

Geographic modelling of sickle cell trait in four US regions

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Background: Many studies have been done concerning the prevalence of sickle cell trait, its incidence and screening techniques. It is most commonly observed in the Black and Hispanic population in the United States. This study used retrospective data from the Centers for Disease Control and Prevention, Morbidity and Mortality Weekly Report (MMWR – December 12, 2014) to model, analyze, and substantiate the geographic distribution of sickle cell trait, its incidence, prevalence and screening in 44 states divided into 4 regions in the United States.

Methods: We conducted data modelling of geographic regions in the United States. The four regions were West, Midwest, South and Northeast. The research question was: How is screening rate related to sickle cell trait in the regions of the United States? The data were pooled in an Excel file and analyzed using linear regression and generalized linear modelling in SAS 9.4.

Results: The results showed that (1) there is a significant relationship between incidence and the number of infants screened for region 2 (Midwest), $p=0.0020$; (2) a significant relationship between incidence and sickle cell trait for region 2 (Midwest), $p=0.000$; (3) incidence with screening and trait for region 1 (West), region 2 (Midwest) and region 3 (South), $p<0.05$. (4) Generalized linear modelling was also significant with interactions for the region 1, region 2, and region 3, with $p<0.05$.

Conclusions: Findings indicate that more screening is needed to diagnose sickle cell trait, particularly among Black and Hispanic infants from the region 2 (Midwest) states. There should be more intervention programs implemented to promote early screening among newborns to reduce disparities and the burden of prevalence.

Key words: sickle cell trait, geographical, regions, modelling, prevalence

<https://doi.org/10.21633/jgpha.7.143>

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