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DIFFERENCES IN RURAL-URBAN COUNTIES' COLLABORATION ACTIVITY FOR OPIOID RESPONSE: A CROSS-SECTIONAL SURVEY

AUTHORS

WILLIAM L. SWANN AND TERRI L. SCHREIBER

INTRODUCTION

Despite being positioned at the front lines of the US opioid epidemic, which has resulted in 450,000 lives lost during the period 1999 to 2018[1], research on opioid response and prevention has only begun to focus systematically on the broader role and activities of local governments in recent years[2,3,4]. Urban and rural counties alike have struggled to address opioid overdose, with the former recently edging out the latter in age-adjusted rates of opioid overdose deaths of 22.0 to 20.0 per 100,000, respectively[5]. These similar rates notwithstanding, the opioid response in rural areas has received less attention despite many such areas being more vulnerable due to lacking treatment capacity and protective social factors[6].

An emerging opioid response and prevention strategy for local governments, especially in resource-scarce rural areas[7], is inter-organizational collaboration. Cross-sector (i.e., spanning public and private sectors), cross-functional (i.e., spanning functional units, divisions, or agencies within organizations or jurisdictions), and inter-governmental (i.e., spanning governments or jurisdictions) collaborations hold promise for achieving a more effective opioid response[8,9]. While no government or organization can resolve or efficiently address the opioid crisis by itself, few studies have systematically examined local governments' use of inter-organizational collaboration in opioid response.

This research brief addresses this gap by reporting the extent to which collaboration activities are used for this purpose and examining whether gaps in such use exist between rural and urban counties.

METHODS

This study used data from a 2019 survey of all county governments in five purposively-selected states (Colorado, North Carolina, Ohio, Pennsylvania, and Washington), which varied in a geographical region, opioid overdose deaths, and political leaning. Of these states, Washington had the lowest age-adjusted opioid overdose death rate per 100,000 in 2017 (9.6), whereas Ohio had the highest (39.2) (mean = 20.0)[10]. Washington also had the lowest Republican vote share in the 2016 presidential election (38.1%), while Ohio had the highest (51.7%) (mean = 46.2%).

From November 2018 to September 2019, Qualtrics (Provo, UT) was used to administer a survey of county officials who were asked questions concerning their opioid-response activities, including "Has your local government engaged in any of the following collaborative actions relating to the opioid crisis prevention and/or intervention? (Check all that apply.)." Six opioid-targeted collaboration actions (including "Government has not engaged in any collaboration actions in these areas") were listed. These items were adapted from an existing local government survey[11] and treated as binary outcomes. Using the National Center for Health Statistics (NCHS) urban-rural classification scheme[12], counties were categorized, from largest to smallest by population size, as metropolitan, micropolitan, or noncore.

Fisher's exact tests between urban-rural classifications and collaboration actions were performed. Odds ratios (ORs)

[1] Centers for Disease Control and Prevention. Wide-ranging Online Data for Epidemiologic Research (WONDER). Atlanta, GA: CDC, National Center for Health Statistics; 2020. Available at http://wonder.cdc.gov.

[2] Feuerstein-Simon R, Lowenstein M, Sharma M, Dupuis R, Luna Marti X, Cannuscio CC. Local health departments and the implementation of evidence-based policies to address opioid overdose mortality. *Subst Abus*. 2020;41(4):468-474.

[3] Raja K, Higgins F, Hall K. *Local Health Department Approaches to Opioid Use Prevention and Response: An Environmental Scan*. Washington, DC: National Association of County and City Health Officials; 2019. Available at https://www.naccho.org/uploads/downloadable-resources/Environmental-Scan-V3-July-2019-FINAL-v2.pdf.

[4] Swann WL, Kim S, Kim SY, Schreiber TL. Urban-rural disparities in opioid use disorder prevention and response activities: A cross-sectional analysis. *J Rural Health*. 2021;37(1):16-22.

[5] Hedegaard H, Miniño AM, Warner M. *Urban-rural Differences in Drug Overdose Death Rates, by Sex, Age, and Type of Drugs Involved*. NCHS Data Brief, no 345. Hyattsville, MD: National Center for Health Statistics; 2019. Available at https://www.cdc.gov/nchs/data/databriefs/db345-h.pdf.

[6] Rigg KK, Monnat SM, Chavez MN. Opioid-related mortality in rural America: geographic heterogeneity and intervention strategies. *Int J Drug Policy*. 2018; 57: 119-129.

[7] Palombi L, Olivarez M, Bennett L, Hawthorne AN. Community forums to address the opioid crisis: An effective grassroots approach to rural community engagement. *Subst Abuse*. Published online February 17, 2019. doi:10.1177/1178221819827595

[8] Au-Yeung C, Blewett LA, Lange K. Addressing the rural opioid addiction and overdose crisis through cross-sector collaboration: Little Falls, Minnesota. *Am J Public Health*. 2019; 109(2): 260-262.

[9] Yatsco AJ, Champagne-Langabeer T, Holder TF, Stotts AL, Langabeer JR. Developing interagency collaboration to address the opioid epidemic: A scoping review of joint criminal justice and healthcare initiatives. *Int J Drug Policy*. 2020;83:102849.

[10] Kaiser Family Foundation's (KFF) State Health Facts. *Opioid Overdose Death Rates and All Drug Overdose Death Rates per 100,000 Population (Age-Adjusted)*; 2019. Available at https://www.kff.org/other/state-indicator/opioid-overdose-death-rates/. Accessed October 25, 2019.

[11] Swann WL. Examining the impact of local collaborative tools on urban sustainability efforts: Does the managerial environment matter? *Am Rev Public Adm*. 2017;47(4):455-468.

[12] Ingram DD, Franco SJ. *2013 NCHS Urban-Rural Classification Scheme for Counties*. Hyattsville, MD: National Center for Health Statistics; 2014. Available at https://www.cdc.gov/nchs/data/series/sr_02/sr02_166.pdf.

were estimated with logistic regression for each action and an additional binary outcome for engaging in at least one collaboration action listed. To control for confounding effects due to financial resources, odds ratios were also adjusted (aORs) for 2017 total county health and human services expenditures in millions of US dollars (mean = 58.0, SD = 147.0, range: 0.0–1700.0)[13]. Since state laws may influence counties' opioid response, standard errors were clustered by state. Alpha level was set to 0.05. Stata version 14 (Stata Corp, College Station, TX) was used for statistical analysis. Tableau Software (Seattle, WA) was used to create data visualizations. The study was considered not human subject research by the Colorado Multiple Institutional Review Board.

Results

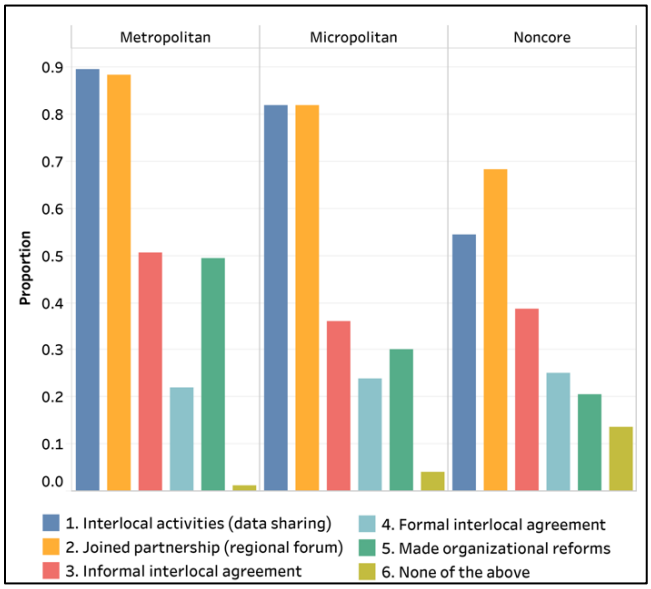
A 47.8% (171 out of 358) response rate was attained. Respondents, limited to one per county, were county health directors (61%), county administrators (24%), county commissioners (13%), or others (2%). Five respondents used a multi-county local health department (LHD), three of which were part of the same LHD, but each had a unique respondent. No nonresponse bias was detected based on mean-comparison tests for population size or other demographics. Although response rates varied by state (range: 39.8% in Ohio, to 56.3% in Colorado), there was little difference between those of metropolitan (48.4%) and nonmetropolitan counties (47.2%). Within states, no statistically significant differences between metropolitan and nonmetropolitan counties' response rates were found.

Figure 1 displays the proportion of collaboration actions used by metropolitan, micropolitan, and noncore counties. Collaboration actions involving interagency or interlocal activities like sharing data and information or joining a partnership such as a regional forum or taskforce were used with greater frequency than informal or formal interlocal agreements or organizational reforms based on collaboration across all urban-rural classifications. Noncore counties had the highest proportion of not engaging in any collaborative actions listed in the survey (13.6%).

Table 1 reports the results of Fisher's exact tests. Informal (P = 0.216) and formal interlocal agreements (P = 0.920) were the only collaboration actions found not statistically significant.

Logistic regression results are also reported in Table 1. Figures 2a and 2b display the results graphically. Compared to noncore counties, metropolitan (OR = 7.2, 95% CI = 3.1–16.6) and micropolitan counties (OR = 3.8, 95% CI = 1.9–7.8) had higher odds of working with other agencies or local governments in activities such as sharing data and information. Metropolitan counties had higher odds of joining a collaborative partnership such as a regional forum (OR = 3.5, 95% CI = 1.7–7.3) and making organizational reforms based on a collaborative partnership (OR = 3.8, 95% CI = 1.2–11.7), compared to noncore counties. Micropolitan counties were more likely than noncore counties to use these actions, but the differences were not statistically significant. Metropolitan (OR = 0.1, 95% CI = 0.01–0.7) and micropolitan counties (OR = 0.3, 95% CI = 0.1–0.8) both had lower odds than noncore counties of not engaging in any collaboration actions listed. Metropolitan counties had odds higher than their noncore counterparts of engaging in at least one collaboration action (OR = 8.3, 95% CI = 1.6–43.0). Neither metropolitan nor micropolitan counties were more or less likely than noncore counties to enter into informal or formal interlocal agreements on opioid issues.

Figure 1: Collaboration Actions Used by Urban-Rural Classification



However, total health and human services expenditures showed a large confounding influence, eliminating nearly all statistically significant differences in collaboration action use between urban-rural classifications. When adjusting for an inverse hyperbolic sine (IHS) transformation[14] of 2017 total county health and human services expenditures and a squared term which improved model fit based on the Bayesian Information Criterion (BIC), the only statistically

[13] NACo (National Association of Counties) Analysis of U.S. Census Bureau – 2017 Census of Individual Governments: Finance. Available at https://ce.naco.org/?dset=County%20Expenditures&ind=Expenditures%20for%20Health%20and%20Human%20Services. Accessed February 13, 2021.

[14] Bellemare MF, Barrett CB, Just DR. The welfare impacts of commodity price volatility: Evidence from rural Ethiopia. *Am J Agric Econ*. 2013;95(4):877-899.

TABLE 1: COLLABORATION ACTIONS USED IN OPIOID RESPONSE BY URBAN-RURAL CLASSIFICATION

	Metropolitan *n* = 77		Micropolitan *n* = 50		Noncore *n* = 44	
	n (%) OR[a] (95% CI[b]) aOR[d] (95% CI)	*P*-value	*n* (%) OR (95% CI) aOR (95% CI)	*P*-value	*n* (%) OR (95% CI) aOR (95% CI)	*P*-value[c]
Worked with other agencies or local governments in activities such as sharing data and information on opioid misuse/abuse, treatment, etc.	69 (89.6) 7.2 (3.1–16.6)[e] 2.2 (0.6–7.3)	<0.001 0.210	41 (82.0) 3.8 (1.9–7.8) 2.4 (1.1–5.0)	<0.001 0.020	24 (54.5) – –	<0.001
Joined a collaborative partnership with other governmental and non-governmental organizations (e.g., regional forum, taskforce)	68 (88.3) 3.5 (1.7–7.3) 1.0 (0.4–2.4)	0.001 0.925	41 (82.0) 2.1 (0.9–4.7) 1.3 (0.5–3.7)	0.065 0.613	30 (68.2) – –	0.026
Entered into an informal agreement with one or more local governments on opioid-related issues	39 (50.6) 1.6 (0.6–4.3) 0.8 (0.4–1.7)	0.318 0.620	18 (36.0) 0.9 (0.4–1.9) 0.6 (0.3–1.4)	0.776 0.264	17 (38.6) – –	0.216
Entered into a formal agreement with one or more local governments on opioid-related issues	17 (22.1) 0.9 (0.4–1.9) 0.2 (0.1–0.5)	0.688 0.001	12 (24.0) 0.9 (0.7–1.2) 0.4 (0.3–0.6)	0.689 <0.001	11 (25.0) – –	0.920
Made organizational reforms (e.g., consolidating departments, creating new ad hoc committees) based on a collaborative partnership for addressing the opioid crisis	38 (49.4) 3.8 (1.2–11.7) 1.7 (0.6–4.4)	0.021 0.297	15 (30.0) 1.7 (0.4–6.4) 1.3 (0.3–5.2)	0.455 0.747	9 (20.5) – –	0.004
The government has not engaged in any collaborative actions in these areas	1 (1.3) 0.1 (0.01–0.7) 0.4 (0.1–3.9)	0.025 0.470	2 (4.0) 0.3 (0.1–0.8) 0.6 0.2–2.2)	0.017 0.470	6 (13.6) – –	0.012
The government has engaged in at least one of the collaborative actions	75 (97.4) 8.3 (1.6–43.0) 1.5 (0.3–6.7)	0.011 0.597	43 (86.0) 1.4 (0.4–4.3) 0.5 (0.2–1.9)	0.594 0.346	36 (81.8) – –	0.008

[a]OR = odds ratio unadjusted.
[b]CI = confidence interval.
[c]Fisher's exact test between urban-rural classification and collaboration action.
[d]aOR = odds ratio adjusted for 2017 total county health and human services expenditures and a squared term.
[e]Standard errors clustered by state.

significant difference that remained was micropolitan counties (aOR = 2.4, 95% CI = 1.1–5.0) having higher odds of interagency or interlocal activities such as sharing data and information than their noncore counterparts (Table 1). Further, the odds of metropolitan (aOR = 0.2, 95% CI = 0.1–0.5) or micropolitan counties (aOR = 0.4, 95% CI = 0.3–0.6) entering into a formal interlocal agreement on opioid-related issues became significantly lower than those of noncore counties after adjusting for expenditures.

The results did not meaningfully change when adjusting for NCHS estimates of counties' five-year average (2012 to 2016) drug poisoning mortality rates[15]. Also, ordinary least squares (OLS) estimation was used to regress a summative index of five collaboration actions (Cronbach α = 0.65) on urban-rural classification, yielding results consistent with the above models (see Appendix A). When excluding the squared term for total expenditures, variance inflation factor (VIF) values were below the recommended cutoff value of 5, suggesting that multicollinearity was not problematic.

DISCUSSION

Despite typically having fewer resources and arguably greater need to collaborate across various organizations in opioid response, this study finds that county governments in the most rural areas (noncore) generally have lower odds of using collaboration actions than their metropolitan, and in some instances, micropolitan counterparts. However, when adjusting for total health and human services expenditures, differences in the odds of using collaboration actions became smaller and statistically insignificant in most cases. Such expenditures appear to matter more than urban-rural classification in explaining the use of collaboration actions.

Inter-organizational collaboration is crucial to health systems, especially those at the local level. For example, while urban LHDs generally develop more partnerships with non-governmental organizations (NGOs) than do their rural counterparts, partnerships mediate the relationship between resources and service provision and reduce differences in such provision between urban and rural LHDs[16].

[15] National Center for Health Statistics. *Drug Poisoning Mortality by County: United States*. 2019. Available at: https://data.cdc.gov/NCHS/ NCHS-Drug-Poisoning-Mortality-by-County-United-Sta/p56q-jrxg. Accessed October 25, 2019.

[16] Beatty K, Harris JK, Barnes PA. The role of interorganizational partnerships in health services provision among rural, suburban, and urban local health departments. *J Rural Health*. 2010;26(3):248-258.

FIGURE 2A: UNADJUSTED ODDS RATIOS (REFERENCE GROUP = NONCORE), *N* = 171

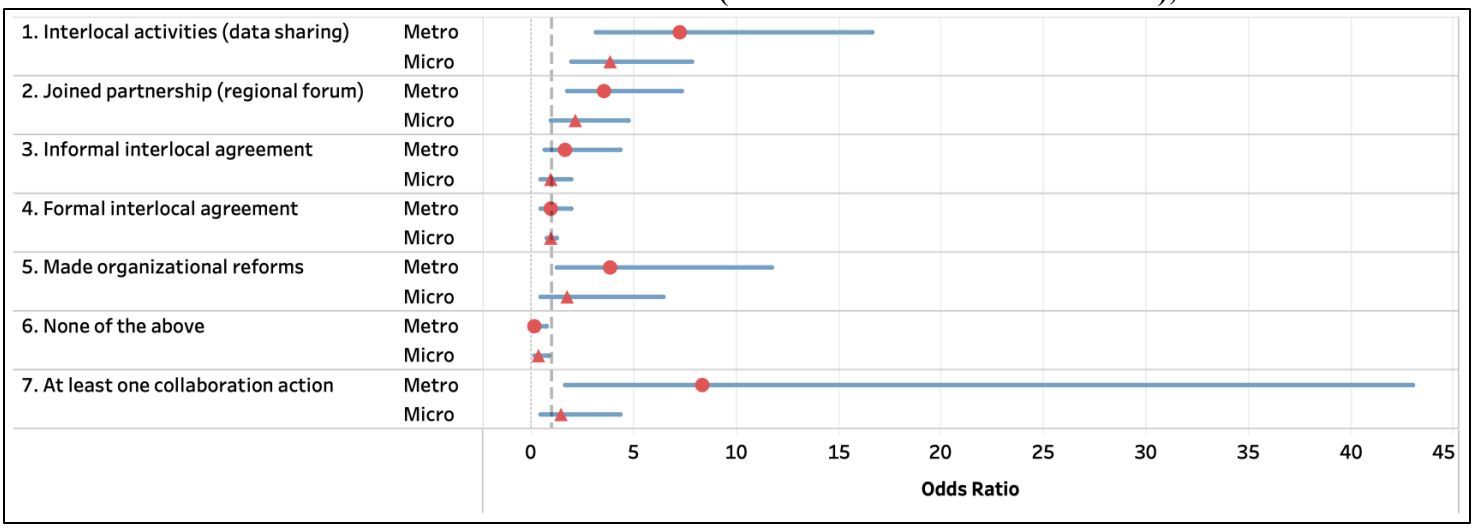
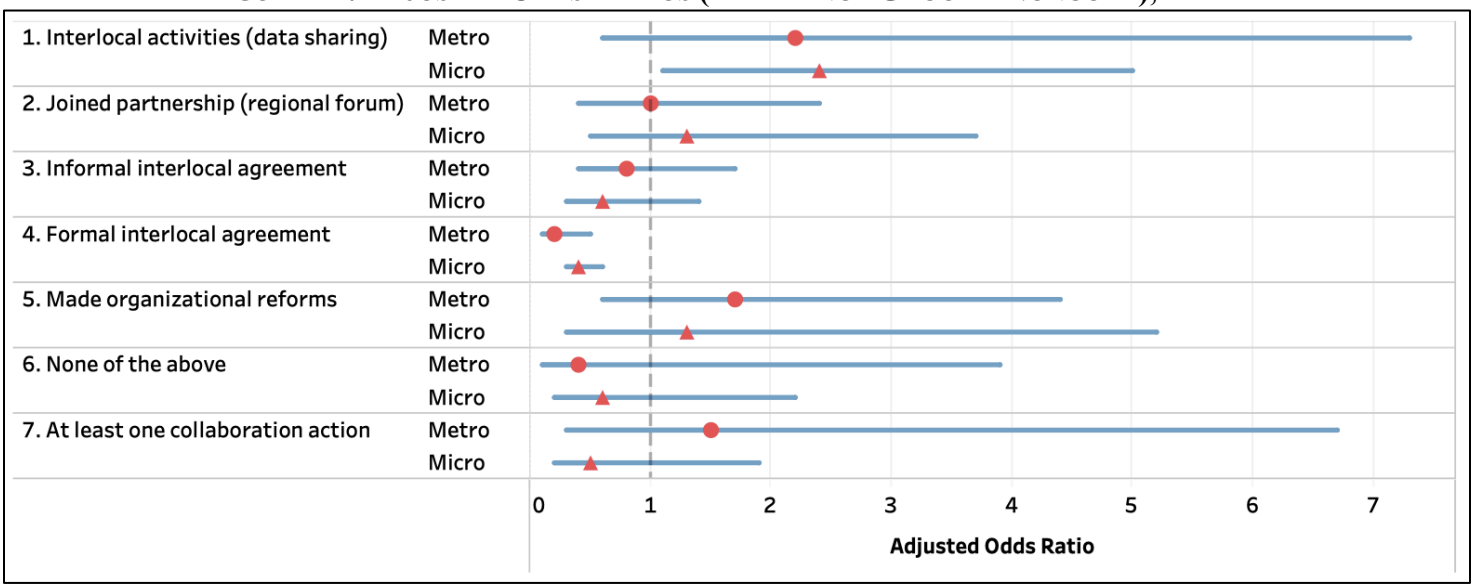


FIGURE 2B: ADJUSTED ODDS RATIOS (REFERENCE GROUP = NONCORE), *N* = 171



Collaboration is also considered a vital element of a comprehensive opioid response.[17] Prior work on opioid response has focused more on interagency and NGO partnerships than on inter-governmental collaboration. Partnerships between LHDs and other local agencies and service providers in criminal justice, emergency medicine, mental/behavioral health, and substance use services are leveraged for opioid response[3(p1)]. Joint programs between law enforcement and healthcare providers have been highlighted and effective in improving treatment outcomes[9(p1)]. Further, case evidence from rural Minnesota suggests interdisciplinary cross-sector collaboration can reduce controlled substance use and drug crimes[8(p1)]. A case study of a rural collaborative for local opioid response in Southern Colorado is included in Appendix B.

This research brief adds to our empirical understanding of rural-urban collaboration activity in opioid response. Knowing collaboration may be driven by financial resources, federal and state governments may find a greater reason to invest in and facilitate collaborations in rural and urban communities to better address opioid outcomes. With opioid overdoses on the rise in Canada, Australia, the UK, and other countries, there may also be opportunities for comparative analysis and practical lessons on a global scale.

[17] Levine M, Fraser M. Elements of a comprehensive public health response to the opioid crisis. *Ann Intern Med* 2018;169:712-715.

LIMITATIONS

This study is limited by its cross-sectional nature and reliance on self-reported activities within counties from five states. Although two subject matter experts reviewed the survey prior to distribution, the collaboration actions may not have been independent and/or distinguishable from one another, and this potential overlap is a limiting factor.

CONCLUSION

To help navigate a fractured US public health system that is underfunded and now stretched due to COVID-19, local governments can leverage inter-organizational collaboration as a means to tackling a concurrent opioid epidemic. But effective collaboration, especially in resource-scarce rural areas, seems unlikely without more significant resource commitment that could come from higher-level governments and/or future opioid settlement funds.

APPENDIX A

OLS MODEL FOR COLLABORATION ACTIVITY

	Inter-organizational collaboration[a] $n = 171$		
	Unadjusted		
	β	95% CI[b]	*P*-value
Metropolitan	0.93	0.08–1.78	0.038
Micropolitan	0.47	-0.29 to 1.24	0.161
Noncore (reference)	–	–	–
	Adjusted		
	β	95% CI	*P*-value
Metropolitan	0.13	-0.67 to 0.94	0.668
Micropolitan	0.08	-0.70 to 0.86	0.794
Noncore (reference)	–	–	–
Total health and human services expenditures (IHS-transformed)[c]	0.33	0.07–0.60	0.025

[a]Index of collaboration actions (mean = 2.63, SD = 1.43, range: 0–5).
[b]Standard error clustered by state.
[c]IHS = inverse hyperbolic sine (IHS) transformed variable.

APPENDIX B

COLLABORATION IN RURAL OPIOID RESPONSE PLANNING: A CASE STUDY

In 2020, the Pueblo Department of Public Health and Environment (PDPHE) in Colorado, in partnership with Crowley, Otero, and Conejos counties and The Schreiber Research Group (TSRG), was awarded a Rural Communities Opioid Response Program (RCORP)-Planning grant by the Health Resources & Services Administration (HRSA). This grant "is a multi-year HRSA initiative [to reduce] morbidity and mortality resulting from substance use disorder (SUD), including opioid use disorder (OUD), in [high-risk] rural communities"[18]. The planning phase prepares rural communities to implement sustainable prevention, treatment, and recovery services. Through this partnership and advice from the Colorado Rural Health Center (CRHC), the Colorado Consortium for Prescription Drug Abuse Prevention, and the Attorney General of Colorado's Director of Opioid Response, TSRG conducted a community needs assessment and gap analysis to inform the strategic planning.

The project's primary goal was to satisfy HRSA's requirements while uncovering the specific issues faced by Crowley, Otero, and Conejos counties that impede forward progress in addressing OUD. A secondary goal for TSRG was to work closely with the counties to develop a deep understanding of opioid response in rural communities with limited resources and high overdose death rates.

FIGURE B1: HEALTH RESOURCES AND SERVICES ADMINISTRATION LOGO (SOURCE: WIKIMEDIA COMMONS)

The collaboration began as PDPHE and TSRG were preparing separate RCORP-Planning grants. Upon learning of each other's objectives, neither organization wanted to work in cross purposes if doing so would diminish the likelihood of being funded, so the organizations decided to explore a collaboration. Meetings were held virtually, subject matter experts were brought in, and LHDs from the counties were asked if they, too, wanted to be included. A collaborative was formed, the grant was written, and all parties committed to an 18-month, $200,000 project, which was awarded funding in the fall of 2020.

ENVIRONMENTAL CHALLENGES AND COLLABORATIVE STRATEGY

What was unknowable at the outset was how COVID-19 would impact the daily operation of the planning phase of the work. When all LHDs were in "red alert" status, no face-to-face meetings could be held. All interaction would occur virtually, including stakeholder focus groups, lived-experience interviews, and coalition meetings. As the weeks progressed, LHDs needed to perform contact tracing and administer vaccinations instead of HRSA tasks. During the budgeting phase, it was expected that each county would provide at least a part-time headcount to the project. The competing demands made it clear that this was unachievable.

Collaborative governance literature emphasizes the importance of creating quick wins, building trust, having a face-to-face dialogue, and a shared commitment when building a collaborative[19]. However, these theoretical

[18] Health Resources & Services Administration. Rural Communities Opioid Response Program – Planning. Available at https://www.hrsa.gov/grants/find-funding/hrsa-20-109.

[19] Ansell C, Gash A. Collaborative governance in theory and practice. *J Public Adm Res Theory*. 2008;18(4):543-571.

constructs had to be tested in real-time and under challenging circumstances. Roles needed to shift. Budgets needed to be reallocated. PDPHE and TSRG needed to take on more responsibility to keep the project on track for success. During the first coalition meetings, only a few stakeholders attended. Virtual meetings and email became the medium for building trust. The conditions were not ideal.

FIGURE B2: 2 MILLIGRAMS OF FENTANYL, A LETHAL DOSE IN MOST PEOPLE (SOURCE: US DRUG ENFORCEMENT ADMINISTRATION)

Despite the competing demands, low initial turnout, and lack of face-to-face interaction, the glue that kept the project together was a shared commitment to finding solutions. Although none of the project personnel had previously worked together, everyone made accommodations. During the early weeks, when project personnel scrambled to understand how to meet the critical HRSA requirements, a decision was made to rely more heavily on secondary data. If enough participants for focus groups and interviews could not be secured within the short time window (ultimately, three focus groups and ten interviews were completed), the collaborative would need to rely on existing data, including a recent survey of opioid program and service availability administered by the University of Colorado Denver and TSRG. It was also helpful that the Colorado Department of Public Health and Environment (CDPHE) had implemented a data dashboard making data on overdose death rates, opioid prescribing volumes, and emergency room visits and hospitalizations for nonfatal overdoses publicly available.[20] The multiple data sources proved useful in revealing the communities' specific needs and the gaps that the strategic plan aimed to fill.

Fortuitously, it was the challenges of the project that facilitated the trust-building and shared commitment. An all-hands-on-deck approach created an interdependent, diverse, and virtual team willing to share skills and knowledge and a reinforced commitment to the overall project goals. As job duties were reassigned and budgets were reallocated, team members had to find efficiencies so that no individual's time was squandered. Differences in educational backgrounds, geographical locations, demographics, and political values took a back seat to an unspoken but genuine feature of finding common ground and facilitating mutual learning. Staying flexible was privileged over sticking to prior plans.

On March 2, 2021, the community needs assessment and gap analysis will be formally submitted to HRSA. On March 12, 2021, a proposal will be submitted for a $1 million, three-year HRSA implementation grant that will require extensive and ongoing collaboration in the Southern Colorado region.

CONCLUSIONS

HRSA looks to fund cross-sectoral, inter-governmental, and interagency collaboratives[18(p5)]. The issues are too complex, the funding requirements are too great, and the layers of understanding needed to address the opioid crisis are too demanding without collaboration. TSRG brought a skill set that includes applied research on local opioid response. Governmental and other NGO partners brought professional and local knowledge, grass-roots networks, and timely resources. Through this effort, a key lesson learned is that all partners were needed in whatever capacity they had available, and that challenges at the outset may become opportunities as collaboratives develop. This patchwork approach of committed partners, if successful, will help inform rural America how to better address the opioid crisis.

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[20] Opioid Overdose Prevention Program, Colorado Department of Public Health and Environment. Drug Overdose Dashboard. Available at https://cohealthviz.dphe.state.co.us/t/PSDVIP-MHPPUBLIC/views/DrugOverdoseDashboard/LandingPage?:showAppBanner=false&:display_count=n&:showVizHome=n&:origin=viz_share_lin k. Accessed February 22, 2021.