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Implementation of Reach Out and Read by Health Departments Increases Rural Access

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Abstract

Background: Reach Out and Read is an evidence based early literacy program used in primary care practices. In 2014, the program expanded to County Health Departments in Oklahoma.

Objective: To evaluate how implementation of the program in Health Departments affects access for at risk children.

Methods: Oklahoma program sites were classified as either Health Department or practice, geocoded, and mapped to census tract, census block group, and county subdivision maps. Sites were classified as rural or urban, and census data was used to classify sites as high or low poverty prevalence and education level. Sites were compared to determine their accessibility to at risk children as defined by living in rural areas, high poverty, and low educational level.

Results: There were 18 Health Department and 67 practice sites. Health Department sites were more likely to be in rural areas: 13 of 18 sites versus 16 of 67 practices ($p<0.001$). They were less likely to be in areas of high poverty: 10 of 18 versus 61 of 67 practices ($p<0.001$), and they were not more likely to be in areas of lower education, with 8 of 18 sites in low education areas versus 34 of 67 practices ($p=0.8342$).

Conclusions: Implementation of Reach Out and Read in Health Departments in Oklahoma increased the number of rural program sites. Health Department locations were less likely to be in areas of poverty and lower education. Use of the program in Health Departments is an effective way to expand the program to serve rural children.

Introduction:

Poor literacy is a known predictor of poor health outcomes.[1,2] In addition, literacy is an important component of childhood academic success, but despite this, many children begin school without the language skills needed to read.[3] Medical providers have a unique opportunity to promote literacy and language development in early childhood. The American Academy of Pediatrics recommends that pediatric providers promote early literacy by advising all parents to read to their young children, encourage developmentally

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appropriate reading activities, and provide books at health supervision visits for high risk children.[3]

Reach Out and Read (ROR) is an evidence based program that promotes early language skills, parent-child interaction, and early childhood literacy through their model which includes encouraging medical providers to distribute books at health supervision visits, provide literacy based anticipatory guidance, and a literacy rich waiting room.[4] The program serves children at health supervision visits from 6 months to 5 years and fosters literacy based anticipatory guidance including discussing the importance of reading with families and discussing developmentally appropriate interaction with books.[4]

Historically, pediatric providers have implemented ROR in practices. In 2014, ROR was first implemented at the Garfield County Health Department in an effort to improve rural access to the program as this Health Department is in a rural county in Oklahoma. After positive feedback, other County Health Departments in the state of Oklahoma requested participation, and were added over the next few years. The purpose of this study is to evaluate the potential population served by the ROR program in County Health Departments when compared to practice sites for children at risk, as defined by living in rural locations, high poverty status, and low education level. These three factors were chosen as they are known to place children at risk for adverse health outcomes.[5–8] In addition, children in Oklahoma are at particular risk. Recent data has shown that Oklahoma ranks 44th out of all 50 states for child well-being and 46th in education, with 71% of fourth graders not proficient in reading and 76% of eighth graders not proficient in math.[9] Thus, efforts should be made in Oklahoma to improve child well-being, including expanding programs that improve school readiness and early literacy, such as ROR.

Methods:

Site classification and location

Oklahoma Reach Out and Read site addresses were obtained from the Reach Out and Read national database. Practice sites were defined as sites that were associated with a primary care physician office (the traditional ROR model), in which medical providers (physician, nurse practitioner, or physician assistant) provide books and literacy based anticipatory guidance. Health Department sites were defined as those located within Country Health Departments, in which Health Department staff have been specially trained to provide the age appropriate books and literacy based anticipatory guidance. Physical addresses for each site were mapped and geocoded using Esri World Geocoder in the ArcGIS software.[10]

Site Data

The three variables examined were urban/rural status, poverty status of children under 5 years of age, and community education level. Each variable was examined at the smallest division where the relevant data was available. Hence, urban/rural status was examined at the census tract level, poverty was examined at the county subdivision level, and education was examined at the census block group level. Definitions of census tracts, census block groups, and county subdivisions are set by the U.S. Census Bureau.[11] Census tracts are comprised of

census block groups. County subdivisions are a statistical unit and are generally larger than a census tract. Despite the varied size of the geographic units used, the order of interest of the variables is urban/rural status, poverty, and education, thus discussion of the analysis and results will be in this order.

Urban/rural status

For each census tract in the state of Oklahoma as defined by the 2010 census, shapefiles and Rural Urban Commuting Area (RUCA) codes were obtained from the United States Census Bureau.[12] RUCA codes are used to describe both the rural/urban status of individual areas and their commuting relationship to other urban areas. The most conservative definition of rural was used, which defined small cities that commute to larger cities as urban. This was done by dichotomizing census tracts as urban or rural with classifying codes 1.0, 1.1, 2.0, 2.1, 3.0, 4.1, 5.1, 7.1, 8.1, 10.1 as urban, and classifying the remaining codes as rural using the WWAMI Rural Health Research Center dichotomization.[13]

Poverty

County subdivision boundaries were obtained and poverty estimates were calculated from a TIGER/shapefile geodatabase using U.S. Census geographic subdivisions combined with data from the 2012–2016 American Community Survey and available from the U.S. Census Bureau.[14]

County subdivisions were dichotomized to high early childhood poverty or low early childhood poverty. The definition of poverty was that used by the U.S. Census Bureau. This definition is based on a comparison of household income to preset poverty thresholds which vary by family size and composition.[15] High early childhood poverty was defined as greater than 20% of those less than 5 years old living below the federal poverty threshold. Low early childhood poverty was defined as less than or equal to 20% of those less than 5 years old living below the federal poverty threshold. This dichotomization was based on the average proportion of children living in poverty in the United States under five in 2016 as reported by the USDA Economic Research Service.[16]

Education

Census block group boundaries were obtained and educational level attainment estimates were also calculated from a TIGER/shapefile geodatabase using U.S. Census geographic subdivisions combined with data from the 2012–2016 American Community Survey and available from the U.S. Census Bureau.[14] Census block groups were dichotomized to high or low educational attainment. Educational attainment was defined among those over 25 years of age. High educational attainment was defined as the proportion of the population that did not graduate high school being less than the national average (13%). Low educational attainment was defined as the proportion of the population having not graduated high school greater than or equal to the national average (13%). This dichotomization was based on the average high school non-graduation rate for those over the age of 25 for the years 2012–2016 as reported by the USDA Economic Research Service.[17]

Statistical Analysis

For each factor, the proportion of practice and ROR sites, located in the higher risk group (rural, high poverty, and low education level) were compared using the Chi squared test or Fisher's exact test as appropriate based on cell counts.

The University of Oklahoma Health Sciences Center Institutional Review Board (IRB) for Human Research deemed this study as not meeting criteria for human subjects research (IRB # 9194).

Results:

Site/Region Specifics

There were eighty-five Reach out and Read sites identified in Oklahoma. Since the initiation of the Reach Out and Read programs in Health Departments, 52 sites have been added to the 33 practice sites previously in existence in the state; 18 Health Department sites and 34 practice sites.

For the urban/rural classification, there were 1046 census tracts identified, 277 of which were classified as rural and 769 of which were classified as urban. For poverty metrics, there were 305 county subdivisions identified. One hundred eighty seven were identified as having high early childhood poverty and 118 were identified as having low early childhood poverty. For educational attainment, there were 2,965 census block groups identified, with 1,371 identified as having below average educational attainment and the remaining 1,594 block groups having above average educational attainment. Site Distribution by factor (table 1):

Rural/Urban

Figure 1 shows the distribution of County Health Department and practice sites in relationship to the rural/urban designations of the census tracts. County Health Department sites were more likely then practice sites to be in rural census tracts, with 13/18 (72%) in rural locations, whereas 16/67 (24%) of practice sites were found in rural locations ($p<0.001$).

Poverty

Figure 2 shows the distribution of County Health Department and practice sites in relationship to county subdivision level poverty. County Health Department sites were less likely than practice sites to be in county subdivisions with high poverty, with 10/18 (56%) in high poverty county subdivisions, whereas 61/67 (91%) of practice sites were found in high poverty county subdivisions ($p<0.001$).

Educational Level

Figure 3 shows the distribution of County Health Department and practice sites in relationship to census block group level education. There was no significant difference in proportion of County Health Department sites when compared to practice sites in lower educational level census block groups, with 8/18 (44%) of County Health Department sites

in low education census block groups and 34/67 (51%) of practice sites in lower educational level census block groups (p=0.8342).

Discussion:

Implementation of ROR by County Health Departments in Oklahoma increased the number of rural ROR sites compared to practice sites. However, County Health Department locations were less likely to be in areas of high poverty when compared to practice sites, and were not more likely to be in areas of lower education. It should be noted that both Oklahoma and Tulsa County are counties with high poverty and a high density of practice sites which may have contributed to the fact that County Health Department locations were found to be less likely to be in areas of high poverty compared to the practice sites.

There have been multiple positive outcomes found as a result of participation in the Reach Out and Read model. Mendelsohn et al. found that when compared to control participants, families participating in ROR reported reading more frequently to their children.[18] In addition, children who participated in ROR were found to have higher receptive and expressive language scores and effects were found to be dose dependent, thus the more exposure to the program, the better the child's receptive and expressive language scores.[18] Other studies have corroborated these results, including High et al., who found that families participating in ROR reported reading to their children more often, and also reported higher receptive and expressive vocabulary scores among children participating in the program, when compared to the control group.[19] Several studies have shown that ROR may change parental attitudes and practices in regards to reading and book sharing activities.[20–25] Despite the significant evidence supporting the use of ROR for improving early literacy, there is little known about the utilization of, and access to the program.[18–25]

This study provides an evaluation of the geographic distribution of the ROR program in the state of Oklahoma and highlights the importance of investigating access to programs and services for those at risk. In addition, other states should evaluate the geographic distribution of their early childhood interventions, including ROR, to ensure equity in access for children at risk. Nationally, efforts should be made to evaluate distribution of interventions for children as well. This geographic evaluation is the first step in further evaluation of the use of the ROR program in Health Departments.

Our study had several limitations. We used a narrow definition of rurality based on RUCA codes, and other classification strategies may have categorized larger areas of the state as rural. In addition, our study examined geographic distributions of sites but did not measure the number of patients reached by the program, and this should be an area of further study. Also, ROR in Health Departments has not been evaluated previously, and the use of the model may vary by Health Department. However, a similar program to ROR has been found to be an effective intervention at the Special Supplemental Nutrition Program for Women, Infants and Children (WIC) sites.[26] Many of the County Health Department Sites in Oklahoma (including those in this study) are implementing ROR through their WIC clinics and through other types of visits but not through traditional health supervision visits. The validation of use of ROR in Health Departments does not affect our site analysis, but

certainly requires further study prior to scaling Health Department implementation. Finally, the distribution and function of County Health Departments may vary by state, which may limit generalizability of our findings.

The Use of ROR by County Health Departments is an alternative and effective way to expand the program to increase the possibility of access for rural children. This strategy should be coupled with other strategies to reach children in areas of lower education and high poverty. Other states could use this model to improve rural access to the evidence-based ROR model. In addition, other clinical programs could be expanded to County Health Departments within Oklahoma to improve rural access.

For more information on recommendations for physicians to improve reading in young patients, or for information on starting a ROR program, please visit http://reachoutandread.org/.

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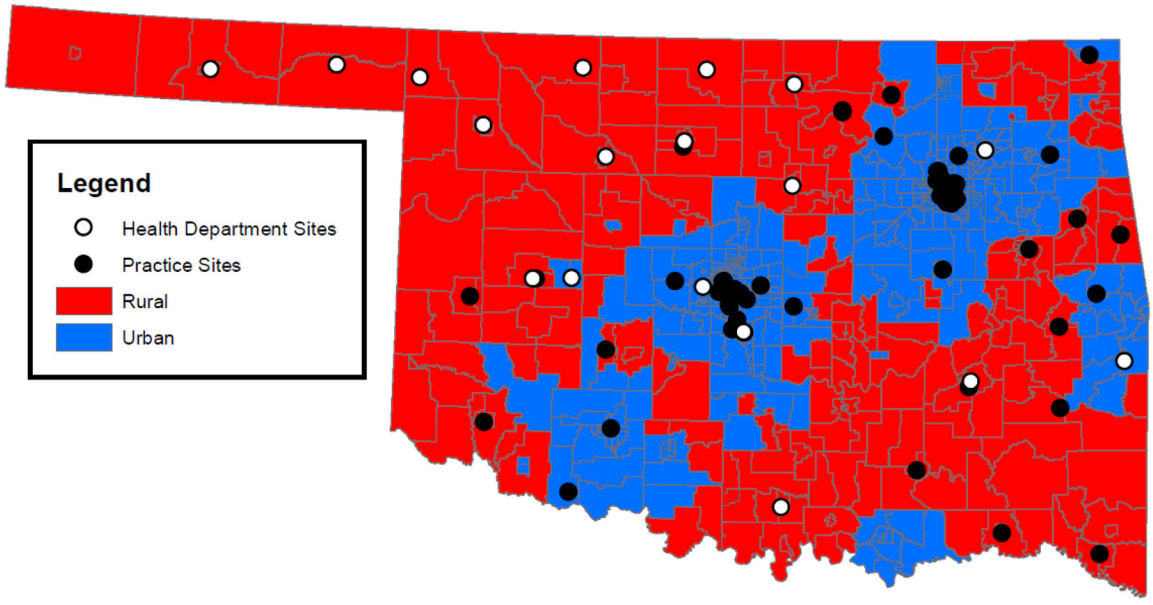

Figure 1.
Reach Out and Read Urban/Rural

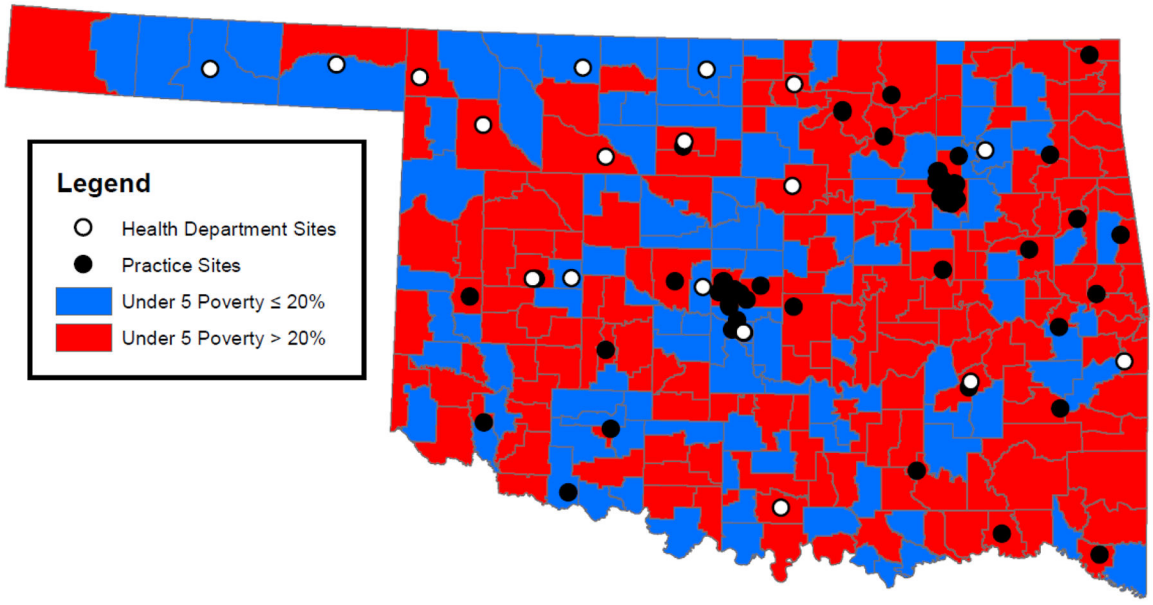

Figure 2.
Reach Out and Read Poverty

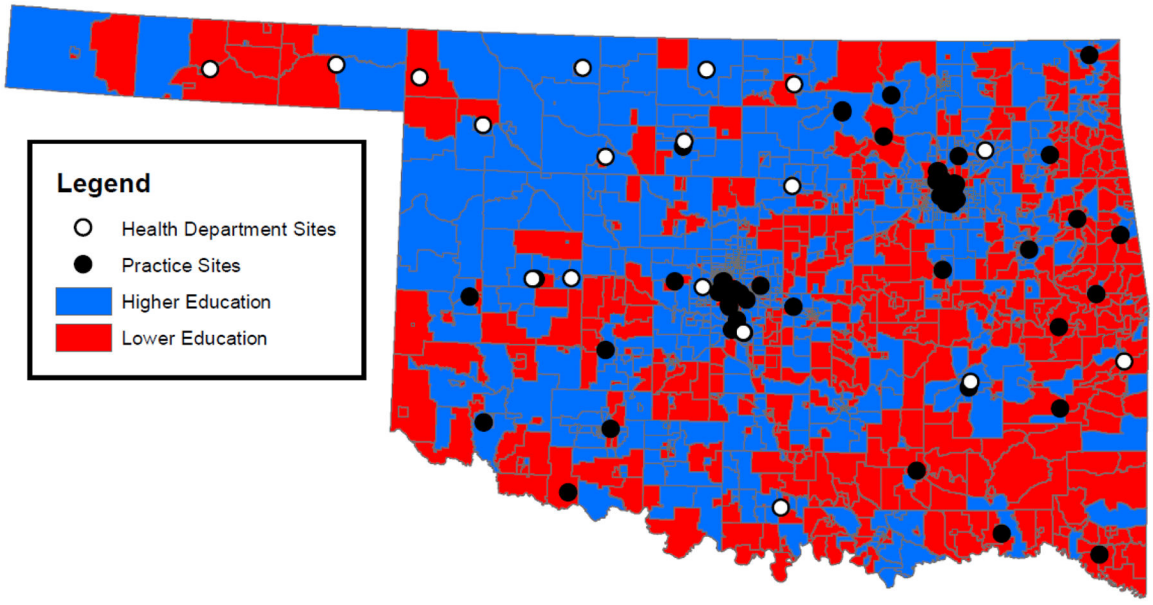

Figure 3.
Reach Out and Read and Education

Table 1.

Number and percentage of Health Department and practice sites by risk factor.[a]

Rural vs Urban	Rural	Urban	Total Sites
Health Department Sites	13 (72%)[b]	5 (28%)	18 (100%)
Practice Sites	16 (24%)[b]	51 (76%)	67 (100%)
Poverty	**High Early Childhood Poverty Sites**	**Low Early Childhood Poverty Sites**	
Health Department Sites	10 (56%)[c]	8 (44%)	18 (100%)
Practice Sites	61 (91%)[c]	6 (8%)	67 (100%)
Education Attainment	**Below Average Educational Attainment Sites**	**Above Average Educational Attainment Sites**	
Health Department Sites	8 (44%)	10 (56%)	18 (100%)
Practice Sites	34 (51%)	33 (49%)	67 (100%)

[a]Variables examined at the smallest division available. Urban/rural status was examined at the census tract level, poverty was examined at the county subdivision level, and education was examined at the census block group level.

[b]The percentage of Health Department sites in rural locations were significantly higher than that of practice sites ($p<0.001$).

[c]Health Department sites were less likely than practice sites to be in high poverty areas ($p<0.001$).