2 diabetes prior to pregnancy is called pre-existing diabetes. Diabetes that develops during pregnancy is called gestational diabetes (GDM).^{1,2}
- Several comorbidities have been associated with pre-existing diabetes and GDM including asthma, hypertension and obesity.³⁻⁵
- Mental illness and short sleep durations are associated with worsened glucose control in mothers with GDM.^{5,6} Association between thyroid disorders and diabetes have also been reported.⁷⁻¹⁰
- The Michigan Health Data Warehouse affords the Diabetes Prevention and Control Program the opportunity to study the impact of diabetes among expectant mothers participating in a Michigan Medicaid program.
- This brief is part three in a multi-part series. Part one examined pre-existing diabetes and GDM burden and disparities in diabetes burden among age, racial/ethnic group, and urban/rural setting. Part two examined maternal complications.

Mental Health and Sleep Disorder

Mental Health and Sleep Disorders by Diabetes Status Among Michigan Mothers in a Michigan Medicaid Program, 2016-2019 Combined



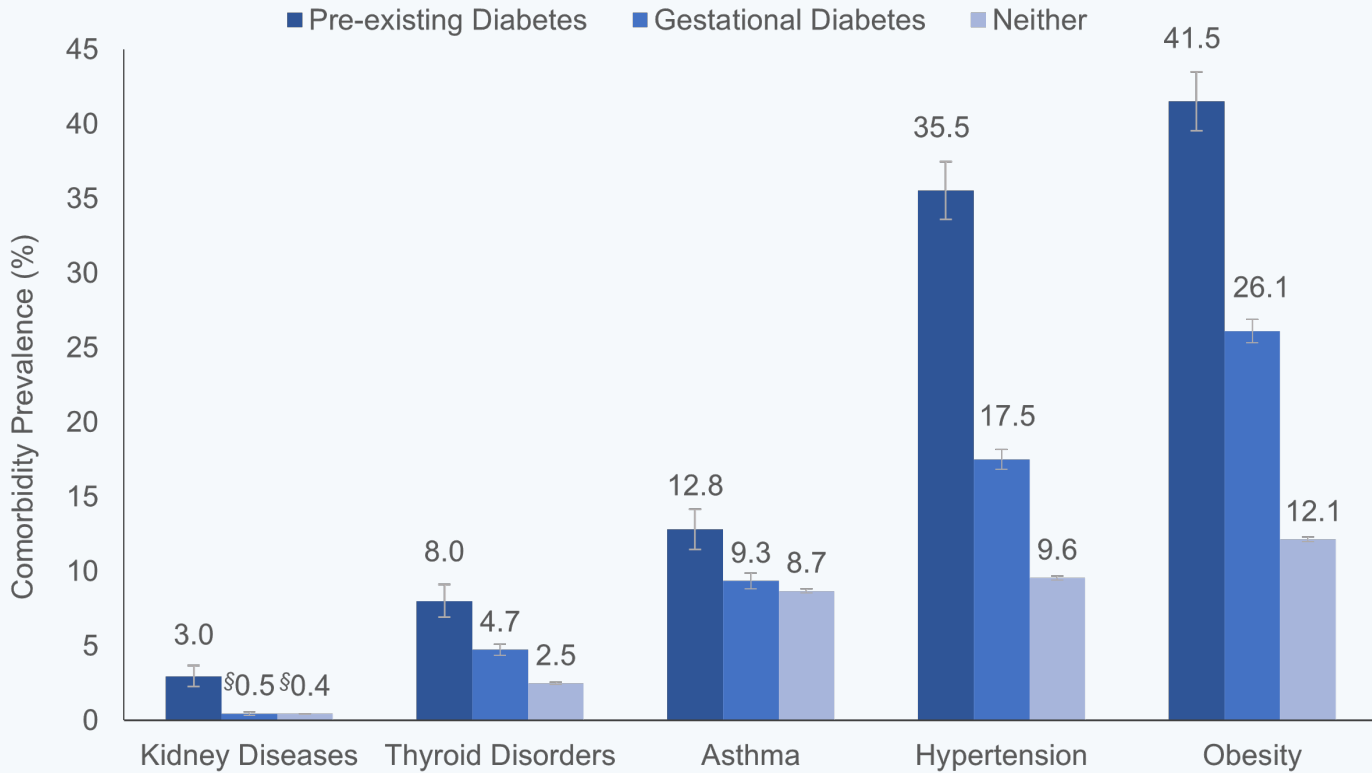
§ No evidence of statically significant difference ($p > 0.05$) between pair
95% CI – 95% Confidence Interval

Source: Michigan Health Data Warehouse (2016-2019 Combined)

- Mothers with pre-existing diabetes had significantly higher prevalences of sleep-wake disorders and depression compared to GDM, which was significantly higher than mothers without diabetes. For example, sleep wake disorder prevalence among mothers with pre-existing diabetes was double that among mothers with GDM and five times the prevalence among mothers without diabetes.
- Mothers with pre-existing diabetes and GDM had a higher prevalence of anxiety/fear-related disorders compared to mothers without diabetes. Pre-existing diabetes and GDM prevalences were comparable.

Additional Comorbidities

Select Comorbidities by Diabetes Status Among Michigan Mothers in a Michigan Medicaid Program, 2016-2019 Combined



§ No evidence of statically significant difference ($p > 0.05$) between pair
95% CI – 95% Confidence Interval

Source: Michigan Health Data Warehouse (2016-2019 Combined)

- Kidney disease prevalence among mothers with pre-existing diabetes was six times the prevalence among mothers with GDM and those without diabetes. Kidney disease prevalence was comparable between mothers with GDM and those without diabetes.
- The prevalence of thyroid disorders among mothers with pre-existing diabetes was 3.4 times the prevalence among mothers without diabetes.
- One in eight mothers with pre-existing diabetes had asthma, compared to one in 11 mothers with GDM and about one in 12 mothers without diabetes. Prevalences among mothers with GDM and without diabetes were statistically significantly different although the 95% confidence intervals overlap for this comparison ($p < 0.05$).
- More than one in three mothers had hypertension with pre-existing diabetes compared to one in six mothers with GDM and one in 11 mothers without diabetes.
- The obesity prevalence among mothers with pre-existing diabetes was 1.6 times the prevalence among mothers with GDM and 3.4 times the prevalence among mothers without diabetes.

Public Health Impact and Recommendations

- The [Maternal Infant Health Program \(MIHP\)](#) is Michigan's statewide evidence-based home visitation program for Medicaid eligible pregnant people and infants.
- MIHP provides documents that address medical considerations for chronic illnesses during pregnancy. For example, Maternal Plan of Care-Part 2- Stress and Depression can be found at: [MIHP Maternal Forms](#).

Public Health Impact and Recommendations

- While kidney disease impacts a smaller number of people, the health implications may be severe. Specifically for people with pre-existing diabetes, preconception screening and counseling should be incorporated into routine diabetes clinic visits. Preconception care should focus on achieving glycemic targets, healthy nutrition, overweight/obesity counseling, diabetes education, and screening for diabetes comorbidities and complications.
- Following preconception screening, a management plan should be put into place for general health or comorbid conditions including hypertension and nephropathy. Refer to the 2022 ADA Standards of Medical Care – Diabetes for specific information.¹

Methods

Data for this report was based on Medicaid claims data extracted from the Michigan Health Data Warehouse between January 1, 2016, and December 31, 2019. The unit of analyses was maternal delivery that resulted in at least one live birth. These deliveries were identified by querying all hospital claims through a combination of DRG and ICD-10-CM diagnosis codes. No additional criteria related to the mother's Medicaid eligibility were applied to the query. The mother's diabetes status was determined if the hospital delivery claim included an ICD-10-CM diagnosis code of E10, E11, and E13 for pre-existing diabetes and O24 for gestational diabetes.

Comorbidities were based on the Clinical Classifications Software (CCS) for ICD-10-CM diagnosis codes. CCS is one in a family of databases and software tools developed as part of the Healthcare Cost and Utilization Project (HCUP), a federal-state-industry partnership sponsored by the Agency for Healthcare Research and Quality. HCUP databases, tools, and software inform decision making at the national, State, and community levels. Sleep-wake disorders involve problems with the quality, timing, and amount of sleep resulting in result in daytime distress and impairment in functioning.

Indicator (CCSR Category):

- NVS016 Sleep-wake disorders
- MBD005 Anxiety and fear-related disorders
- MBD002 Depressive disorders
- GEN003 Chronic kidney disease and GEN006 Other specified and unspecified diseases of kidney and ureters (excluding duplicates)
- END001 Thyroid disorders
- RSP009 Asthma
- CIR007 Essential hypertension and CIR008 Hypertension with complications and secondary hypertension (excluding duplicates)
- END009 Obesity

A limitation is that the results reported were based on mothers who met the criteria. It is not representative of all mothers in a Michigan Medicaid program or the general population. Statistical significance between two groups was determined using a two-proportion z-test where needed ($\alpha = 0.05$). The terminology “significantly lower/higher” was used to represent “statistically significant difference.” Ninety-five percent confidence intervals were included. Estimates were not reported in cases which numerator was non-zero less than 11 and/or the denominator was less than 20.

Note

In this publication, mothers were defined as people who gave birth assigned as female sex at birth.

References

- 1) American Diabetes Association: Clinical Practice Recommendations 2022. Standards of Medical Care in Diabetes—2022. Diabetes Care January 2022 Jan; 45 (Supplement 1).
- 2) Deputy, N.P., Kim, S.Y., Conrey, E.J. and Bullard, K.M. (2018) Prevalence and Changes in Preexisting Diabetes and Gestational Diabetes among Women Who Had a Live Birth—United States, 2012–2016. Morbidity and Mortality Weekly Report, 67, 1201–1207. <https://doi.org/10.15585/mmwr.mm6743a2>
- 3) Jensen, M. E., Barrett, H. L., Peek, M. J., Gibson, P. G., & Murphy, V. E. (2021). Maternal asthma and gestational diabetes mellitus: Exploration of potential associations. *Obstetric medicine*, 14(1), 12–18. <https://doi.org/10.1177/1753495X20926799>
- 4) Li, L. J., Aris, I. M., Su, L. L., Chong, Y. S., Wong, T. Y., Tan, K. H., & Wang, J. J. (2018). Effect of gestational diabetes and hypertensive disorders of pregnancy on postpartum cardiometabolic risk. *Endocrine connections*, 7(3), 433–442. <https://doi.org/10.1530/EC-17-0359>
- 5) Catalano P. M. (2010). The impact of gestational diabetes and maternal obesity on the mother and her offspring. *Journal of developmental origins of health and disease*, 1(4), 208–215. <https://doi.org/10.1017/S2040174410000115>
- 6) Tang, Y., Lan, X., Zhang, Y., Zhou, F., Cai, C., Zhang, J., Pang, X., Hao, L., Li, R., & Zeng, G. (2020). Wei sheng yan jiu = Journal of hygiene research, 49(2), 179–184. <https://doi.org/10.19813/j.cnki.weishengyanjiu.2020.02.002>
- 7) Twedt, R., Bradley, M., Deiseroth, D., Althouse, A., & Facco, F. (2015). Sleep Duration and Blood Glucose Control in Women With Gestational Diabetes Mellitus. *Obstetrics and gynecology*, 126(2), 326–331. <https://doi.org/10.1097/AOG.0000000000000959>
- 8) Rawal, S., Tsai, M. Y., Hinkle, S. N., Zhu, Y., Bao, W., Lin, Y., Panuganti, P., Albert, P. S., Ma, R., & Zhang, C. (2018). A Longitudinal Study of Thyroid Markers Across Pregnancy and the Risk of Gestational Diabetes. *The Journal of clinical endocrinology and metabolism*, 103(7), 2447–2456. <https://doi.org/10.1210/jc.2017-02442>
- 9) Gong, L. L., Liu, H., & Liu, L. H. (2016). Relationship between hypothyroidism and the incidence of gestational diabetes: A meta-analysis. *Taiwanese journal of obstetrics & gynecology*, 55(2), 171–175. <https://doi.org/10.1016/j.tjog.2016.02.004>
- 10) Yang, S., Shi, F. T., Leung, P. C., Huang, H. F., & Fan, J. (2016). Low Thyroid Hormone in Early Pregnancy Is Associated With an Increased Risk of Gestational Diabetes Mellitus. *The Journal of clinical endocrinology and metabolism*, 101(11), 4237–4243. <https://doi.org/10.1210/jc.2016-1506>

This publication was supported by the Grant Numbers 5 NU58DP006519-03, 5 NU58DP006519-4 and 5 NU58DP006614-03 funded by the Centers for Disease Control and Prevention. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the Centers for Disease Control and Prevention or the Department of Health and Human Services.

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