Modeling the Relationship of Food Deserts with Key Women's Health Outcome

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Background

- 17.5% of individuals in Kansas live in food deserts, higher than the national average of 12.8%.[1]

- Individuals living in food deserts are more likely to consume unhealthy foods, increasing the risk of negative health outcomes such as obesity.[2]

- There is a stronger relationship of food insecurity with being overweight or obese among women than men.[2]

- Food insecurity increases the risk of clinical complications during pregnancy and post-partum period and associated with neonatal abnormalities.[3]

- In 2021, Kansas is projected to have greater obesity rates than the national average at 55.6%.[4]

- The percentage of women with Gestational Diabetes Mellitus (GDM) has increased by 56% in the last ten years. Maternal obesity is a significant risk factor.[5]

Objective

Examine the association between food deserts and women's health based on pre-pregnancy and pregnancy health outcomes

Methods

- Retrospective secondary analysis

Data:

1. Kansas Department of Health and Education on all mothers that gave live birth in the state of Kansas from 2010 to 2019

2. USDA 2010 food desert mapping data. Food deserts are areas where individuals have low income AND low access

Analysis: Binary logistic regression analysis

- Predictor variable – food deserts

- Outcome variable - pre-pregnancy health indicators and key pregnancy health outcomes

- Pre-pregnancy BMI is categorized according to the WHO's definition

Results & Discussion

Table 1. Sample Set Profile of KDHE Mothers Who Gave Live Births from 2010-2019

Characteristic	% Live in Food Deserts	% Don't Live in Food Deserts
Total	43	57
Race: White & Black	43 & 44	57 & 56
Hispanic Origin: Hispanic	43	57
Age: 25-29	43	57
Education: Some college and college graduate	43	57
Payment Source: Private	43	57
Pre-pregnancy BMI: Overweight or Obese	43	57
Pre-pregnancy Diabetes: Yes	44	56
Gestational Diabetes: Yes	43	57

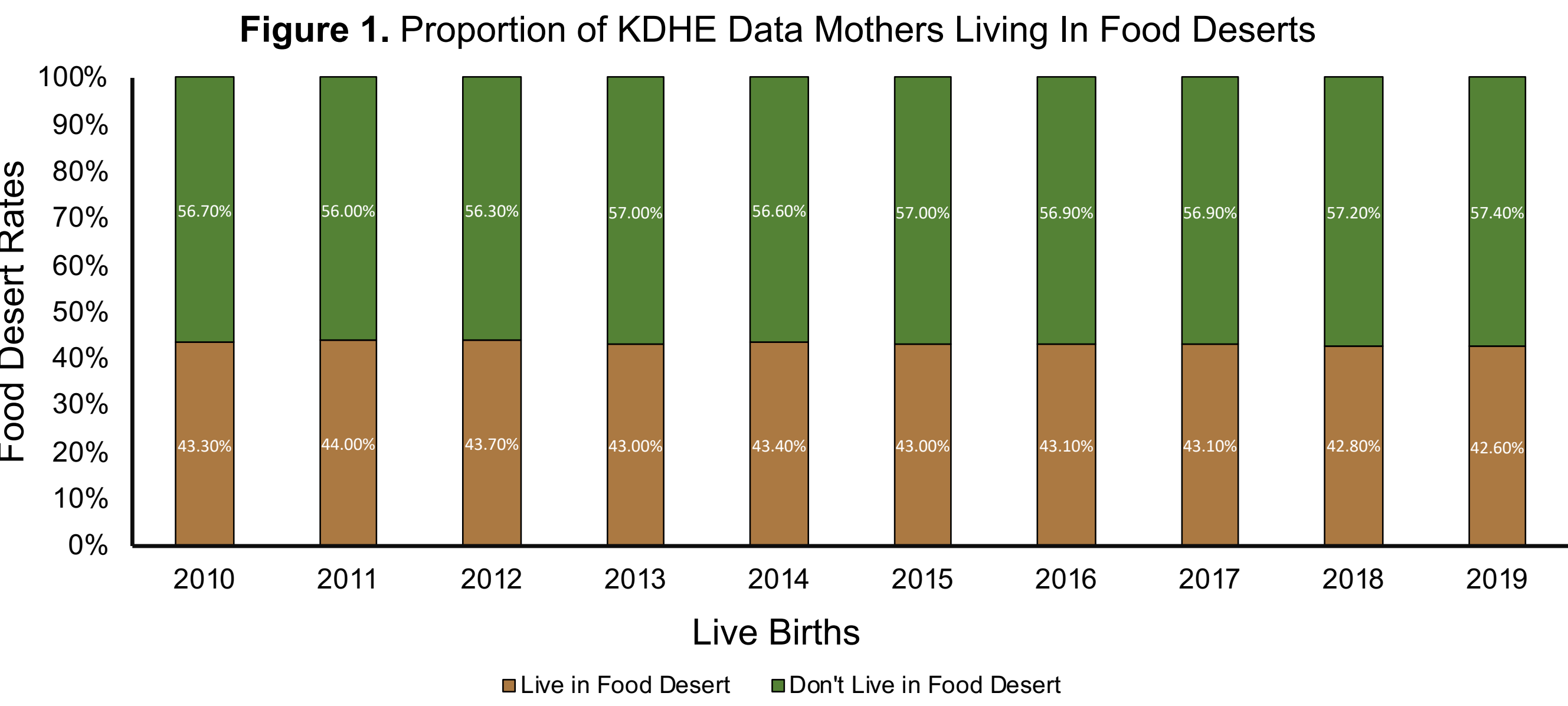**Figure 1.** Proportion of KDHE Data Mothers Living In Food Deserts

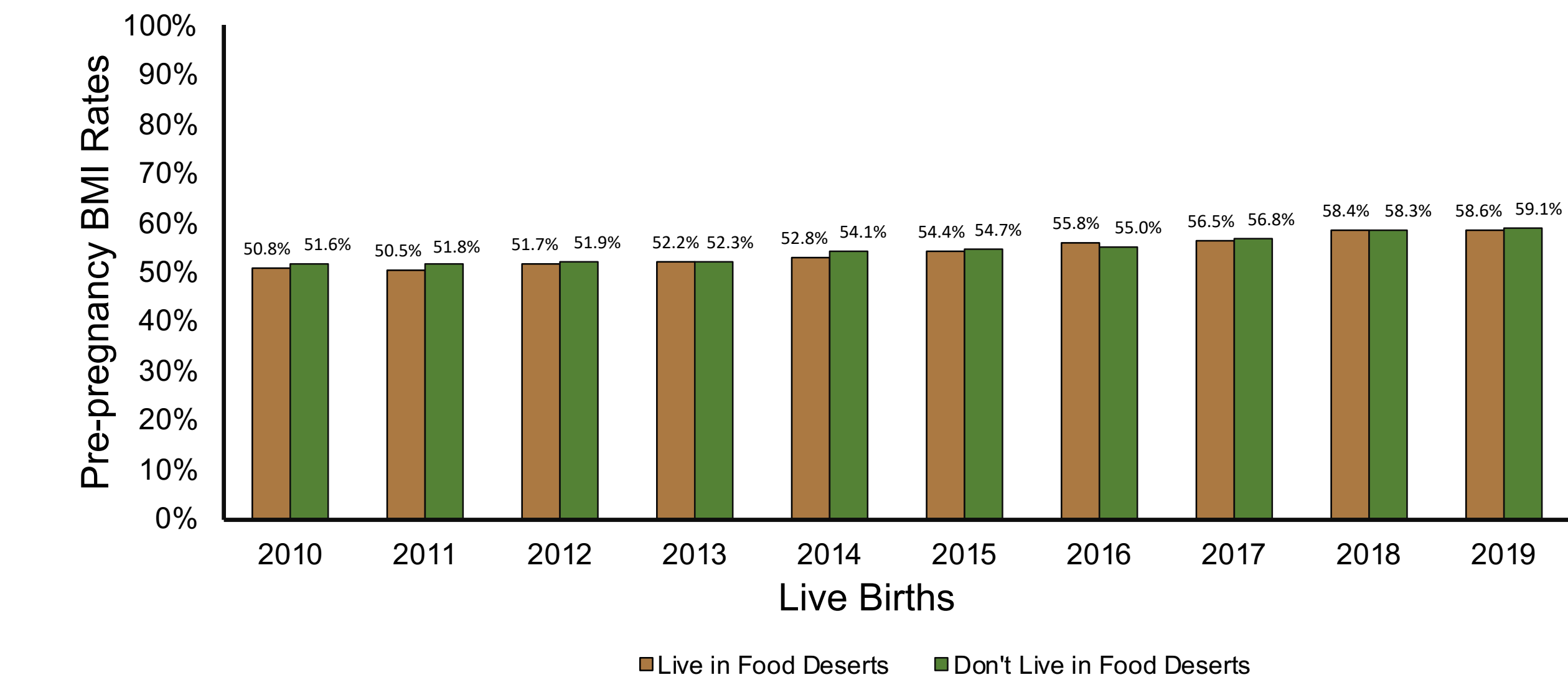**Figure 2.** Proportion of KDHE Data Mothers with Pre-pregnancy Overweight or Obese BMI

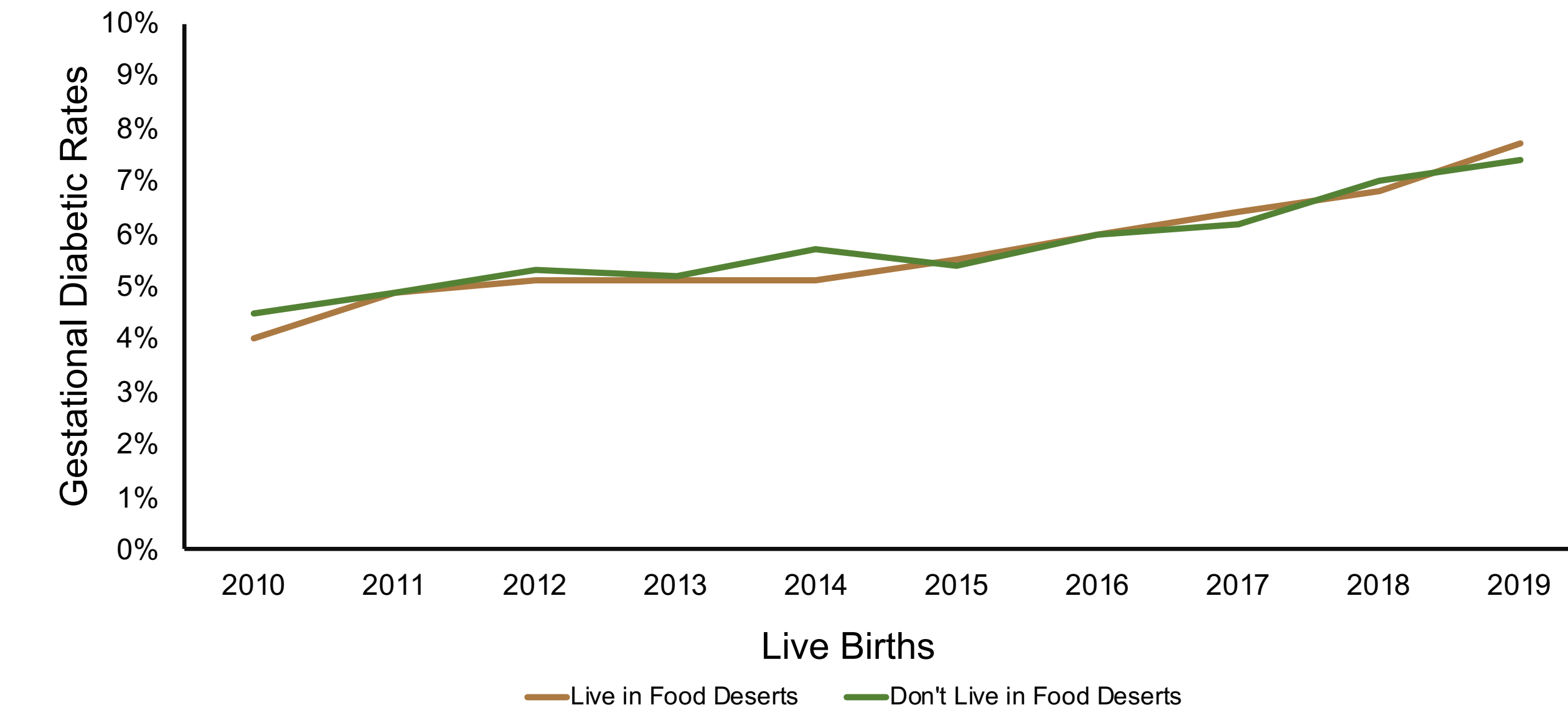**Figure 3.** Proportion of KDHE Data Mothers with Gestational Diabetes

Table 2. Food Desert Parameter Estimates with Pre-pregnancy Health Indicators

Variable	B [S.E.]	OR [95% CI]	p value
Pre-pregnancy BMI: Overweight/Obese			
Yes live in food desert	-0.02 [0.007]	0.983 [0.968, 0.997]	0.018
Constant	0.180 [0.005]	1.197	0
Pre-pregnancy Hypertension: Yes			
Yes live in food desert	-0.056 [0.030]	0.945 [0.891,1.003]	0.061
Constant	-4.19 [0.019]	0.015	0
Pre-pregnancy Diabetes: Yes			
Yes live in food desert	0.034 [0.042]	1.35 [0.953, 1.123]	0.414
Constant	-4.92 [0.028]	0.007	0.000
Prenatal Care Visits: No			
Yes live in food desert	0043 [0.038]	1.04 [0.969, 1.124]	0.261
Constant	-4.72 [0.025]	0.009	0

[a]Pseudo R^2 values for each model are Cox and Snell = 0.000 & Nagelkerke = 0.000

Table 3. Food Desert Parameter Estimates with Pregnancy Health Outcomes

Variable	B [S.E.]	OR [95% CI]	p value
Gestational Diabetes: Yes			
Yes live in food desert	-0.02 [0.016]	0.980 [0.951, 1.010]	0.196
Constant	-2.80 [0.010]	0.061	0
Gestational Hypertension: Yes			
Yes live in food desert	-0.010 [0.015]	0.990 [0.960,1.020]	0.513
Constant	-2.798 [0.010]	0.061	0
Medical-risk Eclampsia: Yes			
Yes live in food desert	0.005 [0.067]	1.005 [0.881, 1.147]	0.943
Constant	-5.86 [0.044]	0.003	0.000

[b]Pseudo R^2 values for each model are Cox and Snell = 0.000 & Nagelkerke = 0.000

- Living in a USDA food desert was not a significant predictor of pre-pregnancy and maternal health.

- The strengths of the research is the large sample size overall

- The main limitations are related to the USDA food desert classification which excludes food security variables such as access to transportation, income, quality of food, cost of food.

Conclusions

- While the prevalence of women living in food deserts is decreasing, there is a considerably high rate emphasizing the need for improving food security.

- Prevalence of pre-pregnancy obesity and GDM continues to increase, highlighting the importance of pre-pregnancy health.

- Food insecurity contributing to food deserts is a multifactorial issue that requires further in-depth analysis on both a public health and socioeconomic level as demonstrated by the analyses.

- Future work will examine the use of other variables to further investigate the impact of food deserts

References & Acknowledgments

[1] Rhone, A., Ver Ploeg, M., & Williams, R. (2019). Understanding Low-Income and Low-Access Census Tracts Across the Nation: Subnational and Subpopulation Estimates of Access to Healthy Food.
[2] Testa, A., & Jackson, D. B. (2019). Food Insecurity, Food Deserts, and Waist-to-Height Ratio: Variation by Sex and Race/Ethnicity. Journal of community health, 44(3), 444–450. https://doi.org/10.1007/s10900-018-00601-w
[3] Di Renzo, G. C., & Tosto, V. (2021). Food insecurity, food deserts, reproduction and pregnancy: we should alert from now. The Journal of maternal-fetal & neonatal medicine : the official journal of the European Association of Perinatal Medicine, the Federation of Asia and Oceania Perinatal Societies, the International Society of Perinatal Obstetricians, 1–3. Advance online publication. https://doi.org/10.1080/14767058.2021.2016052
[4] Bretches, M. P., & Schwasinger-Schmidt, T. E. (2021). The State of Obesity in Kansas: A Community Based Approach to Chronic Care Management. Kansas journal of medicine, 14, 21–28. https://doi.org/10.17161/kjm.vol1413751
[5] Center for Disease Control and Prevention. (2018, June 12). Diabetes During Pregnancy | Maternal Infant Health | Reproductive Health | Centers for Disease Control and Prevention (CDC). https://www.cdc.gov/reproductivehealth/maternalinfanthealth/diabetes-during-pregnancy.htm