

REPORT

FINAL REPORT

Environmental Scan of Programs and Policies Addressing Health Disparities Among Rural Children in Poverty

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A. Introduction and background

About 12.9 million children live in rural communities, where they are more likely than their nonrural peers to experience health problems associated with their environment, their socioeconomic status, their own and their families' health behaviors, and their access to quality clinical care. For example, children living in rural communities are more likely than urban children to be overweight or obese and to live with someone who smokes (U.S. Department of Health and Human Services [HHS] 2015). But despite the wealth of research regarding health disparities by income and race, there is limited information about policies and programs to address disparities among rural children.

To address this information gap, Mathematica Policy Research designed and conducted an environmental scan of policies and programs implemented to address health disparities of rural children living in poverty. The scan addressed three key questions:

1. What interventions or policies have been used at a community or state level to address health disparities among rural children in five areas: obesity, behavioral health, oral health, pre- and postnatal care, and respiratory health?
2. What evidence exists regarding whether and how the identified interventions affect health outcomes?
3. What federal policy levers could be used to address health disparities among rural children living in poverty?

This report summarizes our search methods and results and provides conclusions and recommendations for future work. Along with the program matrix in Appendix A, the report is intended to help HHS and other agencies understand these disparities and make informed decisions about future programs and investments.

B. Methodology

We conducted a targeted search of published and other publicly available literature that addresses the five aforementioned disparities in rural child health. Our search included many databases and websites and involved the use of broad keywords, but it was not comprehensive or systematic. We searched databases of journal publications—Ovid MEDLINE, Ovid PsycINFO, CINAHL, Health Policy Reference Center, SocINDEX, and Scopus—for peer-reviewed literature and used Google Custom Search to scan public websites for grey literature (for example, government reports and policy briefs). We limited the search to resources published since 2005 in the United States. We broadly defined interventions, policies, and programs so as to not inadvertently exclude nontraditional health programs, and we used a broad definition of “rural,” not limiting it to one specific technical definition often used by governmental programs. In particular, we focused on interventions that are multigenerational (targeting parents or grandparents as well as children), interventions or services that are bundled (for example, those that combine health services with human services), and interventions that use technology or “telehealth” to address rural isolation. We also focused on areas with high levels of persistent poverty, such as the Mississippi Delta, Appalachia, the U.S.-Mexican border, and tribal areas. We did not limit our search to these types of programs or areas, but we have highlighted them in our results (Section C).

We used a two-stage process to review the search results. The first stage involved reviewing journal abstracts; quickly skimming the grey literature; and categorizing results as “screened in,” “potential,” and “screened out.” We screened 478 results from the databases search (the range per topic was 79 to 125), and we limited our search to the top 100 results per topic from Google Custom Search. We were able to rule out most of the results very quickly. In this review stage, we used four screening questions:

1. Does the source include a policy, intervention, or strategy to address the disparity?
2. Does the source address a rural/nonmetropolitan/nonurban population?
3. Does the source address a pediatric population (or for pre- and postnatal care, pregnant women)?
4. Was the policy or program based in the United States?

We screened in 54 results, ranging from 2 sources for respiratory health to 31 sources for obesity. We reviewed these 54 sources in further detail to confirm that they were in fact relevant to the task and to extract information to populate the matrix. As we reviewed these results, we screened out some sources and identified additional sources in the original sources’ citations. After final review, 33 programs or policies were included in the matrix, ranging from 4 to 8 per disparity topic. We screened out many of the initial results because they focused on a location outside the United States.

In stage two of the process, we screened out many obesity results for only containing descriptive information or for not focusing on a rural population, as we had thought during the initial review. Table 1 shows, by topic and overall, the number of initial results from databases and Google Custom Searches, the number of results initially screened in, and the number of programs and policies included in the matrix.

Table 1. Search and screening results, by disparity topic and in total

	Number of initial results— databases	Number of initial results—Google Custom Search	Number of results initially screened in	Number of programs and policies included in matrix
Obesity	89	100	31	8
Behavioral health	101	100	7	7
Oral health	84	100	9	7
Pre- and postnatal care	125	100	5	7
Respiratory health	79	100	2	4
Total	478	500	54	33

Note: Although we included 33 programs and policies in the matrix, some of the references found in the search covered the same program, so there are more than 33 citations in the matrix.

The findings of the environmental scan are summarized in the narrative matrix in Appendix A. The matrix includes the following information for each policy or program we identified: the name and a brief description; research questions addressed; findings or results; type of evidence of effectiveness; geographic area; target population; implementation and end date; source of the reference (peer-reviewed or grey literature); lead and partner organizations; funding sources; and

citation for source document. The matrix is organized by disparity topic. Given the preliminary nature of this task, we did not evaluate the evidence in a systematic way to assess the quality of any evaluations, but instead indicated whether the policy or program has been evaluated. We included interventions or policies that have been evaluated but were not found effective. While it is generally accepted that experimental designs are of higher quality than other designs, the information presented in the articles we cite may not provide enough information about aspects such as data used, response rates, problems in randomization, or loss to follow up to say with certainty that the experimental evaluations are of high quality. In addition, we did not assess the models used in quasi-experimental approaches. Future work may wish to include a systematic evaluation of the evidence.

C. Results

For each disparity below, we provide an overview of the problem, the programs identified in our scan, and the evaluations of those programs (if any). As mentioned previously, our search was broad but not systematic or comprehensive; as such, the programs we identified do not represent all interventions targeting these health topics among rural children.

1. Obesity

Background. Obesity is a critical issue affecting many children in the United States. In 2011-2012, 16.9 percent of children ages 2 to 19 were obese, with an additional 14.9 percent overweight (Ogden et al. 2014). Rates of obesity vary by age: in 2011-2012, 8.4 percent of children ages 2 to 5, 17.7 percent of children ages 6 to 11, and 20.5 percent of children ages 12 to 19 were obese (Ogden et al. 2014). Children who are obese are more likely to be obese in adulthood (Freedman et al. 2005). Furthermore, children in rural areas are more likely to be overweight or obese than children living in urban areas, and children in households with lower incomes were more likely to be overweight or obese than children in households with higher incomes (HHS 2015).

A multitude of behavioral and environmental factors contribute to obesity and are targets of obesity prevention programs—for example, a lack of physical activity, poor nutrition, unsafe routes to walk or bike to school, lack of recreation areas, consumption of sugar-sweetened beverages, and an increase in recreational screen time (Sahoo et al. 2015). Many programs and organizations are trying to reduce childhood obesity, including First Lady Michelle Obama’s “Let’s Move!”¹ campaign and the National Football League’s Play 60² initiative. National policies have been designed to improve child health and reduce obesity in school settings, including updated nutritional standards for the National School Lunch Program and School Breakfast Program and the school nutrition and wellness policies mandated by the Healthy, Hunger-Free Kids Act of 2010.³ Private investments have also addressed the issue. For example, the Robert Wood Johnson Foundation has been working to reverse the trend in childhood obesity and has funded many state and community programs to address numerous factors relating to obesity.

¹ <http://www.letsmove.gov/>.

² <http://www.nfl.com/news/story/09000d5d80b4a489/article/nfl-play-60-the-nfl-movement-for-an-active-generation>.

³ https://www.whitehouse.gov/sites/default/files/Child_Nutrition_Fact_Sheet_12_10_10.pdf.

Types of programs. Although there are many programs and policies to address obesity, few specifically target children in rural areas. The environmental scan showed eight programs that address the factors noted above, including enhancing access to pediatric obesity care, improving nutrition or physical activity, and redesigning the built environment (for example, creating a recreational area).

These eight programs targeted the physician office setting, schools and child care facilities, and the broader communities. Of the three programs that were physician-based, two used telemedicine to provide access to multidisciplinary pediatric obesity care and to provide care to support healthy weight. The third involved improving the clinical workflow (integrating registered dietitians and a pediatric clinical psychologist), patient education, and electronic health records. It required providers to assess body mass index (BMI), administer a wellness survey, and provide nutrition and physical activity counseling at each well visit.

Two other programs, including one near the U.S.-Mexican border, targeted child care providers and early childhood educators to improve nutrition and physical activity. Another nutrition program targeted schools; it began as an urban school program and was adapted to a rural school and expanded to include physical activity. Program lessons, which integrated concepts from other academic areas, aimed to improve student knowledge, attitudes, and self-efficacy regarding healthy eating and physical activity. Yet another community created a skate park and plaza for physical activity. Finally, a community-based wellness program was implemented in an Appalachian area to increase the variety of vegetables offered to the entire family at evening meals. It targeted food preparers to promote vegetable consumption and included group sessions to teach new recipes and cooking skills, after which participants took meals home for their families to taste and evaluate.

Sources and evaluation. We found six programs in the peer-reviewed literature and two in the grey literature. Evaluations of the two telemedicine programs showed that telemedicine can increase access to care, promote lifestyle changes for healthy weight, and produce clinical outcomes that are comparable to or better than in-person care. Researchers found that the third physician-based program successfully integrated services; regularly assessed BMI; and provided counseling regarding appropriate child growth, BMI, nutrition, and physical activity.

In addition, researchers reported the urban school-based nutrition program was successfully adapted to the rural school. To facilitate this process, rural teachers and nutrition educators met and made suggestions about how to adapt the lessons so they were culturally relevant. Training sessions for staff were also adapted to have longer, less frequent in-person meetings and more phone consultations, along with a local expert available to discuss lesson content.

For many of the programs that targeted policies and knowledge related to nutrition and physical activity, the evaluations showed that programs had more success in changing nutrition policy, knowledge, and self-efficacy than in increasing physical activity. For example, authors noted that the community-based program to improve vegetable consumption encountered powerful barriers in terms of role expectations and husbands' and children's food preferences.

2. Behavioral health

Background. In rural areas, almost one in four children ages 4 to 17 has a potential mental health problem. However, as many as 80 percent of these children with potential mental health problems live in counties with no community mental health centers (Moore et al. 2005). In as many as one in four pediatric primary care visits, either the parent or the physician raises a behavioral health concern (Cooper et al. 2006), but many physicians in rural family practices describe their own ability to manage children’s mental health problems as “fair to marginal/poor” (Gerdes et al. 2001). Child and adolescent psychiatrists and psychiatric services are mainly available in large health care centers and specialized clinics (Pesamaa et al. 2004), and there is a shortage of these specialists, especially in rural areas. Even when they are accessible, mental health services may be stigmatized (Starr et al. 2002).

Types of programs. The types of behavioral health programs found in the literature included two school-based health centers, four telehealth/telepsychiatry programs, and one integrated primary care program. Six of these seven programs focused on improving access to services by bringing services to new settings (such as establishing school-based health centers) or by setting up a new model of care (such as telehealth or the integration of behavioral health into primary care practices). Only one program, Changing Lifestyles to Impact Mind and Body (CLIMB), could be classified as a medical intervention. This program implemented new care techniques, providing materials to clinicians to integrate into their existing mental health therapy sessions. Nearly all of the programs targeted school-age children.

Telehealth was heavily used in behavioral health programs. Behavioral health services, particularly those serving pediatric populations, are often lacking in rural areas, so telehealth can be used to improve access to services for children in those areas. One of the telehealth programs was implemented at an Indian Health Service (IHS) hospital in South Dakota to improve behavioral health care access for the local American Indian population.

Sources and evaluation. All of the behavioral health sources appeared in peer-reviewed journal articles, which all provided evidence of effectiveness in either process or outcome measures. The evaluations showed that school-based health centers improve access to mental health services. Researchers found that CLIMB enhanced mental health and decreased symptoms, whereas the various telehealth/telepsychiatry programs improved behavioral health outcomes, increased access, and/or increased service use. The authors also noted that parents were satisfied with these services. Another evaluation showed positive results for a model of integrated, co-located behavioral health services in rural primary care practices; the model improved attendance at initial behavioral health visits.

3. Oral health

Background. Many experts say dental care is the most prevalent unmet need among children in the United States (Martin et al. 2009). Lack of dental care can have serious consequences; in particular, pediatric dental caries (dental decay), left untreated, can result in a host of problems—from risks to general health to missed school days and low self-esteem (Vargas et al. 1998).

There are shortages of both pediatric and general dentists in rural areas: in 2005, almost three out of four areas with dental health shortages were in rural locales (Skinner et al. 2006). Rural children, in particular, have been shown to be less likely than urban children to be covered by dental insurance and less likely to receive dental care (Lewis et al. 2007; Liu et al. 2007). Patients may have difficulty finding a dental provider that accepts Medicaid due to low reimbursement rates for dental services (GAO 2010; Seale and Casamassimo 2003). Access to preventive care, including dental sealants and fluoride varnish treatment (FVT), can improve children's health and their dental health later in life.

Types of programs. We found seven oral health policies, strategies, and programs in our scan. Many of them involved changes to Medicaid reimbursement amounts or benefits, or changes in the provision of oral preventive care, including specific treatments such as dental sealants⁴ and FVT to prevent caries.

Each of the seven policies and programs was designed to improve access to care in some way, and three focused on very young children, improving access for a population that is often not served by dentists. Three programs used dental hygienists or dental health aide therapists (an emerging type of provider) to provide care. In three programs, primary care practices delivered preventive dental care, including counseling for caregivers about dental care and treatments such as FVT. In three cases, Medicaid policies were changed to allow medical providers to be reimbursed for providing care such as FVT or to enhance Medicaid fees to dentists for services such as FVT and sealants.

Two of the programs targeted Native populations. Wisconsin changed its Medicaid policy to allow medical care providers to be reimbursed for FVT, which led to some positive outcomes for Native Americans. In addition, the Alaska Native Tribal Health Consortium collaborated with tribal health organizations to provide dental health aides to rural villages. This program was multigenerational, including all people living in the villages. Aides worked under the supervision of dentists at regional offices to perform cleanings, restorations, and uncomplicated extractions.

Sources and evaluation. Most of the findings on oral health care were published in peer-reviewed journals; only one program was found in the grey literature. Each program or policy provided some evidence of effectiveness. Researchers found that dental hygienists and aides successfully provided basic care, and programs increased access and service use, which supports increases in Medicaid reimbursement and the inclusion of primary care providers in preventive oral care. Only one evaluation, of the Access to Baby and Child Dentistry program, showed mixed results regarding service use and health outcomes; however, the number of teeth with initial caries was significantly lower for children in the program compared with Medicaid-enrolled children not in the program.

For evaluations focused on Native populations, researchers found that after the policy change, Native Americans had the highest rate of FVT claims among all ethnicities in the study.

⁴ Dental sealants are plastic coatings applied by dentists or dental aides on the grooves of back teeth (Hiiri et al. 2006). It is well-established that sealants are effective in preventing dental caries in children (Gooch et al. 2009), and recent studies show sealants to also be effective in preventing the progression of existing caries when applied to noncavitated caries in permanent teeth (Griffin et al. 2008).

The study in Alaska showed that aides successfully provided care, increased access, and had high patient satisfaction.

4. Pre- and postnatal care

Background. Prenatal care improves pregnancy outcomes (Stringer 1998), but women in rural areas have a number of barriers to accessing it, including distance to care and lack of providers performing deliveries (Nesbitt et al. 1990). Urban counties average about 35 obstetricians per 1,000 residents, whereas rural counties average fewer than 2 per 1,000 residents (HRSA 2012). Given the low supply of obstetricians, rural women have relied on family practice physicians to perform prenatal services, but the number of family practices providing these services is declining (Cohen and Coco 2009). Women also encounter barriers to delivery because many rural hospitals lack obstetric services. One study showed that 44 percent of nonmetropolitan counties lacked hospital-based obstetric services in 2002, compared with 24 percent in 1985 (Zhao 2007). National organizations, such as the March of Dimes, provide many resources and funding to address maternal and infant health. In addition, models for delivering care, such as CenteringPregnancy (which provides assessment, education, and support in a group setting),⁵ have spread nationwide.

Types of programs. We found seven programs and policies that addressed a mix of population health, medical interventions, and professional access. Most of them targeted pregnant or parenting women, often providing services such as prenatal and parenting education, along with links to community resources. Home visits were a common method of delivering these services. One clinic-based intervention involved the creation of high-risk obstetrics telemedicine clinics that employed nurse practitioners in local clinics and remote perinatologists to provide care. Other programs targeted women's health care and social services providers. One program trained health and social services providers in Appalachia to use prenatal smoking cessation resources (specifically, the American Congress of Obstetricians and Gynecologists' 5As smoking cessation intervention) and to encourage other lifestyle choices that promote prenatal health. In addition, Oregon implemented a policy to address the declining numbers of maternity care providers: the state legislature created a public subsidy to help pay the malpractice liability premiums of rural physicians, with higher subsidies for obstetrician-gynecologists and other physicians who deliver babies.

Two of the studies noted barriers to implementing the programs. The Mothers and Infants Sober Together program in select Appalachian counties in Tennessee, which sought to improve quality of life and daily functioning for mothers with substance abuse problems and their drug-exposed infants, had trouble finding funding to sustain the program as well as difficulty finding available and willing resources to detox pregnant women. A program in a high-poverty county in Arkansas found that education programs need to be culturally appropriate; for example, some participants were unable to read the educational materials, so the program began providing educational videos in addition to written materials.

Sources and evaluation. Overall, researchers conducting these studies in the peer-reviewed articles (four programs) and grey literature (three programs) found mainly positive impacts, but

⁵ <http://centeringhealthcare.org/pages/centering-model/pregnancy-overview.php>.

there were some mixed and null results as well. The telemedicine clinic study showed increased access, but similar measured outcomes as a comparison group. The evaluation of the in-home nursing case management program showed improved outcomes in terms of birth weight and gestational length. However, there were mixed results for behavior changes and changes in knowledge among the programs. Researchers found the smoking cessation program improved provider knowledge of smoking cessation and found evidence that non-health-care providers can extend service resources for prenatal smoking cessation. The researchers studying the Oregon subsidy found that, although the cost of liability insurance was a major reason providers stopped performing deliveries, the program did not appear to encourage rural providers to continue delivery services.

5. Respiratory health

Background. Asthma is one of the most common chronic conditions during childhood (Van Cleave et al. 2010), affecting about 6.1 million children (8.3 percent) in the United States in 2013 (National Center for Health Statistics 2014). In 2010, over 136,000 children were hospitalized due to asthma (Centers for Disease Control and Prevention [CDC], 2010), and asthma is responsible for 10.5 million missed school days each year (Moorman et al. 2012). Clinical and lung function outcomes in the adult lives of children with asthma is strongly determined by the severity of asthma in childhood (Tai et al. 2014). Substantial long-term impacts of childhood asthma range from reductions in health status, more obesity, and increases in absenteeism in early adulthood by as much as 40 to 50 percent (Fletcher et al. 2010).

CDC created a National Asthma Control program in 1999 to help reduce the negative impacts of asthma, such as the number of deaths and hospitalizations, school days missed, and activities limited due to asthma. The program funds states, cities, and schools to help them improve their awareness and surveillance of asthma, while also training health professionals and educating those suffering from asthma and the broader public.⁶ In addition, the National Asthma Education and Prevention program provides evidence-based clinical guidelines for managing and treating asthma.⁷

Types of programs. All of the respiratory health programs found in the environmental scan were asthma-related and were set in schools or the community. We found very little in the literature regarding respiratory health specifically with rural children. Two interventions were developed under state-level programs that were part of CDC's National Asthma Control Program. Most of the programs involved some form of education for parents, caregivers, and children about topics such as asthma triggers, medications, and self-management; one also included interactive education about the use of peak flow meters and metered-dose inhalers. Two of these programs were home-based interventions that also included assessment and abatement of asthma triggers in the home. In another program conducted at schools, researchers used written questionnaires and spirometry to identify children as being at risk for having asthma or having their asthma out of control; they then referred the children to their primary care provider for follow-up.

⁶ <http://www.cdc.gov/asthma/nacp.htm>.

⁷ https://www.nhlbi.nih.gov/about/org/naepp/naep_pd.

Sources and evaluation. We found two programs each in the peer-reviewed literature and grey literature. Evaluators of these four programs provided evidence of their success. Studies showed the two home-based interventions decreased asthma symptoms, medication use, emergency department use, and missed school days, while increasing knowledge and self-efficacy. Furthermore, researchers noted the education intervention improved parent and child knowledge, increased child self-efficacy, and decreased symptoms, but there were no significant differences in parent self-efficacy or in parent or child quality of life. Researchers also found that written asthma screenings and spirometry can be used effectively by school personnel, such as nurses, to determine whether children have asthma and to identify children to refer to follow-up care. Education can be provided via multiple modes to have positive effects on children's asthma management and outcomes.

D. Conclusions

Our environmental scan focused on rural programs and policies that involved population health, public health, and medical interventions or problems of professional access. We found programs in most areas of the United States, except in the Northeast, and in a variety of settings, including schools and child care facilities, homes, communities, and physician practices. Overall, evaluations showed that many were effective in increasing access and improving health outcomes for rural children. We found telehealth programs for a few of the health topics, which also had promising outcomes in terms of improving access and health.

Programs to address childhood obesity tackle the issue in multiple ways. They may provide education for children or their parents regarding nutrition or physical activity. Communities, schools, or child care facilities may encourage healthy eating and more physical activity through education and supportive environments by, for example, instituting policies to support these activities, serving nutritious food, and providing safe places in the built environment for activity.

Access to behavioral health services is challenging for children in rural areas. Telehealth can extend services into these areas. School-based health centers and primary care offices can also integrate behavioral health providers into their practices, providing additional points of access to these services.

Oral health in rural children can be improved by increasing access to preventive treatments. This can be achieved by changing Medicaid reimbursement policies to increase the number of providers—for example, paying higher fees to dentists and allowing primary care practices to provide basic preventive care, such as FVT and parent counseling about oral hygiene in children. In addition, medical treatments such as FVT and dental sealants can be recommended to caregivers and providers and supported by dental benefit policies.

Pre- and postnatal care can improve the health of pregnant and postpartum women and their children. Access to care, education for women about topics such as prenatal care and parenting skills, and support for smoking cessation are all important ways to address this topic. Home-visiting programs and telemedicine are two potentially promising methods of providing access to care, education, and counseling.

There is also evidence to support the use of school- and home-based programs to address asthma in rural children. School nurses can identify and refer children for follow-up care with

their primary care providers, who can diagnose and treat asthma or assist with out-of-control cases of asthma. Home-based programs for children with asthma can educate them and their caregivers about asthma triggers and self-management, and can assess and mitigate asthma triggers in the child's home.

There are a few gaps in the literature. One was a lack of programs and policies that link health services and human services. Because our search focused on health, we may not have found the programs focused on human services. While we included SocINDEX in the current environmental scan, future searches may wish to include other human-service focused databases (such as Campbell Collaboration, Applied Social Sciences Index and Abstracts, Family & Society Studies, Social Service Abstracts, Social Science Research Network, and Sociological Abstracts) to fully cover potential social services-based programs. In addition, because our search strategy was geared toward programs that had already been evaluated, this might have yielded a plethora of narrow, more targeted programs, which are easier to evaluate. Broader, bundled programs may exist that did not show up in our results. Furthermore, publication bias—especially the difficulty of publishing null findings (Franco et al. 2014)—may mean there are programs and policies that do not appear in the literature because they were found to be ineffective.

The policies and programs in the appendix may not be generalizable to the larger rural pediatric population. Generalizability is noted as a limitation to many of the evaluations we cite. More broadly, generalizability tends to be a limitation in most evaluations as they focus on a particular population in a particular area at a particular time.

E. Recommendations

Below are three recommendations that could be explored in future research or could be used in programs to address the health disparities of rural children living in poverty. We also mention several federal programs and other opportunities that could be harnessed for these efforts.

1. Use novel approaches to improve access to quality health care.

- The success of telehealth programs provides support for pursuing and expanding these types of service delivery. For example, based on the results of the behavioral health environmental scan, Medicaid and IHS might be willing to pay for or provide telehealth services, particularly for behavioral health, to enable underserved populations to access services remotely.
- Existing health care delivery systems can also be used in novel ways to provide care. For example, allowing primary care providers to receive Medicaid reimbursement for preventive treatments such as FVT could provide access to preventive dental care and improve children's oral health.

2. Use multiple programs, or multicomponent programs, to address various factors that contribute to disparities.

- Considering the many levels and complex causes of childhood obesity, a wide variety of programs and policies could target this issue. It could also be addressed through many federal levers, such as the Special Supplemental Nutrition Program for Women, Infants,

and Children; the Centers for Disease Control and Prevention; the Supplemental Nutrition Assistance Program; and the National School Lunch Program.

3. Use multiple settings to promote comprehensive lifestyle and environmental changes.

- Many successful programs targeted schools, child care facilities, communities, or children's homes. For example, health and education programs successfully used home visits to deliver pre- and postnatal and asthma services. One vehicle through which home-based programs could be pursued is the Maternal, Infant, and Early Childhood Home Visiting program.

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APPENDIX A

MATRICES OF INTERVENTIONS, POLICIES, AND PROGRAMS

Table 1. Matrix of interventions, policies, and programs addressing overweight-obesity disparities in rural children

	Name of intervention, policy, or program	Brief description of intervention, policy, or program	Research questions addressed	Findings or results	Type of evidence of the effectiveness of the interventions
Program 1	Telemedicine Weight Management Clinic	Rural health clinics in California used telemedicine to address childhood obesity. Using standard practice guidelines, participating physicians provided telemedicine consultations that included interdisciplinary evaluations by a registered dietician and a general pediatrician trained in pediatric weight management.	Is telemedicine a feasible strategy to increase access to medical care and address pediatric obesity in a rural setting? Can it promote lifestyle changes to encourage maintenance of healthy weight?	Fewer telemedicine than face-to-face (FTF) patients received a change in diagnosis or diagnostic criteria. However, a comparison of those telemedicine and FTF patients who completed more than one visit showed that the telemedicine patients improved nutrition, activity level, and screen time substantially more than the FTF patients. Furthermore, 69% of telemedicine patients versus 44% of FTF patients had a successful weight outcome (as measured by weight loss, weight maintenance, or slowing of weight gain). The authors concluded that telemedicine is a feasible approach to providing access to medical care for childhood obesity in rural areas, and it can promote lifestyle changes for healthy weight.	Design: Pre/post with comparison group. Comparison group: Equivalent comparison sample of FTF patients from the study period. Data: Medical record data abstracted for all children seen in the telemedicine clinic during the study period (n=121) and comparison group (n=122), and qualitative patient reports. Measures: Comparison of outcomes of a telemedicine weight management clinic with a FTF clinic: (1) Management of clinicians as measured by changes/additions to patient diagnosis, changes/additions to diagnostic evaluation through laboratory or imaging, and changes/additions to treatment such as dietary counseling, activity recommendations, or medications. (2) Patient outcomes for those with more than one consultation, including qualitative, patient-reported improvement in diet, increase in activity, or decrease in screen time, or quantitative, physician-reported weight status. Statistical test used: Only descriptive, unadjusted frequencies are reported. Limitations: Most clinical care was provided by two physicians, including one who only provided FTF care. The telemedicine and FTF groups were significantly different on multiple measures such as race and number of consultations, and the telemedicine patients were mostly rural and the FTF patients were more urban.
Program 2	TeleFIT	Brenner Families in Training (FIT) is a multidisciplinary, tertiary-care pediatric obesity clinic that uses a pediatrician, dietician, family counselor, physical therapist, exercise physiologist, and social worker to provide care. TeleFIT was created as a telemedicine version of the program. Telemonitors were placed in four rural satellite pediatric clinics of Brenner Children's Hospital to provide better access for rural families to Brenner's FIT program. An in-person intake visit is conducted at the hospital, and follow-up visits occur every two to four weeks at the TeleFIT site closest to the patient's home. Visits follow the Brenner FIT model. After each four-month treatment phase, the patient returns to the hospital clinic for a medical review visit with a pediatrician.	What is the impact of TeleFIT on (1) the reach of the hospital's FIT program, (2) treatment attrition, and (3) improvement in weight status?	According to preliminary results, more families from rural counties participated in the FIT program following the implementation of TeleFIT than those participating in Brenner FIT prior to implementation of TeleFIT, and attrition rates for rural patients decreased. There were no significant differences in outcomes between the groups, and nearly equal proportions of TeleFIT and Brenner FIT groups improved their weight status. The authors concluded that telemedicine can be used to increase the reach of pediatric obesity clinics in rural areas.	Design: Retrospective pre/post. Comparison group: None. Data: Clinical data from patient visits, including outcomes and patient progress, were collected in a prospective, clinical database. All patients with a visit between November 2007 and January 2011 were included in the study. Measures: Compare patient enrollment from rural areas and outcomes before and after the program implementation: (1) Patient enrollment from rural areas, defined as more than 60 miles from the main clinic in a low-population density area. (2) Outcomes of attrition from treatment and improvement in BMI. Statistical test used: Chi-square test, Fisher's exact test, t-test. Limitations: Small sample population (TeleFIT n=35, used for post group; Brenner FIT n=259, used for pre group), and limited generalizability to other treatment centers.
Program 3	Start Healthy, Start Now	With the broad goal of reducing childhood obesity, child care providers received free health promotion and child development training, technical assistance, and educational resources to improve the nutrition, physical activity, emotional well-being, and mental health of the children in their care. Specific training included an adaptation of the 5-2-1-0 Let's Go! program. (5-2-1-0 Let's Go! encourages, per day, a diet of five fruits and vegetables, two hours of recreational screen time or less, at least one hour of physical activity, and zero sugary drinks. The adaptation of this program included at least eight hours of sleep.) The program also included training on trauma-informed care, the impact of trauma on emotion and behavior, education to provide healthier meals at the facility, and a physical activity program (Let's Move!).	How effective was the program in meeting the target outcomes? What areas could be improved?	Participants had increased knowledge to promote healthy behavior, to prepare and purchase healthy food with budget constraints, and to understand the effects of trauma and work with children and families affected by trauma. The majority of child care centers had policies (formal or informal) that included the recommendations from the healthy behaviors trainings. Centers reported changes in food choices and preparation. Although there were no statistically significant changes in the physical activity realm, interview data indicate that some centers met the goal of increasing physical activity. The trauma-informed care trainings succeeded in increasing the number of facilities implementing trauma-informed practices.	Design: Pre/post. Comparison group: None. Data: Following trainings, staff who participated were surveyed. In addition, each participating center completed a pre- and post-test evaluation form about policies and practices about nutrition, physical activity, and the feeding environment. Centers that participated in two or three components were also interviewed about overall program length, the impact on staff and children, and barriers to and facilitators of sustainability. Measures: Participant knowledge, facility policies and practices. Statistical test used: Mainly descriptive analysis; analyses that reported statistical significance used t-tests. Limitations: A low response rate for the physical activity survey portion, program staff turnover, and inconsistent survey implementation leading to a small number of center pre- and post-tests, a small number of interviews, several areas of implementation and impact that were not evaluated, and reliance on self-reporting.
Program 4	Poplar Bluff Skate Plaza	A rural community of about 17,000 residents created a skate park and downtown plaza to provide a place for skaters to get physical activity and for others to gather.	N/A	About 15 to 25 children use the park during nonschool hours when the weather is nice. A few skating competitions or exhibitions have been held. There have been fewer complaints from the business community about skaters in dangerous or nondesignated spaces.	Details not available.

Table 1. Matrix of interventions, policies, and programs addressing overweight-obesity disparities in rural children

	Name of intervention, policy, or program	Brief description of intervention, policy, or program	Research questions addressed	Findings or results	Type of evidence of the effectiveness of the interventions
Program 5	Steps to a Healthier Yuma County's Nutrition and Physical Activity Self-Assessment for Child Care (NAP SACC)	This pilot intervention implemented best practices in nutrition and physical activity in child care and preschool settings, with the goal of preventing childhood obesity and diabetes. The program helped child care providers make changes to organizational practices and policies and the environment to improve nutrition and physical activity behaviors in children under their care. The program has five components: (1) self-assessment of nutrition and physical activity best practices with child care directors and staff, (2) development of action plans, (3) staff educational workshops regarding healthy eating and physical activity for preschoolers and self-care for caregivers, (4) technical assistance, and (5) ongoing evaluation and revision. This pilot intervention is part of a broader Steps to a Healthier Yuma County, which is part of an even broader Steps to a Healthier Arizona. The broader "Steps" programs are conducting additional activities in Yuma County and across the state; the program described here is limited to the NAP SACC pilot intervention.	What effect did the NAP SACC program have on child care providers' policies, practices, and environment?	The median total number of best practices implemented, the median number of nutrition best practices, and the median number of physical activity best practices all increased with statistical significance. Qualitative data indicate that improvements in the nutrition environment were related to menus and variety, meals and snacks, and foods offered at other times. There was visible support for physical activity, as indicated by positive statements about activity and posters, pictures, and books in the facility. An increased number of centers had indoor play space and portable play equipment. Self-care education for staff had a psychosocial impact on staff, with reports of staff changes in their own activity or nutrition behaviors. Staff noted that parents increased their involvement with their children's physical activities.	Design: Pre/post. Comparison group: None. Data: The analysis was based on pre- and post-test self-assessment questionnaires regarding best practices, action plan reviews, and testimonials and feedback from the program coordinator and participants. Measures: Numbers of best practices implemented; various qualitative measures (see findings). Statistical test used: The analyses of numbers of best practices implemented used Wilcoxon sign-rank test with Bonferroni-adjusted alpha level. Other analyses were descriptive. Limitations: Although all centers completed the assessments, due to changes in the tool, only 17 centers used the same revised tool at both time periods and were included in the analysis.
Program 6	Interactive family-based program for Appalachian low-income food preparers	A community-based wellness program was implemented to increase the variety of vegetables offered at evening meals. The intervention included eight weekly two-hour sessions that promoted vegetable consumption, particularly of deep orange, cruciferous, mild dark leafy, and savory dark leafy vegetables. During sessions, participants prepared provided recipes and took them home for their families to taste and evaluate. Reactions were recorded in meal diaries and were discussed at subsequent sessions. Participants received cooking trainings on topics such as knife skills and received packets in the mail containing lesson handouts, recipes, and a meal diary.	The qualitative data in this report address three research questions: (1) how do family functioning, personal characteristics, and food systems affect baseline choices about vegetables; (2) how did the intervention affect the number and variety of vegetables served; and (3) what family factors were critical to changing the vegetables served and eaten?	The food preparers' scores on their readiness to eat more vegetables, their self-efficacy to prepare and select vegetables, and their intake of target vegetables were not significantly different between intervention and control groups post-intervention. Intake of target vegetables increased by about one cup per week for both groups. The intervention decreased access and affordability barriers, improved skills and confidence in vegetable use, and increased vegetable preferences; however, other barriers to change were powerful, including role expectations and husband's and children's preferences of food choices.	Design: Randomized controlled intervention. Comparison group: Control group members received lesson handouts, recipes, and meal diaries via mail. Data: Measured impact using quantitative data (intervention n=25 families, control n=25) collected once before and twice after the intervention, and qualitative data collected via interviews with a subset of participants and their partners before and after intervention (n=20 couples). Measures: Readiness-to-eat more vegetables, self-efficacy, and intake of target vegetables; access and affordability, skills and confidence in vegetable use, vegetable preferences; barriers to change. Statistical test used: Quantitative data were analyzed using a linear mixed model for repeated measures. (Qualitative analysis was conducted using a coding scheme to create thematic summaries.) Limitations: Dinner patterns may not be generalizable to a larger population, unexpected high prevalence of picky eaters in families, control families knew about the intervention characteristics from informed consent and did not receive a per diem to purchase vegetables, the same researcher conducted the intervention and interviews (however, the co-researcher found families to be frank), and the sample did not include many male food preparers.
Program 7	Integrated Nutrition and Physical Activity Program (INPAP)	An urban-based school nutrition program was adapted for a rural school and expanded to include a physical activity component. This school intervention is one of three components in a larger program that aims to promote healthy lifestyles; the other components are directed at the community and family levels. The program was designed to improve student attitudes, knowledge, and self-efficacy related to eating fruits and vegetables, eating lower-fat foods, and being physically active. Lessons integrated other academic areas; for example, physical activity lessons focused on body parts used in activity to fit the science curriculum, and lessons on following recipes used reading and math skills.	Can the curriculum be adapted to the rural environment and expanded to include a physical activity component? Is the intervention effective in affecting student attitudes, knowledge, and self-efficacy? What are teachers' impressions of the intervention?	The intervention was successfully adapted to the rural setting. Children receiving the intervention significantly increased their knowledge, attitudes, and self-efficacy about nutrition. However, although there were school year gains in positive attitudes and self-efficacy for physical activity, there were no significant differences at the end of the program between children included and not included in the intervention. Classroom teachers reported that students enjoyed the lessons, were engaged, and often tried the foods prepared during lessons. Lessons frequently addressed science, literacy, and reading standards. The authors reported that the physical activity component needs to be further refined.	Design: Pre/post with comparison group. Comparison group: Classroom teachers who did not receive the intervention. Data: Pre- and post-test surveys were conducted with three cohorts (173 students taught by a resource teacher, 170 by classroom teachers, and 187 who did not receive the intervention). In addition, classroom teachers were observed and interviewed about the program. Measures: Children's knowledge, attitudes, and self-efficacy about nutrition and physical activity. Teachers' experience with the intervention through multiple measures (see findings). Statistical test used: Wilcoxon rank sum test and general linear modeling. Limitations: None specified.

Table 1. Matrix of interventions, policies, and programs addressing overweight-obesity disparities in rural children

	Name of intervention, policy, or program	Brief description of intervention, policy, or program	Research questions addressed	Findings or results	Type of evidence of the effectiveness of the interventions
Program 8	Obesity Care Model	An Obesity Care Model was implemented at a federally qualified community health center in Hawaii, with the goal of reducing the prevalence of obesity and obesity-related morbidity. The intervention included a quality improvement project targeted to pediatric primary care, designed to make integrated changes to clinical workflow, patient education, and the electronic health record (EHR). Project data were shared with clinicians and administrators and community leaders to inform clinic and community-based strategies to reduce obesity. Registered dietitians and a pediatric clinical psychologist were integrated into the clinic flow. The clinic implemented a healthy child weight policy that required providers at each well visit to assess body mass index (BMI), have the parent or child complete a wellness survey, and provide counseling on child nutrition and physical activity.	How was the Obesity Care Model implemented, and what were the successes and barriers? What outcomes have occurred as a result of the program?	Pediatric services were fully integrated to include nutrition counseling and behavioral health care services. BMI was assessed at all well visits, and counseling about appropriate growth, BMI, nutrition, and physical activity is regularly conducted and documented.	<p>Design: Cross-sectional evaluation.</p> <p>Comparison group: None.</p> <p>Data: BMI and other demographic data from the EHR were collected for over 2,000 children ages 2 to 18 seen at the clinic for well visits. Providers and staff were interviewed about the barriers and successes during implementation.</p> <p>Measures: Integration of pediatric services, barriers, and successes (qualitative); documentation of BMI assessment, counseling, and physical activity.</p> <p>Statistical test used: Descriptive.</p> <p>Limitations: Potentially limited generalizability.</p>

Table 1. Matrix of interventions, policies, and programs addressing overweight-obesity disparities in rural children

	Geographic area	Target population	Implementation date	End date	Source of reference	Lead organizations	Partner organizations	Funding sources	Citation for source document
Program 1	Select rural clinics in California	Children receiving care at rural health clinics in California	Study began June 2006	Study ended June 2011	Peer-reviewed journal brief	University of California Davis Medical Center	Department of Pediatrics, University of California Irvine-Children's Hospital of Orange County; Department of Pediatrics, University of California Davis Medical Center; Department of Family Medicine, Glendale Adventist Medical Center, Department of Public Health Sciences, University of California Davis	Not specified	Lipana, L.S., Bindal, D., Nettiksimmons, J., and Shaikh, U. "Telemedicine and Face-to-Face Care for Pediatric Obesity." <i>Telemedicine and e-Health</i> , vol. 19, no. 10, 2013, pp. 806-808.
Program 2	Four pediatric offices in northwest North Carolina	Obese children ages 2 to 18 with a diagnosis of one or more obesity-related comorbidities	November 2007 (technology was placed in January 2009)	January 2011	Peer-reviewed journal brief	Wake Forest University School of Medicine and Brenner FIT Program at Brenner Children's Hospital, Wake Forest Baptist Medical Center	Department of Epidemiology and Prevention, Division of Public Health Sciences, Wake Forest University School of Medicine	National Institute of Child Health and Human Development Mentored Patient-Oriented Research Career Development Award; Duke Endowment; Kate B. Reynolds Charitable Trust Grant; and the Northwest Area Health Education Center	Irby, M.B., K.A. Boles, C. Jordan, and J.A. Skelton. "TeleFIT: Adapting a Multidisciplinary, Tertiary-Care Pediatric Obesity Clinic to Rural Populations." <i>Telemedicine and e-Health</i> , vol. 18, no. 3, 2012, pp. 247-249.
Program 3	Six rural eastern Washington counties	Child care providers and early childhood educators in target counties, and the children (and their families) cared for by these providers; the project is estimated to have reached more than 157 centers in 39 cities, caring for over 5,700 children	September 2012	December 2014	Grey literature	Inland Northwest Health Services	Washington State University Area Health Education Center, Spokane Regional Health District, and Community Minded Enterprises	Centers for Disease Control and Prevention through a Community Transformation Grant	Program summary: Rural Assistance Center. "Start Healthy, Start Now." Available at https://www.raonline.org/success/project-examples/751 . Accessed July 30, 2015. Evaluation report: Spokane Regional Health District. "Start Healthy. Start Now.: Project Evaluation Report." Available at https://srhd.org/documents/PublicHealthData/SHSN-small.pdf . Accessed August 11, 2015.
Program 4	Poplar Bluff, Missouri	Skateboarders in the community; community members who use the plaza and green space for other activities	September 2012	Ongoing	Grey literature	Parks and Recreation Department of Poplar Bluff, Missouri	N/A	Missouri Foundation for Health via a Healthy and Active Communities grant; Poplar Bluff Parks and Recreation Department; private donations	Rural Assistance Center. "Poplar Bluff Skate Plaza." Available at https://www.raonline.org/success/project-examples/716 . Accessed July 30, 2015.

Table 1. Matrix of interventions, policies, and programs addressing overweight-obesity disparities in rural children

	Geographic area	Target population	Implementation date	End date	Source of reference	Lead organizations	Partner organizations	Funding sources	Citation for source document
Program 5	Yuma County, Arizona, a culturally diverse, rural community along the U.S.-Mexican border	Child care providers and early childhood educators in participating facilities, and the children in their care; the project reached 30 child care centers in six communities, more than 337 staff, and 1,876 children	2005	2008	Peer-reviewed journal article	Yuma County Public Health Services District	N/A	This program was piloted under the broader "Steps" program's cooperative agreement with the Centers for Disease Control and Prevention	Drummond, R.L., L.K. Staten, M. Reyes Sanford, C.L. Davidson, M.M. Ciocazan, K. Khor, F. Kaplan. "A Pebble in the Pond: The Ripple Effect of an Obesity Prevention Intervention Targeting the Child Care Environment." Health Promotion Practice, Supplement, vol. 10, no. 2, 2009, pp. 156S-167S.
Program 6	An Appalachian community	Food preparers and their families. To participate in the program or control group, couples must have had at least one child ages 7 to 25 living in the home; a household income no more than \$50,000; and the food preparer's BMI must be above 25.	Not specified	Not specified	Peer-reviewed journal article	The Pennsylvania State University, Department of Food Science	N/A	Internal Pennsylvania State University funds: College of Agricultural Sciences seed grant, Children Youth and Families Level II grant, and Outreach Health Innovation grant	Brown, J.L., and T.R. Wenrich. "Intra-Family Role Expectations and Reluctance to Change Identified as Key Barriers to Expanding Vegetable Consumption Patterns During Interactive Family-Based Program for Appalachian Low-Income Food Preparers." Journal of the Academy of Nutrition and Dietetics, vol. 112, no. 8, 2012, pp. 1188-1200.
Program 7	A rural, bi-ethnic, low-income county in south-central Colorado	Teachers and students in the participating elementary school, which serves 2nd- and 3rd-grade students (about 320 students)	Fall 2000	Spring 2002	Peer-reviewed journal article	Rocky Mountain Prevention Research Center, University of Colorado Denver Health Sciences Center	N/A	Centers for Disease Control and Prevention cooperative agreement and USDA Food Stamp and Nutrition Program	Belansky, E.S., C. Romaniello, C. Morin, T. Uyeki, R.L. Sawyer, S. Scarbro, G.W. Auld, L. Crane, K. Reynolds, R.F. Hamman, and J.A. Marshall. "Adapting and Implementing a Long-Term Nutrition and Physical Activity Curriculum to a Rural, Low-Income, Bi-ethnic Community." Journal of Nutrition Education and Behavior, vol. 38, no. 2, 2006, pp. 106-113.

Table 1. Matrix of interventions, policies, and programs addressing overweight-obesity disparities in rural children

	Geographic area	Target population	Implementation date	End date	Source of reference	Lead organizations	Partner organizations	Funding sources	Citation for source document
Program 8	Rural communities in Hawaii served by a rural community health center with five satellite offices.	Providers and patients at the Waianae Coast Comprehensive Health Center	Research period began September 2010	Research period ended August 2011	Peer-reviewed journal article	Waianae Coast Comprehensive Health Center	Department of Pediatrics, University of Hawaii's John A. Burns School of Medicine; Kaiser Permanente Hawaii; Waimanalo Health Center	Kaiser Permanente; National Institutes of Health, National Institute on Minority Health and Health Disparities grant	Okhiro, M., M. Pillen, C. Ancog, C. Inda, and V. Sehgal. "Implementing the Obesity Care Model at a Community Health Center in Hawaii to Address Childhood Obesity." <i>Journal of Health Care for the Poor and Underserved</i> , vol. 24, no. 2, 2013, Supplement, pp. 1-11.

Table 2. Matrix of interventions, policies, and programs addressing behavioral health disparities in rural children

	Name of intervention, policy, or program	Brief description of intervention, policy, or program	Research questions addressed	Findings or results	Type of evidence of the effectiveness of the interventions
Program 1	Research study: School-Based Health Centers (SBHCs)	<p>Study 1: Four rural and urban school districts in Northern Kentucky and Southwest Ohio, respectively, began implementing SBHCs beginning in the 2000-2001 school year. Each SBHC was open Monday through Friday and operated for the duration of the school year. Five of the SBHCs served only kindergarten through 8th grade, whereas three also served high school students. All SBHCs were linked to a health provider, and SBHC staff included at least one on-site nurse practitioner and a collaborating physician who may or may not have been on site for any time. Six of the eight SBHCs employed a social worker/counselor on site at least part time for mental health services.</p> <p>All SBHCs provided episodic care and well-child checks, but sites varied in their provision of other services, such as preventive services, dental services, chronic condition counseling, and behavioral and mental health assessments.</p> <p>Study 2: The outcomes study compared changes in student mental health service use during three years in four school districts (seven schools in total) with newly implemented SBHCs versus two other school districts (six schools in total) matched on urban/rural status, percentage of nonwhite students, and percentage of students in the free or reduced-price lunch program (from 37% to 88%, mean 63.5%). The two comparison school districts did not have an SBHC program during the study period. This study collected information on pediatric psychosocial health-related quality of life (HRQOL) and SBHC encounters.</p>	<p>Study 1: This study examined, among other questions, whether SBHCs can improve access to services and address barriers for children in rural communities?</p> <p>Study 2: Does the presence of SBHCs increase the use of primary mental health care and decrease the need for overall hospitalizations and ER visits?</p>	<p>Study 1: The study showed that, compared with their urban counterparts, rural students had lower overall rates of enrollment in the SBHCs. But if they used the SBHC, their rate of service use was higher than urban students. The findings suggest that usage in rural communities may depend less on insurance status than on an overall lack of access to health care services in their communities. Rural students had a significantly greater percentage of visits for acute illnesses and mental health issues compared with urban students. The authors suggest that SBHCs may compensate for reduced availability of health services in local rural communities. As only 27% of all SBHCs serve rural populations, the researchers argue that expanding their use in rural districts may provide a policy solution for providing increased access to health services in rural, medically underserved communities.</p> <p>Study 2: After the SBHCs opened in September 2000, the proportion of those students who accessed any mental health care services increased 5.6% (p,0.0001) for two urban SBHC schools and increased 5.9% (p,0.0001) for one rural SBHC school. Meanwhile, the proportion of students who accessed any mental health care services increased 2.6% (p 0.1023) for one urban non-SBHC school and increased 0.2% (p 0.9361) for one rural non-SBHC school.</p>	<p><u>Study 1</u> Design: Cross-sectional analysis. Comparison group: None. Data: Enrollment data; service use data from a health management database, along with visit diagnosis. Measures: Student enrollment in SBHCs (as a proportion of those eligible), use of SBHCs measured by number of visits. Statistical test used: Odds ratios, poisson distribution, and contingency table analysis. Limitations: Due to a lack of information on previous usage of SBHCs or health care usage outside of the SBHC, the study was unable to determine if overall medical use for students increased or decreased. The absence of a comparison group prevented the study from being able to infer that SBHC changed health care usage by students compared with those without access to an SBHC. There was considerable variation in the structure and staffing at the eight SBHCs examined in this study.</p> <p><u>Study 2</u> Design: Longitudinal, quasi-experimental, repeated measure time-series outcomes and cost study. Comparison group: Two matched districts without SBHCs. Data: The study collected information on pediatric HRQOL (the questionnaire was administered in person by SBHC staff), SBHC visits (via administrative data), and costs (through Medicaid claims of students who accessed mental health services). Measures: The outcomes study examined changes in student health over three years in four school districts that had recently implemented SBHCs compared with two other matched districts without SBHCs. Statistical test used: One-way analysis of variance, chi-square test, repeated measures of analysis of covariance (ANCOVA), linear panel regression. Limitations: The study was limited to K-8 students enrolled in Greater Cincinnati area public schools and Ohio Medicaid, so the study's results are not generalizable to high school or to students in other districts in the U.S. The study also had a small sample size (n=39 students in non-SBHC schools, n=45 in schools with SBHCs who did not use the centers, and n=25 students in schools with SBHCs who did use the centers). In addition, the study was dependent on ICD-9 codes for clinic encounter data, but it is possible that there were misclassifications. The study was unable to assess students with insurance other than Medicaid or students with no insurance. Many HRQOL scores were missing, decreasing the measure's statistical power.</p>
Program 2	Telehealth Service for Treating Children with Attention-Deficit/Hyperactivity Disorder--Children's ADHD Telehealth Treatment Study (CATTS)	<p>CATTS was a community-based randomized control trial that compared the effects of two service delivery systems on outcomes for children with ADHD. Participants randomized into the experimental telehealth service group received six sessions over 22 weeks of (1) combined pharmacotherapy, delivered by child psychiatrists through videoconferencing, and (2) caregiver behavior training, provided in person by community therapists supervised remotely. Study services were completed at community clinics with high-bandwidth videoconferencing connections.</p> <p>Children randomized to the control service delivery received treatment from their primary care provider (PCP), augmented with a telepsychiatry consultation.</p>	<p>Will children who received treatment through a telehealth service model demonstrate better ADHD outcomes than children who received treatment in primary care?</p>	<p>Children in both service models improved. Children assigned to the telehealth service model improved significantly more than children in the augmented primary care arm, based on the Vanderbilt ADHD Rating Scale (VADRS)-Caregivers criteria for inattention, hyperactivity, combined ADHD, ODD, and VADRS-Caregiver role performance and CIS-P impairment. For the VADRS-Teacher diagnostic criteria, children in the telehealth service model had significantly more improvement in hyperactivity and combined ADHD.</p>	<p>Design: Randomized controlled trial. Comparison group: Children who met the eligibility criteria were randomized into program and control groups. Data: Diagnostic criteria for ADHD and oppositional defiant disorder (ODD), role performance on the VADRS as completed by caregivers (VADRS-Caregivers) and teachers (VADRS-Teachers), and impairment on the Columbia Impairment Scale-Parent Version (CIS-P). Measures were completed in five assessments over 25 weeks. Measures: Outcomes included diagnostic criteria for ADHD and ODD and role performance and impairment. Statistical test used: Chi-square tests and t-tests, logistic mixed effects models, and linear mixed effects models. Limitations: The augmentation of primary care treatment with a telepsychiatry consultation may have yielded a smaller group difference than would have been evident if the control had received treatment as usual. The trial may have been biased by referral from PCPs who were willing to use telehealth services and/or the referral of children with more complicated behavioral problems.</p>
Program 3	Changing Lifestyles to Impact Mind and Body (CLIMB)	<p>This pilot study examined the feasibility and potential impacts of a brief, six-session CLIMB program. CLIMB was developed to improve diet, physical activity, and mental health outcomes among adolescents. Program materials were developed for the therapy-based program and provided to clinicians, who were allowed to use them flexibly as indicated by the needs of the clinician, youth, and family. The materials included six content areas that could be integrated and provided during a portion of the therapy session that clients normally received.</p> <p>Clinicians were instructed to deliver the material in one of three session types: youth-only sessions at school, family sessions either at school or over the phone (if families could not attend the session at school), and family sessions in the home. Clinicians provided at least one session at the families' home.</p>	<p>Can a brief, six-session school-based counseling program for adolescents referred to a community mental health center (and their parents) improve family- and adolescent-level variables for physical and mental health?</p>	<p>The CATTS trial demonstrated the effectiveness of a telehealth service model to treat ADHD in communities with limited access to specialty mental health services.</p>	<p>Design: Pre/post. Comparison group: None. Data: Questionnaires administered to the participating adolescents and their parents at baseline and again after the six modules of the program had been completed. The researchers interviewed clinicians for their feedback and to gain insight into the feasibility and acceptability of implementing the program. In addition, the study measured the height and weight of participants, and BMI percentiles were calculated and standardized. Measures: Change in family and youth variables. Statistical test used: Paired sample t-tests of pre- and post-assessment data. Limitations: Small sample size (N=10).</p>
Program 4	Behavioral Health Centers (BHCs) in Rural Primary Care Centers	<p>To improve referral follow-through and appointment attendance in the area in behavioral health, BHCs were placed within primary care offices in rural Nebraska. In each BHC, children and adolescents were referred by a physician, physician's assistant, or nurse practitioner within the primary care clinic for ongoing, integrated behavioral health services with the affiliated BHC provider. The behavioral health specialists were faculty or postdoctoral fellows from the University of Nebraska Medical Center. All behavioral health specialists had training in working with children and in primary care. The BHC was integrated in that patients were referred by their primary care provider to an on-site behavioral health specialist who used clinic space for outpatient services. Collaboration on cases occurred through progress notes, in informal consultations, and in appointment sessions. On some occasions, physicians would introduce the family to the behavioral health specialist at the time of the referral.</p>	<p>Will co-locating collaborative BHCs in rural primary care clinics, and providing referrals to the BHCs from a primary care pediatrician in the same office, improve referral follow-through and attendance at behavioral health appointments?</p>	<p>For the majority (81%) of referrals made by a rural PCP to a behavioral health provider who was integrated into the practice, children and families attended the appointments. The authors claim these results are significantly greater than the rates of attendance for nonintegrated community behavioral services, which have been reported in the literature at 46.8% for urban practices. Among those who scheduled an appointment, only a few (7.5%) failed to keep that visit. This is far less than documented in previous literature. Thus, the authors argue, PCPs in rural settings could expect that if they refer a child for behavioral health services and there is an on-site provider in the practice, the family is highly likely to attend at least the initial visit.</p>	<p>Design: Descriptive. Comparison group: None. Data: Data from referral forms in three clinics with integrated BHCs. Measures: The study's primary variable of interest was whether referred children and their families attended initial appointments with the clinic's integrated behavioral health provider. The study calculated the percentage of patients who scheduled an appointment and the percentage who followed through using administrative data from three clinics. Statistical test used: T-tests, Chi-squared test, and Fisher's exact test. Limitations: It is possible that behavioral health appointment attendance for children is higher in rural areas in comparison to urban areas. In this study, primary care clinic staff contacted families to offer an appointment; this may have led to higher rate of appointment attendance regardless of the model or use of integrated practices.</p>
Program 5	Feasibility report: Child and Adolescent Telepsychiatry Service (CATS) at Indian Health Service (IHS)	<p>IHS's regional mental health clinic in Rapid City, South Dakota, partnered with the University of Colorado School of Medicine's Center for Native American TeleHealth and TeleEducation (CNATT) to provide CATS. In the CATS sessions, which take place twice monthly, patients in the Rapid City IHS clinic are connected via video conference to a CNATT pediatric psychiatrist. CNATT's role is to conduct evaluations and report to IHS mental health staff, who typically see the patients for follow up. The program was created to fill the gap left by the departure of the sole pediatric psychiatrist in IHS's regional clinic in Rapid City, along with the dearth of child and adolescent psychologists in the western South Dakota region.</p>	<p>Can a telepsychiatry consulting service based out of an IHS hospital address the need for child and adolescent psychiatrists among an American Indian population in rural South Dakota?</p>	<p>In the first 12 months of the program's operation, 21 pediatric telepsychiatry evaluations were completed. Patients and clinicians testified that families were receptive to CATS. Telepsychiatry allowed patients to access consultants with specialties in child and adolescent and cross-cultural psychiatry, who may not have been available locally. Diagnostic accuracy did not appear to be compromised. Clinicians in both Rapid City and Denver reported that the technology was easy to use. For child and adolescent psychiatrists in Denver, consultation via telepsychiatry was easily integrated into their week and was much less intrusive in their private lives than traveling to Rapid City would have been.</p>	<p>Design: Feasibility study; did not report research methodology. Comparison group: None. Data: Administrative records. Measures: The study reported the number of appointments completed and referred informally to patient (parent) satisfaction and the satisfaction of referring and participating care providers. Statistical test used: None. Limitations: None specified.</p>

Table 2. Matrix of interventions, policies, and programs addressing behavioral health disparities in rural children

	Name of intervention, policy, or program	Brief description of intervention, policy, or program	Research questions addressed	Findings or results	Type of evidence of the effectiveness of the interventions
Program 6	Feasibility report: Telepsychiatry consultation model for children and adolescents	In Georgia and Alabama, as in much of the United States, pediatric mental health specialists are lacking. Because PCPs often assume the responsibility for rural patients' mental health, this program envisioned using pediatric psychiatrists as medical consultants to PCPs via telehealth services. The Emory Child and Adolescent Mood Program (CAMP) partnered with the Georgia Partnership for Telehealth (GPT) to establish a telepsychiatry consultation practice for children, in which a psychiatrist saw a child via videoconferencing for a limited number of sessions and then provided a treatment plan to that child's PCP and family. The two-session consultation consisted of a psychiatric evaluation session and a recommendation session for patients located in rural Georgia.	Is it feasible to establish a child telepsychiatry consultation practice in rural areas?	It is feasible to establish a child telepsychiatry consultation practice in rural areas. In this study, 15 consultations with children with varying diagnoses were completed. Eleven of the patients' parents completed a satisfaction survey developed by Dr. Kathleen Myers, based on a five-point Likert-style scale, and each of the nine referring PCPs completed a satisfaction survey. The mean parental satisfaction score was 4.58 (SD=0.63) (where 1 represents low satisfaction and 5 represents high satisfaction). The mean PCP score was 5 (SD=0).	Design: Preliminary feasibility study. Comparison group: None. Data: Scores on satisfaction surveys. Measures: Telepsychiatry consultation appointments completed. Statistical test used: Calculation of means and standard deviations. Limitations: None specified.
Program 7	Children's Health Access Regional Telemedicine (CHART): Telepsychiatry for Children and Adolescents	Located in Seattle, Children's Hospital and Regional Medical Center (CHRMC) is a referral site for children living in a vast four-state region (Washington, Alaska, Montana, and Idaho) of the Pacific Northwest. This region covers 20% of the continental United States but contains only 5% of its population. CHRMC provides 5,000 to 6,000 on-site specialty outpatient visits annually at 20 sites within the four states. However, the hospital views the mental health services offered at satellite clinics as lacking. To address this problem, CHRMC initiated CHART, which uses video teleconferencing to connect psychiatrists based in CHRMC to satellite clinics in order to provide consultation and management services to patients. These patients are in four counties across Washington State and are located between 75 to 150 miles from a children's hospital. The U.S. Census Bureau has identified rural census tracts in all four counties. PCPs could refer any patient to the program. There was no screening or triage. There was no specific model of care--three telepsychiatrists provided care consistent with their own on-site practice. All patients were referred back to their PCP at the end of the telepsychiatric consultation or care.	Can telepsychiatry consultation and management services provide needed services to children living 75 to 150 miles away from a regional children's hospital?	Over the study year, 387 telepsychiatry visits were provided to 172 youth ages 2 to 21, with a mean of 2.25 visits per patient. Parents endorsed high satisfaction with their children's telepsychiatric care, with an indication of increasing satisfaction upon return appointments. Parents demonstrated some differential satisfaction, tending to higher satisfaction with their young school-age children's care and lower satisfaction with their adolescents' care. Telepsychiatry offered through a regional children's hospital was well used, and parents were highly satisfied with their children's care.	Design: Cross-sectional survey design. Comparison group: None. Data: A 12-month review of billing records provided service use data. Surveys of parents' satisfaction over 12 months examined whether parents would accept and be satisfied with the care rendered to their children. Telepsychiatry visits were identified from a retrospective review of the hospital clinic scheduling system. Of the 387 psychiatric encounters, 248 surveys were completed, for an overall response rate of 64%. Measures: Differences in parents' satisfaction by overall mean rating, patient age, and visit type. Statistical test used: Differences were analyzed with the Kruskal-Wallis Nonparametric Rank Test and the Mann-Whitney Rank Sum Test. Limitations: None specified.

Table 2. Matrix of interventions, policies, and programs addressing behavioral health disparities in rural children

	Geographic area	Target population	Implementation date	End date	Source of reference	Lead organizations	Partner organizations	Funding sources	Citation for source document
Program 1	Study 1: Northern Kentucky and Southwest Ohio Study 2: Urban and rural school districts in Ohio (Greater Cincinnati area)	Study 1: School children, kindergarten through eighth grade, attending a school served by one of the eight SBHCs examined in this study. 13,046 students met this criteria. Study 2: Adolescents in grades 6-8 who had been referred to a community mental health center for a variety of emotional and behavioral difficulties.	Study 1: 2000 Study 2: 2001	2003 (both studies)	Peer-reviewed journal article (both studies)	Study 1: Departments of Community Health Sciences and Child and Youth Studies, Brock University, St. Catharines, ON, Canada Study 2: College of Pharmacy, University of Cincinnati Academic Health Center, Cincinnati, OH; Institute for the Study of Health, University of Cincinnati, Cincinnati, OH; Departments of Community Health Sciences and Child and Youth Studies, Brock University, St. Catharines, ON, Canada	Study 1: Division of General and Community Pediatrics, Cincinnati Children's Hospital Medical Center, Cincinnati, OH; College of Pharmacy, University of Cincinnati Academic Health Center, Cincinnati, OH; Institute for the Study of Health, University of Cincinnati, Cincinnati, OH; Division of Health Policy and Clinical Effectiveness, Cincinnati Children's Hospital Medical Center, Cincinnati, OH Study 2: N/A	The Health Foundation of Greater Cincinnati, Cincinnati, OH (both studies)	Study 1: Wade, T.J., M.E. Mansour, J.J. Guo, T. Huentelman, K. Line, and K.N. Keller. "Access and Utilization Patterns of School-Based Health Centers at Urban and Rural Elementary and Middle Schools." Public Health Reports, vol. 123, no. 6, 2008, pp. 739-750. Study 2: Guo, J.J., T.J. Wade, and K.N. Keller. "Impact of School-Based Health Centers on Students with Mental Health Problems." Public Health Reports, vol. 123, no. 6, 2008, pp. 768-780.
Program 2	A 40,000-square-mile geographic area that spanned from Western to Central Washington and from North Central Washington to North Central Oregon.	Children ages 5.5 to 12.9 years old who met the diagnostic criteria for ADHD, from seven underserved communities. A sample of 111 children were randomized into the intervention group and 112 into the comparison group.	November 2009	August 2012	Peer-reviewed journal article	University of Washington School of Medicine, Seattle; School of Public Health at the University of Washington; Seattle Children's Research Institute	N/A	National Institute of Mental Health (NIMH) University of Washington Institute of Translational Health Sciences American Academy of Child and Adolescent Psychiatry	Myers, K., A.V. Stoep, C. Zhou, C.A. McCarty, and W. Katon. "Effectiveness of a Telehealth Service Delivery Model for Treating Attention-Deficit/Hyperactivity Disorder: A Community-Based Randomized Controlled Trial." Journal of the American Academy of Child & Adolescent Psychiatry, vol. 54, no. 4, Apr 2015, pp. 263-274.
Program 3	Rural, Southeastern region of the U.S. characterized by low income and high poverty	Adolescents in grades 6 to 8 who had been referred to a community mental health center for a variety of emotional and behavioral difficulties.	Not specified	Not specified	Peer-reviewed journal article	Department of Psychology, University of South Carolina	N/A	National Institutes of Health	George, M.W., N.N. Trumpeter, D.K. Wilson, H.L. McDaniel, B. Schiele, R. Prinz, and M.D. Weist. "Feasibility and Preliminary Outcomes from a Pilot Study of an Integrated Health-Mental Health Promotion Program in School Mental Health Services." Family & Community Health, vol. 37, no. 1, 2014, pp. 19-30.
Program 4	Rural Nebraska	Children and adolescents ages 7 months to 20 years.	January 2002	May 2005	Peer-reviewed journal article	Munroe Meyer Institute, University of Nebraska Medical Center; Department of Psychology, East Tennessee State University	N/A	This research was supported in part by a Graduate Psychology Education Grant, Bureau of Health Professions, Health Resources and Services Administration	Valleley, R., S. Kosse, A. Schemm, N. Foster, J. Polaha, and J. Evans. "Integrated Primary Care for Children in Rural Communities: An Examination of Patient Attendance at Collaborative Behavioral Health Services." Families, Systems, & Health, vol. 25, no. 3, 2007, pp. 323-332.
Program 5	Rural South Dakota	American Indian children and adolescents	October 2003	October 2004	Peer-reviewed journal article	Department of Psychiatry, University of Colorado Health Sciences Center, Denver	Division of American Indian and Alaska Native Programs, Department of Psychiatry, University of Colorado Health Sciences Center; Rapid City Indian Health Service Hospital, Rapid City, SD	National Center for Minority Health and Health Disparities Agency for Healthcare Research and Quality	Savin, D., M. Garry, P. Zuccaro, and D. Novins. "Telepsychiatry for Treating Rural American Indian Youth." Journal of the American Academy of Child & Adolescent Psychiatry, vol. 14, no. 2, 2008, pp. 484-488.

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	Geographic area	Target population	Implementation date	End date	Source of reference	Lead organizations	Partner organizations	Funding sources	Citation for source document
Program 6	Rural Georgia	Children and adolescents ages 4 to 18 living in rural Georgia.	Not specified (after 2005)	Not specified (before 2012)	Peer-reviewed journal article	Emory University School of Medicine	N/A	The Neuroscience Initiative of Emory University The Brock Family Fund The Fuqua Family Fund John Templeton Foundation	Jacob, M., J. Larson, and W. Craighead. "Establishing a Telepsychiatry Consultation Practice in Rural Georgia for Primary Care Physicians: A Feasibility Report." <i>Clinical Pediatrics</i> , vol. 51, no. 11, 2012, pp. 1041-1047.
Program 7	Washington State counties between 75 and 150 miles from Seattle; all counties contained both metropolitan and rural areas.	Children ages 2 to 21 living within the vicinity of clinics in Thurston County, Chelan County, Cowlitz County, and Yakima County (and in the State of Washington)	January 2004	December 2004	Peer-reviewed journal article	CHRMC	Departments of Psychiatry and Pediatrics, University of Washington School of Medicine, Seattle, WA	Not specified	Myers, K.M., J.M. Valentine, and S.M. Melzer. "Child and Adolescent Telepsychiatry: Utilization and Satisfaction." <i>Telemedicine & E-Health</i> , vol. 14, no. 2, 2008, pp. 131-137.

Table 3. Matrix of interventions, policies, and programs addressing oral health disparities in rural children

	Name of intervention, policy, or program	Brief description of intervention, policy, or program	Research questions addressed	Findings or results	Type of evidence of the effectiveness of the interventions
Program 1	Price County (WI) Public Health Department Oral Healthcare Program	Many children and families living in underserved rural communities have difficulty accessing necessary dental services. To address this problem, Price County created a program where dental hygienists work collaboratively through the county's public health department to apply sealants to prevent dental caries, particularly among children. When restorative care is needed, the department refers patients to a federally qualified health clinic (FQHC), a community health center, (CHC), or a private dentist for additional services.	Can dental hygienists working through local area health departments in the rural Midwest effectively apply sealants to avert dental caries in children?	The sealant retention rates ranged from 95% to 98.3% over five years (the Centers for Disease Control and Prevention's [CDC's] standard benchmark is 85%). Dental caries were averted for an estimated 858 children over a three-year period.	Design: Descriptive observational study. Comparison group: None. Data: For sealant retention: reports from visual and tactile examinations and industry-standard screenings surveys; for caries averted: application of CDC algorithm to create estimations. Measures: Number of children given sealants, dental sealant retention rates, and number of restorative referrals. Statistical test used: Descriptive only. Limitations: Sealants only prevent dental caries in buccal and lingual pits and on occlusal surfaces. Outcomes data about averted dental caries from CDC does not include interproximal lesions that develop if children and families have poor oral hygiene, poor dietary habits, or developmental structural tooth defects.
Program 2	Research study: Personal healthcare providers' relationship to dental care	Researchers concerned about the oral health of children have suggested that strengthening the PCP's role in preventive oral health care will improve oral health status and access to care for children. In response, this study examined the relationship between having a personal healthcare provider (PHP) and a child's receipt of dental visits, focusing on whether the PHP relationship attenuates rural-urban disparities in dental care.	Are children with PHPs more likely to receive preventive dental care? Do PHPs ameliorate urban/rural disparities in visits for preventive oral health care?	This study showed that having a PHP can improve access to dental care for children, and it reported many statistically significant associations with having a PHP. For example, having a PHP improves the likelihood a child will have dental visits in a year, although this effect is not as strong for rural as for urban children. Children living in rural areas are slightly less likely than urban children to be without a PHP. Children with a PHP were more likely to have received preventive dental care, and they were less likely to have received no dental care at all during the preceding year (15.2% vs. 16.2%). Rural children were slightly less likely than urban children to have received preventive services, and they were more likely to have had no dental care within the past year. Among children with PHPs, rural children were slightly less likely than urban children to have received preventive care and slightly more likely to not have received any care.	Design: Cross-sectional analysis. Comparison group: None. Data: Data from the 2003 National Survey of Children's Health (NSCH) augmented with county-level ecological data from the 2003 Area Resource File. Measures: The study's independent variables were preventive dental visits and any dental visits. The control variables were demographic variables, special health care needs, health insurance, dental insurance, and status regarding primary care and dental health professional shortage areas (HPSAs). Statistical test used: The study adjusted for covariate effects using multiple logistic regression models. Limitations: The NSCH has a modest (55%) response rate, with the potential for under-representation of children from minority races/ethnicities. The study's outcome variables are based on parental reporting subject to recall bias and relevant subjectivity. The quality of the PHP cannot be determined via the data source. The NSCH's PHP-related question is broad.
Program 3	Research study: Medicaid Reimbursement for Fluoride Varnish Treatment (FVT)	In 2004, Wisconsin Medicaid policy changed to allow medical care providers to be reimbursed for providing FVT for children's teeth, with the goal of improving access to and use of preventive oral health services. This study explored whether the Medicaid change was associated with increases in FVT among children living in rural counties and among Native Americans, among others.	Did Wisconsin's Medicaid policy change (to allow medical care providers to be reimbursed for FVT) lead to increases in Medicaid FVT claims in rural areas—especially among Native Americans?	Before the policy change, residents of rural counties and counties classified as entirely dental HPSA showed the lowest rates of FVT claims (compared with metropolitan and micropolitan counties, and with counties with partial or no dental health professional shortages.) After the policy change, rural counties showed a higher rate of FVT claims among those eligible than both metropolitan and micropolitan counties. Similarly, following the policy change, counties entirely encompassed by dental HPSA reported a higher rate of claims than counties with partial or no shortage areas within their boundaries. In the two years before the program began, the number of FVT claims in rural counties was 17; the following three years saw 5,198 claims in rural counties. The rate of FVT claims per 100 person-years of eligibility of Native Americans increased from 0.31 before the policy change to 7.09 (the highest rate of any ethnicity) afterwards.	Design: Retrospective pre-post design whereby FVT claims were extracted two years before the policy change, as well as for the three years following its initiation. Comparison group: None. Data: Medicaid claims data from 2002 to 2006 from the Electronic Data Systems of Medicaid Evaluation and Decision Support (MEDS) database for Wisconsin. Measures: Rate of FVT claims. Statistical test used: Multivariable poisson regression for the rate of FVT claims at baseline and the effect of the policy change. Limitations: The study examined only Wisconsin Medicaid enrollees; the findings may not be generalized to other states. The study didn't have access to detailed provider information and thus was unable to examine the role that other provider characteristics (such as practice size and location) play in FVT provision. This also meant the study could not adjust for potential clustering with a specific provider; as a result, variances associated with the estimated rates of FVT claims may be underestimated. In addition, the study did not examine a control state that didn't allow medical care providers to bill for FVT, which limits the study's ability to explain the increase in FVT claims observed.
Program 4	Research study: Deregulatory legislation in tandem with public and private investments to increase the capacity of community-based clinics to serve Medicaid/CHIP children	In 2001, Missouri passed legislation expanding rules allowing hygienists to serve Medicaid/CHIP children without the supervision of a dentist. Missouri passed legislation in 2004 to enable certain public health institutions to obtain certification to run a dental practice. In addition, federal investments were made in 2005 to expand oral health care in community-based health centers. Private foundations in Missouri granted funds of over \$5 million in 2006 for community-based dental sealant programs in the state.	Can public initiatives (state deregulation, federal investment) and private initiatives (investments) improve use of dental care services among Missouri's rural Medicaid/CHIP enrollees?	In the post-intervention period, the number of rural Missouri children on Medicaid/CHIP using care increased by 1,689 (1.8%). The number of Medicaid/CHIP enrollees receiving care from community health centers increased by 12,565 (50.4%), while the number of community health centers submitting Medicaid/CHIP claims increased by 25 (28.7%). However, the number of Medicaid/CHIP enrollees receiving care from private dental offices decreased by 10,528 (14.9%). Similarly, the number of private dental offices submitting Medicaid/CHIP claims decreased by 43 (14.9%). There was a net decrease in the overall number of dental providers submitting Medicaid/CHIP claims in the state, as 18 fewer providers submitted claims in the "post" period compared with the "pre" period—a decrease of 4.4%.	Design: Pre/post descriptive analysis with spatial analysis. Comparison group: None. Data: Medicaid/CHIP claims for pediatric dental care submitted in Missouri. The study examined claims submitted for services in 2004-2005 as the "pre" period and those claims submitted for services in 2006-2007 as the "post" period. Measures: Use of oral health services (assessed via Medicaid claims). Statistical test used: None specified. Limitations: This study did not focus on a clear one-point-in-time interruption; policy changes had begun to be implemented and some investments had already been made during the "pre" period. Thus, direct causation due to deregulatory policy changes and clinic expansion cannot be concluded. Medicaid/CHIP claims data sets are meant for administrative rather than research purposes. Detailed data are often missing or incomplete. Collapsing the data into two-year periods resulted in a loss of cases because multiple visits per year or two years could not be captured. As a result, the level of child service use may be underestimated.

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	Name of intervention, policy, or program	Brief description of intervention, policy, or program	Research questions addressed	Findings or results	Type of evidence of the effectiveness of the interventions
Program 5	Alaska Dental Health Aide Initiative	To address the oral health disparities among Alaska Natives living in remote regions, the Alaska Native Tribal Health Consortium began collaborating with tribal health organizations to establish a program for dental health aide therapists in rural villages, modeling the program after one begun in New Zealand in the 1920s.	Can dental health aides work under the general supervision of dentists at regional offices to effectively perform cleanings, restorations, and uncomplicated extractions for Alaska Natives living in rural villages?	Blinded assessments of dental health aides' restorations showed they performed procedures with a low rate of deficiencies and an extremely low rate of complications. Qualitative interviews showed village residents reported a high level of patient satisfaction, appreciated the opportunity to have dental problems addressed more quickly, and felt their access to care had improved.	Design: Descriptive. Comparison group: None. Data: Qualitative interviews with village residents, observations of therapist performance, blinded assessments of restorations by dentists, and dental record audits. Measures: Assessments of restorations: rates of deficiencies and rates of complications; patient satisfaction. Statistical test used: N/A Limitations: None specified.
Program 6	Access to Baby and Child Dentistry (ABCD) Program	The ABCD program provided early intervention by dentists in private practice to prevent and control major dental problems and costs that promised to escalate in the future in the absence of intervention. The program focused on preschool children to reduce the need for emergency treatment common among low-income recipients of dental care. It included coordinated efforts between dental care providers, local government, and the Medicaid dental program. The ABCD program in Stevens County consisted of four components: outreach, training and certification of dental professionals, enhanced dental benefits, and enhanced dental fees. In cooperation with the local dental society, dentists and dental office staff received special training (on child management, preventive education, and use of fluoride varnish and fluoride-releasing glass ionomer fillings) and were certified to receive enhanced payments for dental services under Medicaid. Enrolled children received enhanced benefits, including coverage for three FVTs per year, fluoride-releasing glass ionomer materials used as sealants and fillings in primary teeth, and family preventive oral health instruction once per year. Fees for program-certified dentists who participated were increased to raise the maximum allowable payments to the 75th percentile of all usual and customary fees.	Does the ABCD program increase children's dental service use, and does the program improve the oral health of participants?	Service use: Children in the ABCD program had a higher level of use than Medicaid-enrolled children not in the ABCD program in the first year of the study (34% vs. 24.7%). In the first year, ABCD children had a significantly higher average number of claims for fluoride varnish than Medicaid-enrolled children not in ABCD (0.36 vs. 0.21). During the second year of the study, there was no statistically significant difference in use rates between ABCD and Medicaid-enrolled children not in ABCD. The difference in service use between the two groups was highest in the two months following the outreach activity for the program. Oral health: Clinical examinations of the ABCD children showed significantly fewer teeth with initial caries than Medicaid-enrolled children not in ABCD. There was no significant difference in the number of children who were free of caries between the two groups.	Design: Randomized controlled trial. Comparison group: 438 children were recruited for the study; 216 were assigned to the ABCD program, and 221 were assigned to the control group, which was the standard Medicaid dental program. Data: Two years of Medicaid claims data. Measures: Service use and clinical examinations to compare the oral health of the two groups. Statistical test used: Chi-square tests and one-way analysis of variance (ANOVA). Limitations: The results in this study focus on only one county, and thus the study is of limited generalizability.
Program 7	North Carolina Physician-Based Oral Health Services for Medicaid-Enrolled Children	North Carolina's physician-based services for preventive oral care include an in-person continuing education session on early childhood oral health, approved by the American Medical Association. The services also include a generous reimbursement for oral evaluation, risk assessment, caregiving counseling, and fluoride varnish application. The program reimburses providers for up to six visits for preventive oral health services in primary care medical settings for children during their first three years of life. For the provider to be reimbursed, all services must be delivered in a single visit by trained physicians or physician extenders. During this study, guidelines required at least three months between visits, and medical oral health benefits ended on the child's third birthday.	Study 1: Do preventive oral health services located in medical offices and public health clinics improve access to oral health services for infants and toddlers? Study 2: Did North Carolina's preventive oral care program, which involved dental services provided by medical offices and public health clinics, lead to increases in the provision of oral health services to young Medicaid-enrolled children in North Carolina?	Study 1: Physician-based preventive oral health services have expanded the geographic availability of preventive oral health services. Of the nine counties that lacked a dentist who treated infants and toddlers enrolled in Medicaid, five had physical-based preventive oral health services. Among the 42 counties with 25% or more children living in poverty, 60% of these counties had as many or more practices providing physician-based preventive oral health services than dental practices that cared for the youngest Medicaid enrollees. Three counties remain in North Carolina without physician-based preventive oral health services or dental practices treating young Medicaid enrollees. Regression results showed that greater distance to care was associated with decreased probability of dental visits, but this was not true of physician-based preventative services, perhaps because these services can be provided during well-child or sick-child medical visits. Study 2: The program resulted in substantial increases in oral health services. By the end of the study, nearly 30% of all well-child visits for children younger than age 3 included preventive oral health services. Depending on age, 18 to 39% of children had one or more fluoride applications in 2006 as part of medical visits, while nationally only 2.5% of children under age 4 had fluoride treatments from dentists in 2006. Participation in the program by medical providers was greatest in rural areas of the state where shortages of dentists are most severe. The number of visits to medical offices that included preventive oral health services was greater in more sparsely populated, nonmetropolitan counties than in urban counties.	<u>Study 1</u> Design: Geospatial analysis. Comparison group: None. Data: To test the association between distance from the nearest practice and dental visits, the study combined geographic information with Medicaid claims data. Measures: Geographic distribution of dental and medical clinics providing pediatric oral health services for Medicaid enrollees in order to understand if the program expanded the geographic accessibility of services. Statistical test used: Chi-square, t-tests, regression analysis. Limitations: The practices examined had one or more Medicaid claims for infants and toddlers. The results of a study looking at practices that treat a higher volume of patients may yield different results. The regression analyses in this study make the assumption that children visit the nearest practice and that families use their own vehicle to travel there, but this may not be true for all families in the sample. Children in the sample lived relatively close to practices, which may differ for those in more rural locations where distance may be more of a barrier. The findings report from a nonprobabilistic convenience sample; as a result, they are of limited generalizability. <u>Study 2</u> Design: Descriptive analysis. Comparison group: None. Data: Oral health services provided in medical clinics as part of a dental visit between 2000 and 2006. Measures: Factors associated with a child completing an oral health visit at a medical clinic or a dentist visit. Statistical test used: Regression analysis. Limitations: None specified.

Table 3. Matrix of interventions, policies, and programs addressing oral health disparities in rural children

	Geographic area	Target population	Implementation date	End date	Source of reference	Lead organizations	Partner organizations	Funding sources	Citation for source document
Program 1	Price County, Wisconsin	Prenatal to geriatric patients in Price County, Wisconsin, with a focus on children.	2004	2009	Peer-reviewed journal article	Public Health Department of Price County, Wisconsin	University of Wisconsin-Stevens Point	Not specified.	Olmsted, J.L., N. Rublee, L. Kleber, and E. Zurkawski. "Independent Analysis: Efficacy of Sealants Used in a Public Health Program." <i>Journal of Dental Hygiene</i> , vol. 89, no. 2, 2015, pp. 86-90.
Program 2	National sample, differentiating between urban and rural respondents	Urban and rural children. The sample excluded children who were younger than age 1, had missing data on study variables, or had inconsistent data on county of residence. The final sample included 91,696 children.	Research period began January 2003	Research period ended 2003	Peer-reviewed journal article	University of South Carolina, Columbia, Arnold School of Public Health	N/A	Federal Office of Rural Health Policy, Health Resources and Services Administration (HRSA)	Martin, A.B., J. Probst, J. Wang, and N. Hale. "Effect of Having a Personal Healthcare Provider on Access to Dental Care Among Children." <i>Journal of Public Health Management & Practice</i> , vol. 15, no. 3, 2009, pp. 191-199.
Program 3	Rural counties and dental HPSA areas in Wisconsin	Urban and rural children, ages 1 to 6, who were enrolled in Wisconsin Medicaid were included in this study.	Research period began in 2003	Research period ended in 2006	Peer-reviewed journal article	School of Dentistry, Marquette University, Milwaukee, Wisconsin	Department of Population Health, Medical College of Wisconsin, Milwaukee, Wisconsin	HRSA Maternal and Child Health Bureau Grant	Okunseri, C., A. Szabo, R.I. Garcia, S. Jackson, and N.M. Pajewski. "Provision of Fluoride Varnish Treatment by Medical and Dental Care Providers: Variation by Race/Ethnicity and Levels of Urban Influence." <i>Journal of Public Health Dentistry</i> , vol. 70, no. 3, 2010, pp. 211-219.
Program 4	Missouri, particularly rural areas and dental HPSAs	Rural children and adolescents, ages 3 to 18, enrolled in Missouri Medicaid or CHIP	Research period began in 2004	Research period ended in 2007	Peer-reviewed journal article	School of Dentistry, Marquette University, Milwaukee, Wisconsin	Department of Population Health, Medical College of Wisconsin, Milwaukee, Wisconsin	Not specified.	Squillace, J. "Assessing the Community Clinic Replacement Effect on Private Medicaid Practices in Oral Health Care Within Rural Environments." <i>Journal of Public Health Dentistry</i> , vol. 73, no. 1, 2013, pp. 18-23.

Table 3. Matrix of interventions, policies, and programs addressing oral health disparities in rural children

	Geographic area	Target population	Implementation date	End date	Source of reference	Lead organizations	Partner organizations	Funding sources	Citation for source document
Program 5	Remote Alaska	Alaska Natives (adults and children) living in remote villages	2003	Ongoing	Grey literature	Alaska Native Tribal Health Consortium	Unspecified tribal health organizations	W.K. Kellogg Foundation, Rasmuson Foundation, Bethel Community Services Foundation	Wetterhall, S., J. Bader, B. Burrus, J. Lee, and D. Shugars. "Evaluation of the Dental Health Aide Therapist Workforce Model in Alaska: Final Report." Research Triangle Park, NC: RTI International, October 2010.
Program 6	Rural Stevens County, Washington	Medicaid-enrolled children ages 1 to 4 residing in Stevens County, Washington	February 1997	May 1999	Peer-reviewed journal article	Department of Dental Public Health Services, University of Washington	N/A	This research was supported, in part by grants from the National Institute of Dental and Craniofacial Research, NIH	Kaakko, T., E. Skaret, T. Getz, P. Hujuel, D. Grembowski, C.S. Moore, P. Milgrom. "An ABCD Program to Increase Access to Dental Care for Children Enrolled in Medicaid in a Rural County." Journal of Public Health Dentistry, vol. 62, no. 1, 2002, pp. 45-50.
Program 7	North Carolina	Study 1: Medicaid-enrolled children ages 1 to 4 in North Carolina Study 2: Medicaid-enrolled children younger than age 3 (0 to 35 months) in North Carolina	Study 1: 2006 Study 2: 2000	Study 1: 2010 Study 2: 2006	Peer-reviewed journal article (both studies)	Study 1: Department of Pediatric Dentistry, University of North Carolina at Chapel Hill Study 2: Department of Health Policy and Management, University of North Carolina at Chapel Hill	Study 1: N/A Study 2: Departments of Pediatric Dentistry and Pediatrics, University of North Carolina at Chapel Hill	Study 1: The Carolina Oral Health Literacy Project is supported by a grant from the National Institute of Dental and Craniofacial Research. The lead author was supported by a National Institutes of Health National Research Service Award, Training for a New Interdisciplinary Research Workforce grant. Study 2: National Institute of Dental and Craniofacial Research.	Study 1: Kranz, A.M., J. Lee, K. Divaris, A.D. Baker, and W. Vann Jr. "North Carolina Physician-Based Preventive Oral Health Services Improve Access and Use Among Young Medicaid Enrollees." Health Affairs, vol. 33, no. 12, 2014, pp. 2144–2152. Study 2: Rozier, Gary R., Sally Stearns, Bhavna Pahel, Rocio Quinonez, and Jeongyoung Park. "How a North Carolina Program Boosted Preventive Oral Health Services for Low-Income Children." Health Affairs, vol. 29, no. 12, 2010, pp. 2278–2285.

Table 4. Matrix of interventions, policies, and programs addressing pre- and post-natal care disparities in rural children

	Name of intervention, policy, or program	Brief description of intervention, policy, or program	Research questions addressed	Findings or results	Type of evidence of the effectiveness of the interventions
Program 1	Family Health Advocacy (FHA)	In the FHA intervention, paraprofessional workers sought to reduce risk factors for poor pregnancy outcomes (prematurity and mortality) through education, behavioral change, and social support via empowerment strategies. They strove to increase prenatal care attendance, linked and referred women to existing community-based educational resources and case management services, and worked to improve social support and stress reduction for pregnant and parenting women. Health education focused on topics identified by CDC as risk factors for poor pregnancy outcomes: smoking, alcohol, tobacco use, douching, sexually transmitted infections, poor nutrition, chronic stress, and oral health.	Does the FHA intervention increase knowledge of and change behaviors related to factors associated with prematurity and infant mortality?	Participants increased their knowledge of safer sex practices, alcohol consumption, early prenatal care, maternal infection, nutrition, HIV/AIDS prevention, preterm labor, and douching. However, behavior change was found to be statistically significant only for taking medication for the period prescribed (i.e., finishing a course of antibiotics). Descriptive statistics indicated that participants used more positive ways to lower stress, and they decreased use of some negative methods of coping with stress (yelling or breaking something or eating) by the end of the study period. There were no statistically significant differences in knowledge of the importance of dental visits during pregnancy, healthy spacing of pregnancies, periodontal disease, or safe levels of alcohol consumption during pregnancy. In addition, there were no significant behavioral changes in regards to douching or consuming fast food.	Design: Pre/post. Comparison group: None. Data: Data collected from program participants. Measures: Participant knowledge and behavior change (see details in findings). Statistical test used: Paired t-tests and descriptive statistics. Limitations: Small sample size (46 participants completed both the pre and post periods of data collection), selection bias, nonrandom sampling design, lack of a control group, many participants did not complete the program, limited generalizability, and relatively short study duration.
Program 2	Research study: Collaborative telemedicine clinics for high-risk prenatal care	Collaborative telemedicine clinics focused on high-risk obstetrics were established. Nurse practitioners provided hands-on prenatal care and examinations at the participating local rural clinics. The patient, the nurse practitioner, and a remote perinatologist met in real time via video telemedicine.	What effects does a telemedicine-based, high-risk prenatal clinic have on maternal-child health outcomes for low-income, rural women?	Women who received the telemedicine intervention were (1) significantly less likely to miss one or more prenatal visits and (2) had babies with significantly shorter NICU stays. Those who received the intervention also had babies with higher mean birth weights, but the findings were not significant. No difference was found in the gestational age at first visit, the percentage of women with deliveries after 37 weeks of gestation, or the rate of NICU admissions. In the aggregate, over three years, the intervention saved 162,126 miles of patient travel. In summary, the researchers found that telemedicine was associated with improved access to care and similar rates of measured outcomes.	Design: Quasi-experimental (intervention versus comparison group). Comparison group: Comparison of 374 women served by the telemedicine clinics versus 181 women in a comparison group who were served before the telemedicine clinics were implemented. Data: Demographics, access, and outcomes data extracted from chart reviews. Measures: Patient access to care and pregnancy outcomes. Statistical test used: Two-sample t-tests and chi-square tests. Limitations: None specified.
Program 3	Health Education for Prenatal Providers in Appalachia (HEPPA)	HEPPA was targeted to providers to augment their prenatal smoking cessation resources and to support a consistent message by providers. The goal of the program was to increase knowledge and training of the providers serving the target areas and to help them incorporate the training into their care. The program included the American College of Obstetricians and Gynecologists (ACOG) 5As smoking cessation intervention, which uses a five-step process to approach smoking cessation with pregnant women: (1) ask about tobacco use, (2) advise quitting, (3) assess willingness to quit, (4) assist in quitting attempt, and (5) arrange for follow-up. In addition, HEPPA included other lifestyle choices related to prenatal health promotion. Smoking reduction among those unwilling or unable to completely quit was also promoted by providers. Provider training was conducted as an in-person, 1.5-hour session using lectures, handouts, case studies, and referral to online intervention resources.	Does the HEPPA program improve providers' knowledge of and use of smoking cessation counseling methods with pregnant women?	Most providers believed the program was effective, of good quality, and helpful; that it enhanced their knowledge regarding prenatal smoking; and that it improved their attitudes toward smoking cessation. At baseline, health care providers had significantly higher rates of using the 5As steps than social services providers; these differences were not found in the post-intervention period, which supports the idea that non-health care providers are able to extend prenatal care resources, at least for smoking cessation, in rural communities. Overall, participants significantly increased their use of the Advise and Assist steps of the 5As five-step smoking cessation process. The researchers concluded that the program contributed to providers' increased counseling behaviors related to smoking cessation.	Design: Pre/post. Comparison group: None. Data: Survey data and website page-view tracking data. The sample included 140 providers who participated in the intervention, 120 providers who completed the pre-intervention survey, and 76 providers who completed the post-intervention survey. Measures: Knowledge and behaviors relating to prenatal smoking cessation counseling at three points: pre-intervention, immediately post-intervention, and one to three months post-intervention; page views of the intervention resources website. Statistical test used: Nonparametric tests to compare survey results. Limitations: Some participants were lost to follow-up.
Program 4	Oregon's Rural Medical Practitioners Insurance Subsidy Program	Due to concerns about the declining number of maternity care providers in Oregon, particularly in rural areas, the state legislature created a public subsidy to help pay premiums for rural physicians' malpractice liability insurance. The subsidy varies by specialty and delivering status: 80% of the premium for an ob/gyn and 60% for a family practitioner or general practitioner who delivers babies, and 40% for all rural physicians who do not deliver babies. The physician (1) must practice more than 60% of the time in a rural community (as defined by the Oregon Office of Rural Health) and (2) must not be an employed physician (employed by a hospital, health system, government agency, etc.). Midwives were not eligible for the subsidy.	How does the rural liability subsidy affect rural maternity care providers' willingness to provide services? In addition, what factors determined practices' willingness (or lack thereof) to provide maternity care and deliver babies in Oregon in 2002 and 2006?	There were significant decreases in the proportion of providers performing maternity care services. Liability insurance cost was the most commonly cited reason for stopping or planning to stop performing deliveries. Those who received the subsidy reported that it was very important to being able to continue to provide maternity care; however, subsidized physicians were as likely as nonsubsidized physicians to plan to stop providing maternity services. In addition, those who were subsidized and currently providing services but planned to stop were more likely to cite the cost of premiums as their reason for stopping, compared with those who did not receive the subsidy. The researchers reported that a large proportion of clinicians receiving the subsidy threatened to cease providing care if the program was discontinued. The authors note multiple features of the program that might have affected the findings: (1) the subsidy qualifications create systematic differences in those who are and are not subsidized; (2) the funding mechanism has questionable long-term viability, making the future costs of liability premiums uncertain for providers; (3) some physicians are not aware that they are receiving the subsidy; (4) given the yearlong or more process of ceasing maternity care, the program's impacts may be different in a time frame beyond the study; and (5) there were stable malpractice premium rates in Oregon during the study time frame. Only one-fifth of the current maternity care providers in 2006 received the subsidy (many of those who did not receive the subsidy were not qualified for it due to being an employed physician or practicing in a nonrural area, while a small percentage lacked knowledge of the the subsidy). In 2007, the Oregon Office of Rural Health held a focus group to better understand the similar rates of cessation of services between subsidized and unsubsidized providers and the fact that subsidized providers were more likely to cite malpractice costs as a reason to stop providing delivery services. They found that lower premiums were very important but not sufficient to continue services, and that a combination of three things were needed to continue services: low overhead, reasonable reimbursement, and a pool of providers large enough to minimize stress and frequency of call duties. The researchers concluded that the program does not appear effective in getting rural providers to continue deliveries, and other policies that address the focus group's concerns should be considered.	Design: Longitudinal cohort study. Comparison group: None. Data: All obstetric providers in Oregon were surveyed in 2002 and 2006 (before and after the subsidy legislation was implemented in 2004). The survey data were combined with state administrative data for demographic, licensure and malpractice subsidy information. The survey included information about demographics, maternity care practice, actual or planned cessation of maternity services (and reasons for cessation); the 2006 survey also included information about receipt of the subsidy, amount and type of premium, and opinions about the subsidy program. Each year of the survey included just over 1,000 providers who completed the survey. Measures: Proportion of providers performing maternity care services and reasons for stopping or planning to stop performing deliveries. Statistical test used: Chi square tests and descriptive analyses. Limitations: Respondent bias, length of survey, reliance on self-report, and focus on one state; however methodology mitigated some of the effect of potential respondent bias and self-report limitations.

Table 4. Matrix of interventions, policies, and programs addressing pre- and post-natal care disparities in rural children

	Name of intervention, policy, or program	Brief description of intervention, policy, or program	Research questions addressed	Findings or results	Type of evidence of the effectiveness of the interventions
Program 5	MIST: Mothers and Infants Sober Together	The MIST program's staff (case managers, a therapist, and a program coordinator) provide a variety of services to mothers with substance abuse problems: home visits, mental health counseling, substance abuse treatment, relapse prevention, parenting education, supervised visits for non-custodial mothers, case management, weekly support groups, individualized treatment plans, and individual therapy. The program aimed to improve quality of life and daily functioning for mothers with substance abuse and drug-exposed infants.	N/A	The first report, covering the period the program was supported by a FORHP grant (2006-2009), noted client improvement in knowledge of developmental stages, and improvement in quality of life and mood. Of 715 drugs screens conducted, 79 percent were negative, and of the positive screens, 60 percent were positive due to prescribed medications. The program expected to serve 72 clients during the grant period, and exceeded this target. The report from the grant period noted a major barrier with financial sustainability, and reported that efforts to sustain the effort failed. However, funding appears to have been found within a relatively short time period, as the second report indicates that the program is current in place. In the second report, which included information from August 2009 to January 2015, 672 referrals were received, and services were provided to 359 clients. 116 participants successfully completed the program and 178 did not due to non-compliance or a need for higher level care. The program faced barriers in getting pregnant women into treatment, and finding available and willing resources to detox pregnant women. The program was deemed successful, and there were suggestions for others implementing a similar program: plan for sustainability, and work with local law enforcement, judges, healthcare providers, and mental health providers.	Evidence of effectiveness is minimal. The first report includes some assessments of knowledge and quality of life, number of drugs screens conducted and their results, and number of clients served. The more recent report's results are limited to counts of referrals, clients served, program graduates, those who fail to complete the program, the average and range of patient age, and pregnancy status at time of referral. Discussions of program barriers are included in both reports.
Program 6	Healthy Families Arkansas (HFAR)	The HFAR program provided prenatal check-ups, education, transportation, well-baby check-ups, and child immunizations to pregnant women and new mothers. Nine local organizations in the county collaborated to provide multiple health and social services. Healthy Connections, Inc. (HCI) is the focal point of the collaboration and received referrals to provide case management, transportation, parenting education, and follow-up. Home visiting to provide services was a major component of the program. Services were provided free-of-charge, and were available until the child was three years old. The program was modeled on and is now part of Healthy Families America, the program continues and has expanded under HCI, a national, evidence-based home visiting model that has been evaluated and proven effective, which has grown to become a Federally Qualified Health Center in five locations, and has expanded the home visiting program to another county with funding from the federal MIECHV program.	N/A	Children received all well-baby checks and immunizations, and most pregnant women received 13 prenatal visits and participated in at least 6 prenatal education classes. In addition, births to unwed mothers decreased, none of the teen mothers participating in the program had a second birth in two years, first trimester prenatal care rates increased, confirmed cases of child abuse decreased, and childhood immunization rates were above targets. The program found that in-home education programs can be successful, but they need to be culturally competent. For example, some clients were unable to read the educational material provided, so HCI purchased TVs, VCRs, and videotapes to provide alternative educational methods.	Methods are not outlined in the HFAR summary. Program tracking and outcome data is available (see results).
Program 7	Perinatal Health Partners (PHP) Southeast Georgia	The program includes in-home nursing case management for high-risk pregnant women, with the goal of improving outcomes for mothers and babies, decreasing the infant mortality rate, and decreasing infant illness. Specific program activities include clinical assessments of mother and baby; in-home case management; care coordination including referrals for medical care and education, WIC, and other services; education for mother and family; and connections to resources.	N/A	The most recent evaluation report includes information about participant demographics, referral reasons, average gestational age at referral, prior birth outcomes (gestational length and birth weight), birth outcomes for the evaluation period (weight, gestational length, adverse outcomes such as transfer to NICU, assisted ventilation, jaundice, and abnormal blood sugar), and patient satisfaction. The evaluation concludes that the program reaches and provides valuable services to high-risk women, and has statistically significantly improved outcomes (birth weight and gestational length) based on obstetric history and the matched comparison group. Patients are satisfied with the program, demonstrating staff effectiveness in managing patients.	Design: Descriptive. Comparison group: Matched comparison group for birth weight and gestational length outcome analyses. Data: Program data collected as part of the program, and surveys. Measures: Program implementation and outcomes (including birth weight and gestational length) via program data, and patient, provider, and staff satisfaction via survey. See the results for examples of the basic descriptive statistics calculated and reported. Statistical test used: Birth weight and gestational length outcome analyses are based on more sophisticated analysis, using prior obstetric histories of participants and a matched comparison group. Specific tests not noted. Limitations: None specified.

Table 4. Matrix of interventions, policies, and programs addressing pre- and post-natal care disparities in rural children

	Geographic area	Target population	Implementation date	End date	Source of reference	Lead organizations	Partner organizations	Funding sources	Citation for source document
Program 1	A rural southern community in northern Florida	Pregnant or parenting African American women ages 13 to 35 living in the target community	January 2004	June 2004	Peer-reviewed journal article	Winston-Salem University; University of South Australia, Adelaide; Florida State University College of Social Work; University of Maryland, Baltimore County	N/A	Not specified	Baffour, T.D., and J.M. Chonody. "Do Empowerment Strategies Facilitate Knowledge and Behavioral Change? The Impact of Family Health Advocacy on Health Outcomes." <i>Social Work in Public Health</i> , vol. 27, 2012, pp. 507-519.
Program 2	Five rural locations in Virginia	High-risk obstetrics patients in the participating clinics	2009	The last clinic was established in 2013, though the end date of services is not specified)	Summary of poster presentation in peer-reviewed journal	University of Virginia	N/A	Not specified	Veith, S.T., C. Chisholm, W. Novicoff, K. Rheuban, and W. Cohn. "Perinatologists and Advanced Practice Nurses Collaborate to Provide High-Risk Prenatal Care in Rural Virginia Communities." <i>Journal of Obstetric, Gynecologic, & Neonatal Nursing</i> , vol. 43, supplement 1, 2014, pp. S26-S27.
Program 3	Four contiguous Appalachian counties in West Virginia with limited prenatal care resources and known health disparities	Health care and social service providers in the target counties. Because the target areas have limited prenatal care providers, the intervention included other health care and social service providers directly interacting with pregnant women, as well as the primary obstetric providers affiliated with regional hospitals (which provide much of the prenatal and delivery care in these areas).	Not specified	Not specified	Peer-reviewed journal article	West Virginia University School of Nursing and School of Medicine	N/A	Appalachia Regional Commission	Azulay Chertok, I.R., M.L. Casey, and K. Greenfield. "Approach to Addressing Prenatal Smoking in West Virginia." <i>West Virginia Medical Journal</i> , vol. 110, special CME issue, 2014, pp. 36-40.
Program 4	Rural areas of Oregon	Obstetric providers in rural Oregon	2004	Ongoing (originally scheduled to sunset in 2007, but the legislature has repeatedly extended the program)	Peer-reviewed journal article	Department of Family Medicine, Oregon Health & Science University (OHSU)	N/A	The subsidy is provided by a public fund authorized by the state legislature. The study was supported by a grant from the American Academy of Family Physicians, by the OHSU Family Medicine Research program, and by the Oregon Medical Association.	Smits, A.K., V.J. King, R.E. Rdesinski, L.G. Dodson, and J.W. Saultz. "Change in Oregon Maternity Care Workforce After Malpractice Premium Subsidy Implementation." <i>Health Services Research</i> , vol. 44, no. 4, 2009, pp. 1253-1270.

Table 4. Matrix of interventions, policies, and programs addressing pre- and post-natal care disparities in rural children

	Geographic area	Target population	Implementation date	End date	Source of reference	Lead organizations	Partner organizations	Funding sources	Citation for source document
Program 5	Select Appalachian counties in East Tennessee	Mothers who tested positive for substances during pregnancy or at delivery and/or admitted drug use during pregnancy.	2006	Ongoing	Grey literature	Ridgeview Behavioral Health Center	Blue Cross Blue Shield Foundation of E. Tennessee; Dayspring Family Health Center, Jellico Community Hospital, and BlueCare Tennessee	2006-2009 funding from a grant from the Federal Office of Rural Health Policy; current funding through a grant through the BlueCross BlueShield of Tennessee Health Foundation.	FORHP grant period report - U.S. Department of Health and Human Services, Health Resources and Services Administration. "Outreach Sourcebook, Volume 14, Rural Health Demonstration Project: 2006-2009." Rockville, MD. April 2010. Available at https://www.raconline.org/pdf/vol14sourcebook.pdf . Accessed August 5, 2015. Current program summary - "MIST: Mothers and Infants Sober Together". Rural Assistance Center. Webpage accessed July 30, 2015. https://www.raconline.org/success/project-examples/380 . Current program brochure - http://www.ridgevw.com/images/Jellico%20MIST%20Brochure%20without%20BCBS%20logo%20-print%20ready.pdf
Program 6	High-poverty Polk County, Arkansas	Pregnant women and new mothers up to 25 years of age in the target location.	1998	The initial grant ended in 2001, but the program has continued.	Grey literature	Healthy Connections, Inc.	Multiple local organizations	1998-2001 funding from FORHP; current funding provided by The Department of Health and Human Services and the Arkansas Children's Trust Fund.	Program summary - "Healthy Families Arkansas (HFAR)". Rural Assistance Center. Webpage accessed July 31, 2015. https://www.raconline.org/success/project-examples/49 . Current program website - "HFA: Healthy Families America." Health Connections, Inc. Webpage accessed August 6, 2015. http://www.healthy-connections.org/Home/Programs/Thrive/tabid/21186/Default.aspx .
Program 7	Eleven rural southeast Georgia counties	Women referred to the program by healthcare providers after being identified as high-risk. High-risk factors include: history of miscarriage or later pregnancy loss, prior premature labor or delivery, previous fetal or neonatal death, diabetes, preeclampsia, incompetent cervix, multiples pregnancy with complications, fetal abnormality, or other pre-existing conditions.	Not specified	Ongoing	Grey literature	Southeast Health District	Multiple local partners including OB/GYNs, birthing hospitals, county health departments, and other perinatal care providers.	Funded as a line item in state budget; additional funding from March of Dimes and FORHP grants.	Program summary - "Perinatal Health Partners Southeast Georgia". Rural Assistance Center. Webpage accessed July 30, 2015. https://www.raconline.org/success/project-examples/302 Most recent evaluation - Tedders, S.H. "Perinatal Health Partners: Annual Evaluation, July 1, 2013 - June 30, 2014." Jiann-Ping Hsu College of Public Health, Georgia Southern University, October, 2014. Accessible at https://www.raconline.org/success/project-examples/files/302-php-2014-final-evaluation.pdf .

Table 5. Matrix of interventions, policies, and programs addressing respiratory health disparities in rural children

	Name of intervention, policy, or program	Brief description of intervention, policy, or program	Research questions addressed	Findings or results	Type of evidence of the effectiveness of the interventions
Program 1	Research study: Identification of rural children at risk for asthma	This study was designed to identify rural children at risk for asthma via written questionnaires, assess children's respiratory health status through spirometry, and identify children who were taken to a health care provider for follow-up. Children with abnormal values on the questionnaire or spirometry test were referred to their PCP for follow-up. Parents of these children were called six weeks after screening to confirm that follow-up was done or planned.	Can rural children at risk for asthma be identified via written questionnaire and assessments of respiratory health status through spirometry, and be referred to a health care provider for follow-up?	Written asthma screenings and spirometry can be used effectively by school personnel, such as nurses, to determine whether children have asthma and to identify children to refer to urgent or nonurgent follow-up care.	Design: Prospective descriptive. Comparison group: None. Data: Data were collected for a convenience sample of 770 children in 12 rural schools via written demographic questionnaire, a Life Quality (LQ) asthma questionnaire, spirometry, and telephone calls to parents. Measures: LQ asthma questionnaire and spirometry results; outcomes of referrals to health care providers. Statistical test used: N/A. Limitations: The study was conducted in a rural, agricultural Midwestern state, so researchers warn that spirometry results may differ depending on the season. Some parents did not complete the LQ before the spirometry tests, so researchers relied on child answers to the LQ. Follow-up information was incomplete for over a quarter of study children.
Program 2	Montana Asthma Home Visiting Project (MAP)	Based on <i>The Community Guide</i> published by the Community Preventive Services Task Force, this program is a home-based, multi-trigger, multi-component environmental intervention. During six home visits or phone calls over 12 months, registered nurses with the program teach children and their parents self-management skills and assess home environmental triggers. Participants receive mattress and pillow covers, progress workbooks, high-efficiency particulate absorption (HEPA) filters if the home has a pet or smoker, a home assessment of asthma triggers, and education on triggers and medications.	N/A	After one year, participants in the program reported improvement in their asthma symptoms, fewer emergency department visits, fewer missed school days, and less activity limitations. In addition, fewer participants used their short-acting beta agonist every day, and fewer experienced symptoms every day. Participants' inhaler technique and asthma control improved over the course of the program. Participants' and families' self-efficacy in handling the child's asthma improved, and they were more knowledgeable about asthma, medications, and triggers.	Design: Pre/post (baseline versus 12-month data). Comparison group: None. Data: Nurses conduct an Asthma Knowledge Test (AKT), administer the Asthma Control Test (ACT), check inhaler technique, assess number of urgent or emergency medical visits, and ask about missed school/work days and asthma symptoms. Data collected on these activities are submitted quarterly by MAP nurses. Children are enrolled in the program if they meet the eligibility criteria and live in one of the targeted locations. As of December 2013, 53 children had completed the program and were included in the analysis. Measures: Participants' asthma symptoms, emergency department use, number of missed school days, activity limitations, use of short acting beta agonist, inhaler technique, and asthma control; participants' and families' self-efficacy and knowledge. Statistical test used: Descriptive statistics only. Limitations: None specified.
Program 3	Hawaii Childhood Rural Asthma Project	This program provides (1) training for community health center providers in asthma care protocols and (2) training for community outreach workers to conduct home-based asthma interventions, including helping families remove in-home asthma triggers. The program also provides in-home environmental assessments and educational interventions, including standardized education, development of asthma action plans, and provision of environmental toolkit items (such as pillow and mattress covers, cockroach traps, and nontoxic cleaning supplies) to reduce exposure to indoor triggers in the environment.	N/A	Results on websites and conference abstracts indicate a reduction in asthma medication use, physician and emergency department visits, asthma symptoms, and missed school days, along with an increase in provider and participant competency, knowledge, and skills related to environmental triggers, self-management, and clinical symptoms and treatment.	While no full evaluation is available, the program website notes that the project included approximately 200 families. Website summaries and conference abstracts indicate positive results. A 2011 conference abstract of a pre/post analysis reports 89 children were recruited by local community health centers in 2009-2010. A 2013 abstract of a pre/post analysis includes 86 children enrolled during 2010-2011 in the administrative districts of Kona Big Island County as well as Koolauloa and Waianae, Honolulu County.

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<p>Program 4</p>	<p>Research study: Interactive asthma education</p>	<p>This study provided interactive education workshops for both parents or caregivers and the child with asthma. Parental education included one-hour asthma education workshops with a rural asthma educator. Educators provided information on topics such as early warning signs of asthma exacerbation, avoidance of rural environmental triggers, asthma medications, and control plans. They also provided cue cards for parental or caregiver communication with providers, a resource guide for asthma management care, and a quarterly newsletter. Educators also demonstrated use of peak flow meters and metered dose inhalers with spacers. Sessions for the child included two two-hour sessions in the school with the asthma educator. The educational topics for children were similar to those provided to adults and were tailored to the child's developmental level. Children also practiced use of peak flow meters and metered-dose inhalers. Children received an asthma coloring book, peak flow meter, and spacer.</p>	<p>Does an interactive asthma education improve asthma knowledge, self-efficacy, and quality of life for rural families?</p>	<p>Among parents and children in the intervention, asthma knowledge significantly improved. Among children in the intervention, self-efficacy significantly improved. Asthma symptoms were significantly lower for intervention children than for those not in the intervention. However, there was no significant difference between intervention and nonintervention groups in self-efficacy for parents or in quality of life for parents or children.</p>	<p>Design: Randomized controlled trial with two groups and repeated measures. Comparison group: Children were recruited from rural elementary schools and randomized into a control group that received standard asthma education or an intervention group that received interactive education. Data: Interview data using various survey and questionnaire instruments. The sample included 221 children eligible for and recruited into the study. Families and children were followed for an entire school year. Measures: Parental and child asthma knowledge, self-efficacy, asthma symptoms, and quality of life. Statistical test used: Chi-square tests, Wilcoxon rank sum tests, and Spearman correlations. Limitations: Asthma severity was subject to seasonal variation, is not static, and has no gold standard for measurement, so some misclassification of severity is possible. Caregiver reports were subject to recall bias. Sample may have been biased toward families who were more concerned about or who needed asthma education or services.</p>

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	Geographic area	Target population	Implementation date	End date	Source of reference	Lead organizations	Partner organizations	Funding sources	Citation for source document
Program 1	A rural, agricultural, and ranching-dependent area in one Midwestern state	Convenience sample of children ages 6 to 18 in 12 schools in the targeted rural communities	Not specified (study published in 2006)	Not specified (study published in 2006)	Peer-reviewed journal article	Researchers from the University of Nebraska Medical Center College of Nursing and the University of Wyoming Fay Whitney School of Nursing	N/A	Panhandle Community Services funded the cost of the screenings; funding for the research staff is unclear	Rodehorst, T.K.C., S.L. Wilhelm, and M.B. Stepans. "Screening for Asthma: Results from a Rural Cohort." Issues in Comprehensive Pediatric Nursing, vol. 29, no. 4, 2006, pp. 205-224.
Program 2	Six sites within Montana: Bullhook Community Center, Missoula City-County Health Department, Lewis and Clark City-County Health Department, Cascade City-County Health Department, Flathead City-County Health Department, and Richland County Health Department	Children ages 0 to 17 are eligible for the program if they (1) score less than 20 on the ACT or have had an emergency department visit or hospitalization for asthma in the past 12 months, (2) live in or near a funded site, and (3) have a diagnosis of asthma	Three sites funded in 2011; three additional sites added in 2014	Current	Grey literature	Montana Asthma Control Program through the Montana Department of Public Health and Human Services	N/A	Centers for Disease Control and Prevention	Montana Chronic Disease Prevention & Health Promotion Bureau, Montana Department of Public Health and Human Services. "The Montana Asthma Home Visiting Program: Chronic Disease Surveillance Report." March 2014. Helena, MT. Available at https://dphhs.mt.gov/Portals/85/publichealth/documents/Asthma/SurveillanceReportMar2014MAP.pdf . Accessed July 30, 2015.
Program 3	Select sites within Hawaii	Children diagnosed with asthma who were served by participating community health centers	2003	Not specified (ongoing as of the latest source dated 2014)	Grey literature: websites and conference abstracts	Hawaii Department of Health	Hawaii Primary Care Association	Centers for Disease Control and Prevention, Hawaii Asthma Control Program	<p>Nett, Blythe. "Breathing Easier in Hawaii." Hawaii State Department of Health Asthma Control Program. Available at http://www.cdc.gov/asthma/contacts/factsheets/APHA-Asthma_HI_6.pdf. Accessed July 30, 2015.</p> <p>Tamulis, T., and D. Krupitsky. "Community-based Participatory Research Intervention to Reduce the Exposure to Environmental Asthma Triggers and Severity of Asthma among Asthmatic Children in Hawaii." In abstracts of the 2013 Conference of the International Society of Environmental Epidemiology (ISEE), Abstract 5274. Research Triangle Park, NC: Environmental Health Perspectives, 2013. Available at http://ehp.niehs.nih.gov/isee/o-4-16-06/. Accessed July 30, 2015.</p> <p>Tamulis, T., and D. Krupitsky. "Principles of Community-Based Participatory Research in Environmental Childhood Rural Asthma Intervention." In abstracts of the 2011 Conference of the International Society for Environmental Epidemiology (ISEE), Abstract 1915. Research Triangle Park, NC: Environmental Health Perspectives, 2011. Available at http://ehp.niehs.nih.gov/isee/PDF/isee11Abstract01915.pdf. Accessed July 30, 2015.</p> <p>The Hawaii State Department of Health, Chronic Disease Management and Control Branch, Hawaii State Asthma Control Program. 2009. "Childhood Rural Asthma Project." In newsletter of the Hawaii Asthma Initiative, 2009. Available at http://health.hawaii.gov/asthma/files/2013/06/hainews09.pdf. Accessed July 30, 2015.</p> <p>National Center for Environmental Health (NCEH), Centers for Disease Control and Prevention. "NCEH State Fact Sheet: Hawaii." 2014. Available at http://www.cdc.gov/nceh/information/state_factsheets/hawaii.htm. Accessed July 30, 2015.</p>

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Program 4	Seven rural counties of Maryland	Children ages 6 to 12 in rural areas who have persistent asthma, and their parents or caregivers	2001	2003	Peer-reviewed journal article	Researchers from the Johns Hopkins University School of Nursing, the Johns Hopkins University School of Medicine/Division of General Pediatrics, and the Bloomberg School of Public Health	N/A	National Institute of Nursing Research	Butz, A, L. Pham, L. Lewis, C. Lewis, K. Hill, J. Walker, and M. Winkelstein. "Rural Children with Asthma: Impact of a Parent and Child Asthma Education Program." <i>Journal of Asthma</i> , vol. 42, no. 10, 2005, pp. 813-821. Available at http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2276310/pdf/nihms42231.pdf . Accessed July 30, 2015.

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