



What's Happening

March 2019

Teacher retention, mobility, and attrition in Colorado, Missouri, Nebraska, and South Dakota

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Key findings

Among Colorado, Missouri, Nebraska, and South Dakota teachers, between 2015/16 and 2016/17:

- 82 percent remained in a classroom teaching position in the same school (stayers), 8 percent transferred to a classroom teaching position in a different school or district (movers), and 10 percent took a nonteaching position or left their state public school system (leavers).
- The proportion of stayers was similar in rural schools (83 percent) and nonrural schools (82 percent).
- The proportions of stayers, movers, and leavers varied substantially across districts within states.
- Most stayers (98 percent) remained in the same grade-level assignment.
- About half of movers transferred to a school in the same district, and half transferred to a school in a different district.

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Summary

Educator Pipeline Research Alliance members from Colorado, Missouri, Nebraska, and South Dakota expressed a shared concern about teacher shortages, particularly in rural settings, and an interest in better understanding teacher mobility and attrition. National data suggest that, from one year to the next, about 84 percent of teachers remain in the same school, 8 percent transfer to a different school, and 8 percent leave the profession (Goldring, Taie, & Riddles, 2014). Research also shows that teacher shortages tend to vary across content areas, types of districts and schools, and geographic areas (Podolsky, Kini, Bishop, & Darling-Hammond, 2016; Sutchter, Darling-Hammond, & Carver-Thomas, 2016). Alliance members requested information about teacher retention, mobility, and attrition in their states to inform their thinking about approaches to reducing mobility and attrition, which contribute to teacher shortages and may contribute to negative consequences for students and schools.

The study used administrative data for 2015/16–2016/17 provided by the state education agencies in Colorado, Missouri, Nebraska, and South Dakota to identify the proportion of teachers who remained in a classroom teaching position in the same school (stayers), teachers who transferred to a classroom teaching position in a different school or district (movers), and teachers who took a nonteaching position or left their state public school system (leavers) by state, rural and nonrural setting, and district. It also compared the proportion of stayers who had the same grade-level assignment with the proportion who had a different grade-level assignment, the proportion of movers who remained in the same district with the proportion who transferred to a different district, and the proportion of leavers who took a nonteaching position in their state public school system with the proportion who left their state public school system, all by rural and nonrural setting and state.

The key findings across all four states were:

- Consistent with prior national-level research, 82 percent of teachers were stayers, 8 percent were movers, and 10 percent were leavers.
- The proportion of stayers was similar in rural schools (83 percent) and nonrural schools (82 percent).
- The proportions of stayers, movers, and leavers varied substantially across districts within states, suggesting the importance of looking beyond state-level trends when developing strategies to address teacher shortages.
- Most stayers (98 percent) remained in the same grade-level assignment, suggesting a low overall prevalence of within-school movement. Within-school movement may be associated with negative outcomes for students.
- About half of movers transferred to a school in the same district, and half transferred to a school in a different district.

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Why this study?

Educator Pipeline Research Alliance members from Colorado, Missouri, Nebraska, and South Dakota expressed a shared concern about teacher shortages, particularly in rural settings, and an interest in better understanding teacher mobility and attrition. Colorado’s House Bill 17–1003, passed in May 2017, yielded a strategic plan that included a focus on the unique challenges associated with teacher recruitment and retention in rural districts (Cole, 2017a). In a report for the Governor’s Blue Ribbon Task Force on Teachers and Students, the South Dakota Department of Education (2015) also identified the need to better understand the dynamics of the teacher workforce and the factors affecting them. Alliance members requested information about teacher retention, mobility, and attrition (see box 1 for definitions of key terms) in their states to inform their thinking about approaches to reducing mobility and attrition, which contribute to teacher shortages and may contribute to negative consequences for students and schools.

Concerns about shortages in rural settings are particularly relevant for these states because they employ a large proportion of teachers in rural schools and districts. According to data from 2013/14 and 2014/15, all four states have a higher proportion of small rural districts and a higher proportion of rural schools than the national average, and three of them have a higher proportion of rural students than the national average (table 1).

National data suggest that, from one year to the next, about 84 percent of teachers remain in the same school, 8 percent transfer to a different school, and 8 percent leave the profession (Goldring et al., 2014). Research also shows that teacher shortages tend to vary across content areas, types of districts and schools, and geographic areas (Podolsky et al., 2016; Sutchter et al., 2016). Teacher mobility and attrition are frequently associated with challenges for students and schools, such as improving student achievement and ensuring that all students have equitable access to high-quality teachers (Atteberry, Loeb, & Wyckoff, 2016; Borman & Dowling, 2008; National Commission on Teaching and America’s Future, 2003; Podgursky, Ehlert, Lindsay, & Wan, 2016).¹ These challenges arise because teachers often leave low-performing districts and economically disadvantaged areas, and schools and districts incur substantial financial costs to allocate additional resources for teacher recruitment and professional development (Podolsky et al., 2016). Research has provided a basic, national-level picture of teacher mobility and attrition while suggesting that these phenomena vary substantially across regions, states, and districts (Plecki, Elfers, Loeb, Zahir, & Knapp, 2005; Sutchter et al., 2016).

Educator Pipeline Research Alliance members from Colorado, Missouri, Nebraska, and South Dakota requested information about teacher retention, mobility, and attrition in their states to inform their thinking about approaches to reducing mobility and attrition, which contribute to teacher shortages and may contribute to negative consequences for students and schools

Table 1. Percentage of small rural districts, rural schools, and rural students, nationally and by state

| Rural entity | National average | Colorado | Missouri | Nebraska | South Dakota |
|--|------------------|----------|----------|----------|--------------|
| Small rural districts (2013/14) ^a | 49.9 | 70.6 | 60.7 | 84.9 | 78.9 |
| Rural schools (2015/16) | 32.9 | 33.3 | 46.4 | 55.0 | 75.1 |
| Rural students (2015/16) | 20.4 | 14.7 | 29.2 | 25.3 | 41.2 |

a. Small rural districts have an enrollment that is lower than the median enrollment for all rural school districts in the United States.

Source: Authors’ calculations based on data from the National Center for Education Statistics (2017, n.d. b).

Box 1. Key terms

Classroom teacher. A staff member assigned the professional activities of instructing students in grades preK–12 in self-contained classes or courses. This definition excludes classroom interventionists, student teachers, teacher aides, paraprofessionals, librarians, psychologists, and speech pathologists.

Grade-level assignment. A classroom teacher's assignment to one or more grade levels.

Leaver. A classroom teacher who takes a nonteaching position or exits a state public school system. For example, a classroom teacher who becomes a principal in the same school is considered a leaver because he or she has left a classroom teaching position.

Mover. A classroom teacher who transfers to a classroom teaching position in a different school or district within a state public school system.

Nonteaching position. A leadership position or other type of school-based employment that does not involve classroom teaching.

Rural district. A district in which the number of students enrolled in rural schools exceeds the number of students enrolled in any of the other three locale categories (city, suburb, or town), based on the National Center for Education Statistics locale framework (Gevert, 2015). A rural district may contain both rural and nonrural schools.

Rural school. A school defined as rural based on the National Center for Education Statistics locale framework (Gevert, 2015). These schools include those in a Census-defined rural territory that have a school locale code of 41 (rural–fringe), 42 (rural–distant), or 43 (rural–remote). A rural school may be in either a rural or nonrural district.

Rural teacher. A classroom teacher in a rural school.

Stayer. A classroom teacher who remains in a classroom teaching position in the same school.

Teacher attrition. Refers to classroom teachers who take a nonteaching position or exit a state public school system for any reason. Because the data for this study were from multiple state education agency administrative data systems that do not share a common teacher identifier, teacher movement across states could not be tracked. So attrition here reflects movement to a nonteaching position, exit from each state's public school system, and exit from the profession.

Teacher mobility. Refers to classroom teachers who transfer to a classroom teaching position in a different public school or district in the same state public school system for any reason.

Teacher retention. Refers to classroom teachers who remain in a classroom teaching position in the same school.

While overall proportions of teachers who stay, move, or leave have implications for schools and their students, dynamics within each of these phenomena also appear to be important. For example, among teachers who remain in the same school (stayers), increased prevalence of teachers who change grade levels or subject areas has been associated with lower student achievement (Atteberry et al., 2016). Among teachers who change schools (movers), costs associated with the transition may be higher among those who change districts than among those who change schools within a district. Similarly, for teachers who leave a classroom teaching position (leavers), associated costs to the public school system are likely higher for those who leave the system than for those who take a nonteaching

position in the system. Alliance members requested information to better understand these different types of retention, mobility, and attrition. See appendix A for a review of the literature on teacher shortages and challenges in rural settings; teacher mobility and attrition and their consequences; factors associated with teacher retention, mobility, and attrition; and the need for local analyses of rural teacher retention, mobility, and attrition.

The current report provides teacher retention, mobility, and attrition rates in rural and nonrural settings in four Regional Educational Laboratory (REL) Central states. The study is designed to help state and district administrators understand the extent to which needs for recruitment and retention differ across states, rural and nonrural locales, and school districts. The study also provides information about the characteristics of stayers, movers, and leavers, including the extent to which teachers change grade-level assignments within a school, the extent to which teachers who change schools also change districts, and the extent to which teachers who leave a classroom teaching position also leave their state public school system.

Taken together, the study findings are designed to provide region- and state-specific information about teacher retention, mobility, and attrition that may be used to target workforce improvement strategies and develop teacher supports or incentives to improve teacher recruitment and retention where the need is greatest. A subsequent report will focus on the teacher, school, and district characteristics that are related to teacher mobility and attrition in rural and nonrural settings.

The study findings are designed to provide region- and state-specific information about teacher retention, mobility, and attrition that may be used to target workforce improvement strategies and develop teacher supports or incentives to improve teacher recruitment and retention where the need is greatest

What the study examined

The study used administrative data provided by the state education agencies in Colorado, Missouri, Nebraska, and South Dakota to address four research questions related to teacher retention, mobility, and attrition between 2015/16 and 2016/17:

1. What proportions of teachers remained in a classroom teaching position in the same school (stayers), transferred to a classroom teaching position in a different school or district (movers), and took a nonteaching position or left their state public school system (leavers)?
2. What proportion of stayers had the same grade-level assignment, and what proportion had a different grade-level assignment?
3. What proportion of movers remained in the same district, and what proportion transferred to a different district?
4. What proportion of leavers took a nonteaching position, and what proportion left their state public school system?

Question 1 examines proportions by state and for rural and nonrural schools and districts; questions 2–4 examine proportions by state and for rural and nonrural schools. Data and methods are summarized in box 2 and presented in more detail in appendix B.

Box 2. Data and methods

The study used administrative data provided by the state education agencies in Colorado, Missouri, Nebraska, and South Dakota. The state education agency data files included data for all teachers during 2015/16 and 2016/17, including their employment positions (the professional role of an individual in a state public school system, defined as either a classroom teaching position or a nonteaching position) and district, school, and grade-level assignments. School and district locale indicators were obtained from the National Center for Education Statistics Elementary and Secondary Information System.

Teachers' primary assignments to districts, schools, teaching or nonteaching positions, and grade levels for 2015/16 and 2016/17 were used as the basis for determining their status as stayers, movers, and leavers. For teachers with multiple assignments, the primary assignment was the one in which they spent the most time.

The study focuses on teachers at the beginning of 2015/16 and determines their status as stayers, movers, and leavers based on their assignments at the beginning of 2016/17. Specifically, the proportions of stayers, movers, and leavers were calculated by dividing the number of teachers in each group in 2016/17 by the total number of teachers in 2015/16. Subcategories of the groups were also examined: the proportion of stayers who had the same grade-level assignment and the proportion who had a different grade-level assignment, the proportion of movers who remained in the same district and the proportion who transferred to a different district, and the proportion of leavers who took a nonteaching position and the proportion who left their state public school system. All proportions were disaggregated by state and by school locale (rural or nonrural setting); data on rural schools were further disaggregated by type of rurality (rural–fringe, rural–distant, or rural–remote; see appendix C).

Data were not available to determine Nebraska teachers' primary grade-level assignments or whether Missouri or Nebraska teachers took a nonteaching position.

What the study found

This section reports patterns of teacher retention (stayers), mobility (movers), and attrition (leavers) in rural and nonrural schools and districts in Colorado, Missouri, Nebraska, and South Dakota between 2015/16 and 2016/17.

Approximately four out of five teachers remained in a classroom teaching position in the same school

Between 2015/16 and 2016/17, 82 percent of teachers across all four states remained in a classroom teaching position in the same school (table 2). The proportion of stayers ranged from 79 percent in Colorado to 86 percent in Nebraska.

The proportion of movers was slightly lower than the proportion of leavers

About 8 percent of teachers across all four states transferred to a different school, and 10 percent took a nonteaching position or left their state public school system (see table 2). The proportion of movers ranged from 7 percent in Nebraska to 9 percent in Colorado, and the proportion of leavers ranged from 8 percent in Nebraska to 13 percent in Colorado.

Between 2015/16 and 2016/17, 82 percent of teachers across all four states remained in a classroom teaching position in the same school, 8 percent transferred to a different school, and 10 percent took a nonteaching position or left their state public school system

Table 2. Stayers, movers, and leavers, by state, 2015/16–2016/17

| State and statistic | Stayers | Movers | Leavers | Total |
|----------------------|---------|--------|---------|---------|
| Four states combined | | | | |
| Number | 127,241 | 12,527 | 16,166 | 155,934 |
| Percent | 81.6 | 8.0 | 10.4 | 100.0 |
| Colorado | | | | |
| Number | 41,185 | 4,487 | 6,772 | 52,444 |
| Percent | 78.5 | 8.6 | 12.9 | 100.0 |
| Missouri | | | | |
| Number | 55,857 | 5,647 | 6,551 | 68,055 |
| Percent | 82.1 | 8.3 | 9.6 | 100.0 |
| Nebraska | | | | |
| Number | 22,313 | 1,696 | 1,977 | 25,986 |
| Percent | 85.9 | 6.5 | 7.6 | 100.0 |
| South Dakota | | | | |
| Number | 7,886 | 697 | 866 | 9,449 |
| Percent | 83.5 | 7.4 | 9.2 | 100.0 |

The proportion of movers ranged from 7 percent in Nebraska to 9 percent in Colorado, and the proportion of leavers ranged from 8 percent in Nebraska to 13 percent in Colorado

Note: Percentages may not sum to 100 because of rounding. The sample includes all teachers for whom a primary school and district assignment could be identified.

Source: Authors' analysis of administrative data provided by the state education agencies in Colorado, Missouri, Nebraska, and South Dakota (see appendix B).

The proportion of stayers was similar in rural and nonrural schools

The proportion of stayers across all four states was similar in rural schools (83 percent) and nonrural schools (82 percent) (figure 1). Comparison of proportions of stayers, movers, and leavers within each state also suggests that they were similar in rural and nonrural schools.

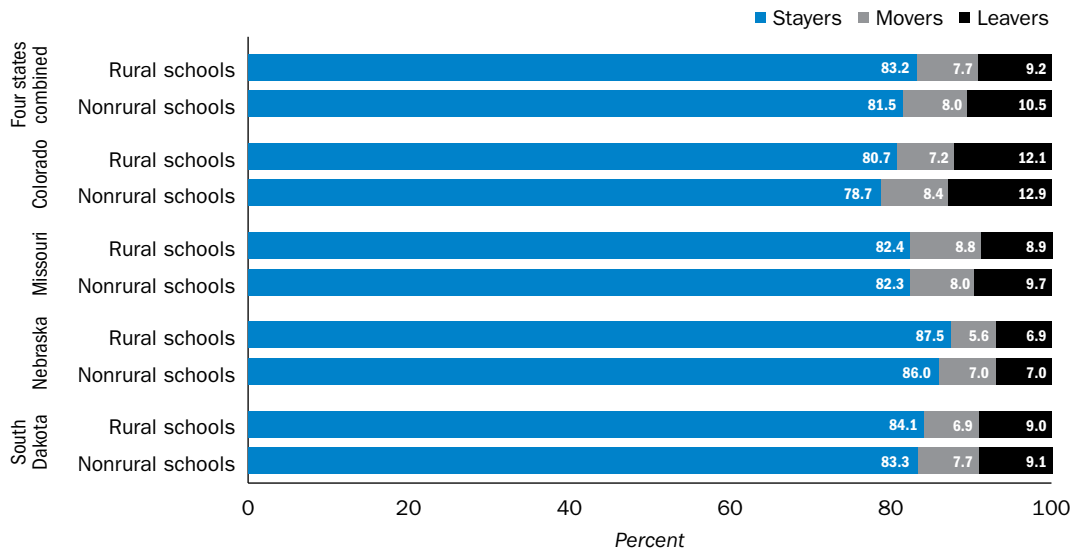
The combined proportion of movers and leavers varied substantially across districts

The combined proportion of movers and leavers varied substantially across districts in each state (map 1). All states have clusters of districts with similar proportions of movers and leavers. While these maps provide only a high-level illustration of variation by district, the data underlying them may be used to generate state-specific reports of district-level mobility and attrition that may help target resources such as additional supports for teacher recruitment and retention. Reports of these data with the proportions of stayers, movers, and leavers by district were shared with stakeholders in each study state for this purpose.

Most stayers remained in the same grade-level assignment

Only a small proportion of stayers across the three states with available data had a different grade-level assignment in 2015/16 and 2016/17 (table 3). The proportion ranged from 0.2 percent in South Dakota to 2.7 percent in Missouri.

Figure 1. The proportion of teachers across all four states who remained in a classroom teaching position in the same school between 2015/16 and 2016/17 was similar in rural and nonrural schools



Note: Percentages may not sum to 100 because of rounding. The sample includes all teachers for whom a primary school and district assignment and school locale could be identified. See table C1 in appendix C for the data used to create this figure.

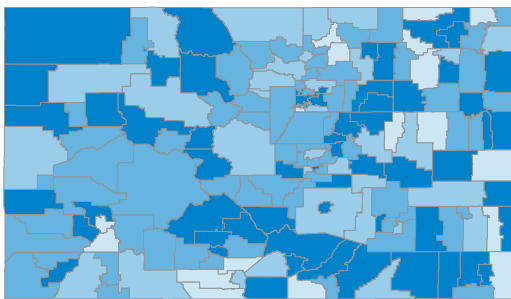
Source: Authors' analysis of administrative data provided by the state education agencies in Colorado, Missouri, Nebraska, and South Dakota (see appendix B).

Map 1. The combined proportion of movers and leavers between 2015/16 and 2016/17 varied across districts in each state

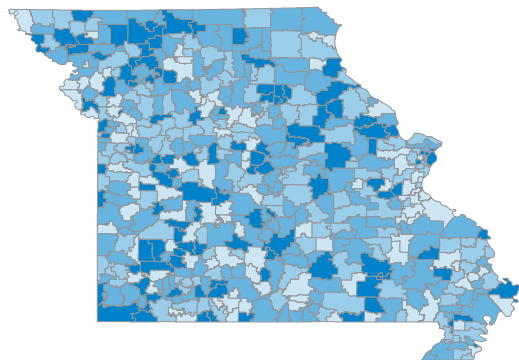
Average proportion of movers and leavers (percent)

■ Less than 11 ■ 11–15 ■ 16–24 ■ More than 24

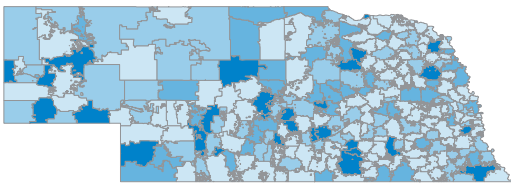
Colorado



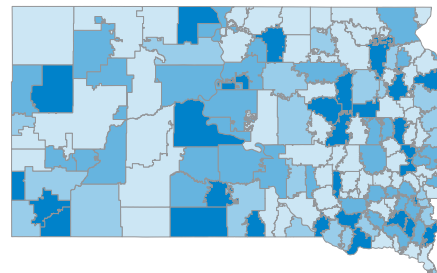
Missouri



Nebraska



South Dakota



Note: The categories in the legend are based on quartiles for the overall (four-state) sample of 2015/16 educators.

Source: Authors' analysis of administrative data provided by the state education agencies in Colorado, Missouri, Nebraska, and South Dakota (see appendix B).

Table 3. Subcategories of stayers, movers, and leavers, by state, 2015/16–2016/17

| State and statistic | Stayers | | | Movers | | | Leavers | | |
|----------------------|-----------------------------|----------------------------------|---------|---------------|--------------------|--------|--|---------------------------------|-------|
| | Same grade level assignment | Different grade level assignment | Total | Same district | Different district | Total | Nonteaching position in state public school system | Left state public school system | Total |
| Four states combined | | | | | | | | | |
| Number | 101,405 | 1,860 | 103,265 | 6,435 | 6,092 | 12,527 | 343 | 7,295 | 7,638 |
| Percent | 98.2 | 1.8 | 100.0 | 51.4 | 48.6 | 100.0 | 4.5 | 95.5 | 100.0 |
| Colorado | | | | | | | | | |
| Number | 39,882 | 367 | 40,249 | 2,242 | 2,245 | 4,487 | 239 | 6,533 | 6,772 |
| Percent | 99.1 | 0.9 | 100.0 | 50.0 | 50.0 | 100.0 | 3.5 | 96.5 | 100.0 |
| Missouri | | | | | | | | | |
| Number | 53,701 | 1,477 | 55,178 | 2,789 | 2,858 | 5,647 | — | — | — |
| Percent | 97.3 | 2.7 | 100.0 | 49.4 | 50.6 | 100.0 | — | — | — |
| Nebraska | | | | | | | | | |
| Number | — | — | — | 937 | 759 | 1,696 | — | — | — |
| Percent | — | — | — | 55.2 | 44.8 | 100.0 | — | — | — |
| South Dakota | | | | | | | | | |
| Number | 7,822 | 16 | 7,838 | 467 | 230 | 697 | 104 | 762 | 866 |
| Percent | 99.8 | 0.2 | 100.0 | 67.0 | 33.0 | 100.0 | 12.0 | 88.0 | 100.0 |

— is not available.

Note: The sample includes all teachers for whom a primary school, district, and grade-level assignment could be identified. The total number of stayers is smaller than in table 2 because that table includes teachers for whom a primary grade-level assignment could not be identified. Data were not available to determine Nebraska teachers' primary grade-level assignments or whether Missouri and Nebraska teachers took a nonteaching position.

Source: Authors' analysis of administrative data provided by the state education agencies in Colorado, Missouri, Nebraska, and South Dakota (see appendix B).

About half of movers transferred to a school in the same district, and half transferred to a school in a different district

In Colorado, Missouri, and Nebraska about half of teachers who transferred to a different school remained in the same district (see table 3). The proportion was higher in South Dakota than in the other three states (67 percent).

Most leavers left their state public school system

In the two states with available data, most leavers left their state public school system as opposed to moving to a nonteaching position (see table 3). The proportion of leavers who took a nonteaching position was 4 percent in Colorado and 12 percent in South Dakota.

The proportion of leavers who took a nonteaching position was 4 percent in Colorado and 12 percent in South Dakota

The proportion of stayers who had a different grade-level assignment and the proportion of movers who transferred to a different district were higher in rural schools than in nonrural schools

The proportion of teachers across the three states with available data who had a different grade-level assignment in 2015/16 and 2016/17 was slightly higher in rural schools (2.9 percent) than in nonrural schools (1.4 percent; table 4). Missouri and South Dakota followed this pattern, while in Colorado the proportion of teachers who had a different grade-level assignment was higher in nonrural schools. The proportion of movers across

Table 4. Subcategories of stayers, movers, and leavers, by state and school locale, 2015/16–2016/17

| State and statistic | Stayers | | | Movers | | | Leavers | | |
|----------------------|-----------------------------|----------------------------------|---------|---------------|--------------------|--------|--|---------------------------------|-------|
| | Same grade level assignment | Different grade level assignment | Total | Same district | Different district | Total | Nonteaching position in state public school system | Left state public school system | Total |
| Four states combined | | | | | | | | | |
| Number of teachers | 100,826 | 1,834 | 102,660 | 6,201 | 5,797 | 11,998 | 339 | 7,110 | 7,449 |
| Rural schools (%) | 97.1 | 2.9 | 100.0 | 40.5 | 59.5 | 100.0 | 6.7 | 93.3 | 100.0 |
| Nonrural schools (%) | 98.6 | 1.4 | 100.0 | 55.3 | 44.7 | 100.0 | 4.1 | 95.9 | 100.0 |
| Total (%) | 98.2 | 1.8 | 100.0 | 51.7 | 48.3 | 100.0 | 4.6 | 95.4 | 100.0 |
| Colorado | | | | | | | | | |
| Number of teachers | 39,671 | 364 | 40,035 | 2,107 | 2,161 | 4,268 | 236 | 6,361 | 6,597 |
| Rural schools (%) | 99.4 | 0.6 | 100.0 | 39.2 | 60.8 | 100.0 | 5.4 | 94.6 | 100.0 |
| Nonrural schools (%) | 99.0 | 1.0 | 100.0 | 50.9 | 49.1 | 100.0 | 3.3 | 96.7 | 100.0 |
| Total (%) | 99.1 | 0.9 | 100.0 | 49.4 | 50.6 | 100.0 | 3.6 | 96.4 | 100.0 |
| Missouri | | | | | | | | | |
| Number of teachers | 53,344 | 1,454 | 54,798 | 2,709 | 2,817 | 5,526 | — | — | — |
| Rural schools (%) | 95.6 | 4.4 | 100.0 | 39.0 | 61.0 | 100.0 | — | — | — |
| Nonrural schools (%) | 98.1 | 1.9 | 100.0 | 53.5 | 46.5 | 100.0 | — | — | — |
| Total (%) | 97.3 | 2.7 | 100.0 | 49.0 | 51.0 | 100.0 | — | — | — |
| Nebraska | | | | | | | | | |
| Number of teachers | — | — | — | 922 | 596 | 1,518 | — | — | — |
| Rural schools (%) | — | — | — | 38.5 | 61.5 | 100.0 | — | — | — |
| Nonrural schools (%) | — | — | — | 68.4 | 31.6 | 100.0 | — | — | — |
| Total (%) | — | — | — | 60.7 | 39.3 | 100.0 | — | — | — |
| South Dakota | | | | | | | | | |
| Number of teachers | 7,811 | 16 | 7,827 | 463 | 223 | 686 | 103 | 749 | 852 |
| Rural schools (%) | 99.7 | 0.3 | 100.0 | 54.1 | 45.9 | 100.0 | 9.7 | 90.3 | 100.0 |
| Nonrural schools (%) | 99.9 | 0.1 | 100.0 | 78.4 | 21.6 | 100.0 | 14.3 | 85.7 | 100.0 |
| Total (%) | 99.8 | 0.2 | 100.0 | 67.5 | 32.5 | 100.0 | 12.1 | 87.9 | 100.0 |

— is not available.

Note: The sample includes all teachers for whom a primary school and district assignment and school locale could be identified. The total numbers of stayers, movers, and leavers are smaller than in tables 2 and 3 because those tables include teachers for whom a primary grade-level assignment and school locale could not be identified. Data were not available to determine Nebraska teachers' primary grade-level assignments or whether Missouri and Nebraska teachers took a nonteaching position.

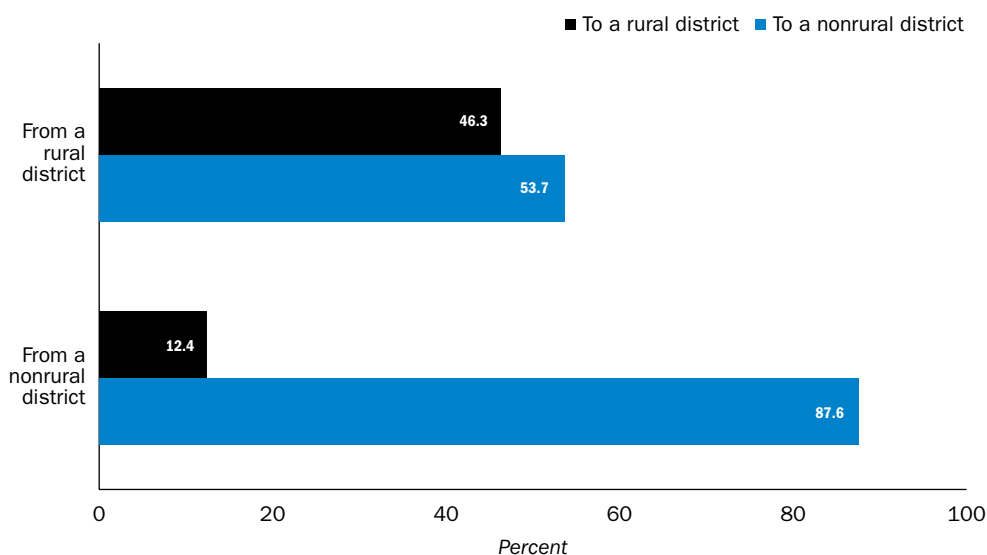
Source: Authors' analysis of administrative data provided by the state education agencies in Colorado, Missouri, Nebraska, and South Dakota (see appendix B).

all four states who transferred to a different district was 60 percent in rural schools and 45 percent in nonrural schools. All four states followed this pattern of higher rates of district changes in rural schools.

Slightly more than half of teachers who transferred from a rural district moved to a nonrural district

Among teachers who transferred from a rural district between 2015/16 and 2016/17, 54 percent moved to a nonrural district (figure 2). Among teachers who transferred from a nonrural district, 88 percent moved to another nonrural district. Movers who transferred from a nonrural school showed a similar pattern: about 12 percent moved to a rural school and about 88 moved to a nonrural school (see table C4 in appendix C). Among

Figure 2. Across all four states, slightly more than half of teachers who transferred from a rural district between 2015/16 and 2016/17 moved to a nonrural district



Note: The sample includes all teachers for whom a primary school and district assignment and school and district locale could be identified in both 2015/16 and 2016/17. See table C3 in appendix C for the data used to create this figure.

Source: Authors' analysis of administrative data provided by the state education agencies in Colorado, Missouri, Nebraska, and South Dakota (see appendix B).

teachers who transferred from a rural school, 58 percent moved to another rural school, and 42 percent moved to a nonrural school. These findings differ by state and likely reflect differences in the proportions of rural and nonrural schools and districts in each state. Additional information about teacher movement according to district and school rurality and by state is presented in appendix C (see tables C3–C5).

Implications of the study findings

The findings of this study provide a picture of teacher stayers, movers, and leavers in rural and nonrural settings in Colorado, Missouri, Nebraska, and South Dakota. National data suggest that from one year to the next, about 84 percent of teachers remain in the same school, 8 percent transfer to a different school, and 8 percent leave the profession (Goldring et al., 2014). The current study finds comparable proportions in the four study states, with a slightly lower proportion of stayers (82 percent) and a slightly higher proportion of leavers (10 percent).

National statistics for rural schools are similar to those for all schools: from year to year, about 85 percent of teachers remain in the same school, 7 percent transfer to a different school, and 8 percent leave the profession (Goldring et al., 2014). The current study finds that in the four study states the proportion of stayers in rural schools is slightly lower (83 percent), while the proportions of movers (8 percent) and leavers (9 percent) are slightly higher.

Echoing national trends, recent state-specific reports have also noted substantial variation in the supply and demand of teachers across regions and content areas (Cole, 2017b;

The current study finds that in the four study states the proportion of stayers in rural schools (83 percent) is slightly lower than the national average, while the proportions of movers (8 percent) and leavers (9 percent) are slightly higher

Gais, Malatras, Wagner, & Park, 2017; Nebraska Department of Education, 2017). Those findings, along with the current study's findings of variation across districts in the proportions of movers and leavers, suggest a more pronounced need for teachers in some districts, where efforts to support teacher recruitment and retention could be prioritized. This variation across districts also suggests that state education agencies may wish to continue to monitor teacher retention, mobility, and attrition at both the state and local levels. Ongoing identification of districts with high rates of movers and leavers could foster collaboration among districts that share needs. For example, district leaders within and across states might work together as a peer group to better understand causes of high mobility and attrition and explore potential solutions. Because transitions to a different district may require additional support for teachers to learn new curricula, policies, or procedures, administrators in schools and districts with high rates of movers and leavers may want to consider ways to support teachers who make these transitions by, for example, providing mentorship opportunities or adjusting the teaching load.

The variation across districts in the proportions of movers and leavers suggests that state education agencies may wish to continue to monitor teacher retention, mobility, and attrition at both the state and local levels. Ongoing identification of districts with high rates of movers and leavers could foster collaboration among districts that share needs

The findings may be of interest to policymakers, state education agency leaders, and district administrators in REL Central states and elsewhere as they address local teacher workforce issues. For example, the proportions of stayers, movers, and leavers vary substantially by school district. District-level information (shared with stakeholders in each state) may be used to target teacher supports or incentives designed to improve teacher recruitment and retention where the need is greatest.

This study shows how administrative data maintained by state education agencies can provide detailed information about teacher retention, mobility, and attrition. Reviewing this information may prompt state education agency leaders in the four REL Central states and elsewhere to collect additional information, or adapt the information they already collect, to better address questions about the teacher workforce. For example, teacher movement across state lines is an issue for states that share borders near population centers. State education agency leaders may wish to explore ways to share data to better understand movement of teachers from one state public school system to another.

Limitations of the study

This study has four main limitations.

First, the teacher retention, mobility, and attrition examined are limited to movement within or out of state public school systems in Colorado, Missouri, Nebraska, and South Dakota. Unique teacher identifiers are state specific, so movement from one state to another could not be tracked.

Second, because the study focuses on point-in-time employment status at the beginning of consecutive academic years, it does not track teachers who left and later returned to the same state public school system. Teachers who left midyear (for example, for medical reasons or maternity leave) and returned the following year to the same school are considered stayers, and those who returned the next year to a different school are considered movers. Similarly, retention, mobility, and attrition are examined for only one year. It was not possible to determine the extent to which the proportions of stayers, movers, and leavers between 2015/16 and 2016/17 are comparable to proportions in other school years.

Third, the data cover public schools only, so the findings characterize teacher retention, mobility, and attrition in state public school systems only. Teacher retention, mobility, and attrition in private schools were not examined. The study characterizes the movement of teachers from a public school to a private school as movement out of a public school system.

Fourth, the study does not distinguish between voluntary and involuntary employment status changes and does not examine why teachers transferred to a different school or left a state public school system because that information is not reliably tracked in state education agency data systems. Those systems vary in the nature and extent of the information they maintain. For example, because descriptions of teacher assignments differ across states, common grade-level categories were created to facilitate comparisons. This categorization may mask state-specific differences.

Appendix A. Literature review

This appendix reviews the literature related to teacher shortages and challenges in rural settings; teacher mobility and attrition and their consequences; the factors associated with teacher retention, mobility, and attrition; and the need for local analyses of rural teacher retention, mobility, and attrition.

Teacher shortages and challenges in rural settings

Over the past several decades education leaders and researchers have focused on teacher shortages (Borman & Dowling, 2008; Malkus, Hoyer, & Sparks, 2015). Several recent studies have prompted continued concern. For example, an analysis of data from the federal Higher Education Act Title II reporting system revealed a decrease in teacher preparation program enrollment in recent years, from more than 700,000 teacher candidates in 2008/09 to fewer than 500,000 in 2012/13 (Office of Postsecondary Education, 2015). In addition, an analysis of national data from the Schools and Staffing Survey, Common Core of Data, and Digest of Education Statistics suggested a national shortage of 64,000 teachers in 2015/16, a number expected to increase fivefold by 2025 (Sutcher et al., 2016).

However, other national data contradict, or at least mitigate, the notion of a worsening national teacher shortage. For example, public school principal reports of teacher vacancies from the Schools and Staffing Survey indicated that vacancies decreased between 1999/2000 and 2011/12 (Malkus et al., 2015). Recent projections, based on national data, have also suggested that the national supply of elementary and secondary teachers will grow 6 percent through 2026, while elementary and secondary student enrollment will grow 2 percent (Hussar & Bailey, 2018).

The literature consistently reports that teacher shortages are more pronounced in particular content areas, types of districts and schools, and geographic areas. Analyses of national data have identified acute shortages among teachers of math, science, special education, foreign languages, and English for English learners; teachers in high-poverty and high-racial/ethnic minority schools; and teachers in locations where wages, school resources, and working conditions are least attractive (Podolsky et al., 2016, Sutcher et al., 2016).

Analyses of shortages and the factors that influence them, including wages, working conditions, and attrition rates, have also revealed substantial variation across U.S. geographic areas, regions, and states (Sutcher et al., 2016). Rural schools and districts face more acute teacher shortages in content areas such as math and science than nonrural schools and districts do (Malkus et al., 2015; McClure & Reeves, 2004; Murphy, DeArmond, & Guin, 2003). They also struggle with teacher retention because they cannot provide competitive salaries and because they are socially and geographically isolated (Hammer, Hughes, McClure, Reeves, & Salgado, 2005; Player, 2015). Rural districts also have smaller applicant pools with fewer qualified teachers (Player, 2015).

Teacher mobility and attrition and their consequences

Teacher mobility and attrition are the primary contributors to teacher shortages, and as is the case with teacher shortages, teacher mobility and attrition rates vary substantially across states and districts (Plecki et al., 2005; Sutcher et al., 2016). Recent analyses of

national data have suggested that 17 percent of new teachers leave teaching within five years (Gray & Taie, 2015). In contrast to teacher decisions to change positions or leave teaching, involuntary mobility and attrition may be caused by principals who assign teachers to a new position or who do not renew teachers' contracts. Involuntary mobility and attrition can yield positive effects for schools and students by better matching teacher strengths to a particular position or by replacing ineffective teachers with more effective ones.

But the movement of teachers out of positions is frequently associated with a range of negative consequences for schools and students. Studies examining the movement of individual teachers out of teaching positions and schools have documented negative effects on student achievement (Atteberry et al., 2016; Ronfeldt, Loeb, & Wyckoff, 2013). High attrition and mobility have also been linked to substantial costs for districts and schools because of the need to invest in additional recruitment, hiring, and training (Barnes, Crowe, & Schaefer, 2006; Borman & Dowling, 2008). These negative consequences tend to be concentrated in schools with consistently high attrition and mobility (commonly schools in low-performing districts and economically disadvantaged areas), leading to inequitable distribution of experienced teachers and compromising efforts to maintain supportive and collegial work environments (Ingersoll & Merrill, 2012; Podgursky et al., 2016; Sutcher et al., 2016).

Factors associated with teacher retention, mobility, and attrition

A large body of research has examined teacher retention, mobility, and attrition and their contributing factors. Many studies have focused on characterizing annual mobility and attrition, describing the extent to which teachers move out of schools and out of the teaching profession. For example, studies of national teacher survey data have shown that, from one year to the next, about 84 percent of teachers remain in the same school, 8 percent move to a different school, and 8 percent leave the profession (Goldring et al., 2014; Keigher, 2010).

These studies have also explored differences among teachers with varying experience, the extent to which teachers move within and across districts, and the factors contributing to teachers' decisions to stay or leave. Other studies have used longitudinal data to examine patterns of retention, mobility, and attrition, focusing on cohorts of teachers over multiple years (Gray & Taie, 2015; Ingersoll, 2001). Studies examining factors related to retention, mobility, and attrition have suggested that the decision to remain in a teaching position is affected by a variety of factors: the teacher's demographics, qualifications, and experience, as well as the characteristics of teacher preparation and induction, school organization and resources, and students and communities (Allensworth, Ponisciak, & Mazzeo, 2009; Borman & Dowling, 2008; Ingersoll, 2001; Podolsky et al., 2016). While several common factors associated with retention, mobility, and attrition have been identified across studies, their relative contribution varies (Borman & Dowling, 2008), and fewer studies have examined differences in rural and nonrural settings.

The need for local analyses of rural teacher retention, mobility, and attrition

Ongoing concern about teacher shortages, particularly in rural settings, and the negative consequences of teacher mobility and attrition suggest the need for information about the

nature and extent of these issues. While research provides a satisfactory national-level picture of teacher retention, mobility, and attrition, the substantial variation and contributing factors across regions, states, and districts reveal the need for more localized analysis of these phenomena to guide policy decisions. Indeed, several studies examining these phenomena at the state and district levels have been undertaken in recent years (Goff, Carl, & Yang, 2018; Janulis, 2017; Lovett, 2016; Podgursky et al., 2016).

Appendix B. Data and methodology

The study team used administrative data provided by the state education agencies in Colorado, Missouri, Nebraska, and South Dakota. These data were supplemented with data from the Elementary and Secondary Information System, which is maintained by the National Center for Education Statistics and includes data from the Common Core of Data, a national data collection involving all U.S. states, districts, and schools (National Center for Education Statistics, n.d. a).

Data acquisition

The study team submitted formal requests for data to state education agencies in late 2017. Memoranda of agreement for data sharing were subsequently established, and the agencies provided data in February and March 2018. In particular, the agencies provided de-identified classroom teacher data that allowed teachers to be linked across years and to their schools and districts and that provided information about teacher characteristics and assignments. The study team worked closely with state education agency staff in early 2018 to acquire additional documentation and confirm understanding of the data provided. Data on district and school locales in 2015/16 were downloaded from the Elementary and Secondary Information System in April 2018.

Data elements

All state education agencies provided teacher data based on agency-specific staff position codes for 2015/16–2016/17. The agencies identified teachers using the following definition: “A staff member assigned the professional activities of instructing students in grades preK–12 in self-contained classes or courses: excluding classroom interventionists, student teachers, teacher aides, paraprofessionals, librarians, psychologists, and speech pathologists.” State education agencies in all four states provided data for classroom teachers for both years. In addition, the agencies in Colorado and South Dakota provided data for educators in nonteaching positions in 2016/17.

The state education agencies provided district, school, and grade-level assignment data for each educator in their public school system as of the beginning of each academic year. All state education agency data files included multiple records for each educator in cases in which a teacher was assigned to more than one district, school, or grade level. Information about the amount of time associated with each district and school was also provided as full-time equivalent percentages for Colorado, Nebraska, and South Dakota and as course minutes for Missouri. Information connecting the full-time equivalent associated with each grade-level assignment was not available for Nebraska teachers.

School and district locales were obtained from the Elementary and Secondary Information System.

Data preparation

The study team followed three steps to prepare the data files for analysis.

Step 1: Identifying classroom teachers. The study team identified all classroom teachers for each year from 2015/16 to 2016/17 for South Dakota. This step was necessary because the state dataset for South Dakota contained multiple records indicating that some educators had both teaching and nonteaching positions.² When educators had multiple positions, the study team used the full-time equivalent in each position to identify whether the majority of their time was spent as classroom teachers. The study team also identified teachers' primary positions as those in which they spent the most time (that is, had the highest total full-time equivalent). When teachers had multiple positions in which they spent equal amounts of time (for example, as a classroom teacher and administrator), the primary position was deemed to be indeterminate and was not identified. In South Dakota less than 1 percent of teachers had an indeterminate primary position (table B1).

Step 2: Determining teachers' primary district, school, and grade-level assignment. The study team identified each teacher's beginning-of-year primary district, school, and grade-level assignment, using the same approach that was used to determine primary position in step 1. The study team identified primary grade-level assignments using only the assignment data associated with teachers' primary schools.

For Colorado, Missouri, and South Dakota, values for grade-level assignments were recoded to use a common set of categories across states. For example, Colorado data contained separate grade-level codes for each grade level, and common categories were created to include "Elementary," "Middle," and "High" school, among other categories. This categorization allowed for assignment data to be combined across states.

Because Nebraska data did not include full-time equivalent information associated with grade level, the primary grade-level assignments for teachers with multiple assignments could not be determined. Although many Nebraska teachers had a single grade-level assignment, these data were excluded to avoid introducing bias due to missing data for teachers with multiple assignments. In each state, a small percentage of teachers (less than 5 percent) had indeterminate primary districts, schools, and grade-level assignments (see table B1).

Step 3: Identifying teachers as stayers, movers, and leavers. School and district identifiers also provided the basis for identifying teachers as stayers, movers, and leavers. Teachers who had the same primary school identifiers at the beginning of both 2015/16 and 2016/17 were considered stayers. Teachers with different primary school identifiers across those two years were considered movers. Individuals who were identified as teachers in 2015/16 but not in 2016/17 were considered leavers.

The study team used a similar approach to determine whether stayers in Colorado, Missouri, and South Dakota had the same grade-level assignment in 2015/16 and 2016/17, whether movers in all four states transferred to a school in the same district (that is, whether they had the same primary district identifier in both 2015/16 and 2016/17), and whether leavers in Colorado and South Dakota took a nonteaching position or left their state public school system. Most leavers were individuals with data records indicating that they were teachers in 2015/16 but with no data records in 2016/17.

Samples

To classify teachers as stayers, movers, or leavers, the numbers and percentages of teachers who could be identified as having a primary position, district, school, and grade-level assignment were identified (table B1). These characteristics were identifiable (as described in step 1 above) for the majority of respondents across states.

The samples included teachers who could be classified as stayers, movers, and leavers (table B2). The percentages of teachers for whom subcategories of stayers, movers, and leavers could be identified (that is, stayers who had the same grade-level assignment and those who had a different grade-level assignment, movers who remained in the same district

Table B1. Preliminary sample, by state, 2015/16

| Preliminary sample | Four states combined | Colorado | Missouri | Nebraska | South Dakota |
|---|----------------------|----------|----------|----------|--------------|
| Number of teachers | 158,060 | 53,167 | 68,629 | 26,702 | 9,562 |
| Teachers with a primary position (%) | 100.0 | 100.0 | 100.0 | 100.0 | 99.6 |
| Teachers with a primary district (%) | 99.9 | 100.0 | 100.0 | 99.6 | 99.9 |
| Teachers with a primary school (%) | 98.2 | 98.5 | 98.9 | 96.5 | 96.0 |
| Teachers with a primary grade level (%) | 99.2 | 98.5 | 99.5 | — | 99.6 |

— is not available.

Note: Data were not available to identify Nebraska teachers' primary grade-level assignments.

Source: Authors' analysis of administrative data provided by the state education agencies in Colorado, Missouri, Nebraska, and South Dakota (see appendix B).

Table B2. Analytic samples, by state, 2015/16

| Analytic samples | Four states combined | Colorado | Missouri | Nebraska | South Dakota |
|--|----------------------|----------|----------|----------|--------------|
| Number of teachers | 158,060 | 53,167 | 68,629 | 26,702 | 9,562 |
| Teachers who could be identified as stayers, movers, or leavers ^a | | | | | |
| Number | 155,934 | 52,444 | 68,055 | 25,986 | 9,449 |
| Percent | 98.7 | 98.6 | 99.2 | 97.3 | 98.8 |
| Teachers who could be identified according to subcategories of stayers, movers, or leavers with additional detail ^b | | | | | |
| Number | 132,018 | 51,539 | 67,401 | 3,673 | 9,405 |
| Percent | 83.5 | 96.9 | 98.2 | 13.8 | 98.4 |
| Teachers for whom school locale could be identified | | | | | |
| Number | 152,042 | 51,919 | 67,528 | 23,147 | 9,448 |
| Percent | 96.2 | 97.7 | 98.4 | 86.7 | 98.8 |
| Teachers who could be identified as stayers, movers, or leavers and for whom school locale could be identified | | | | | |
| Number | 151,505 | 51,738 | 67,323 | 23,032 | 9,412 |
| Percent | 95.9 | 97.3 | 98.1 | 86.3 | 98.4 |

a. Includes teachers for whom primary school and district assignment could be identified in 2015/16 and 2016/17 (stayers and movers), as well as those for whom primary school and district assignment could be identified in 2015/16 but for whom there were no records in 2016/17 (leavers).

b. Includes teachers for whom the following subcategories could be identified: stayers who had the same grade-level assignment and those who had a different grade-level assignment, movers who remained in the same district and those who transferred to a different district, and leavers who took a nonteaching position and those who left their state public school system.

Source: Authors' analysis of administrative data provided by the state education agencies in Colorado, Missouri, Nebraska, and South Dakota (see appendix B).

and those who transferred to a different district, and leavers who took a nonteaching position and those who left their state public school system) were low for Nebraska because primary grade-level assignment could not be identified and the stayers category could not be subcategorized.

The geographic distribution of rural districts in each state is presented to provide context for understanding the maps presented in the report (map B1).

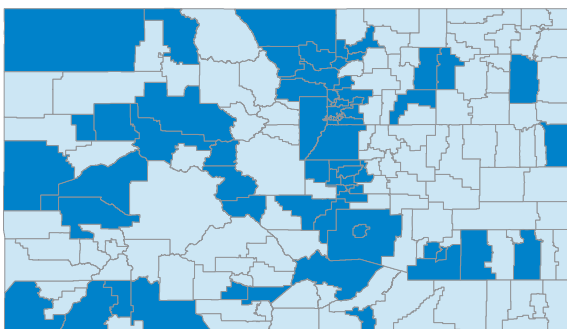
Summary of analysis variables

Teacher variables derived from state education agency data systems are summarized in table B3.

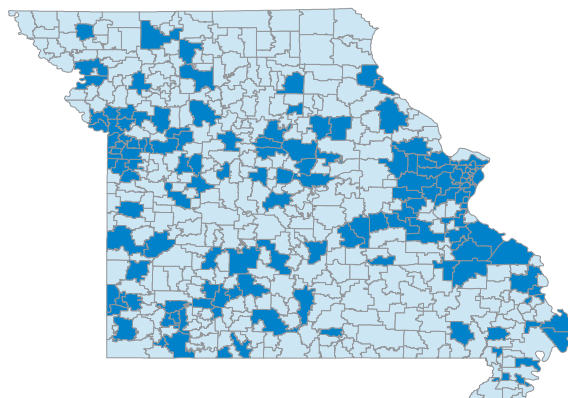
Rural schools and districts were identified based on the National Center for Education Statistics locale framework (Geverdt, 2015), using 2010 Census data, including those in a Census-defined rural territory with a school locale code of 41 (rural-fringe), 42 (rural-distant), or 43 (rural-remote). Schools and districts in other locales were designated as nonrural.

Map B1. Rural districts in Colorado, Missouri, Nebraska, and South Dakota, 2015/16

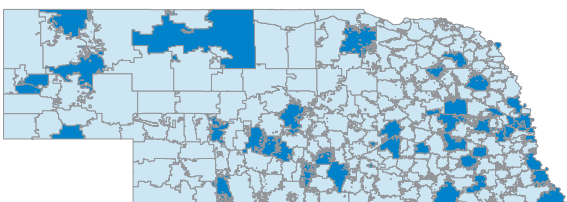
Colorado



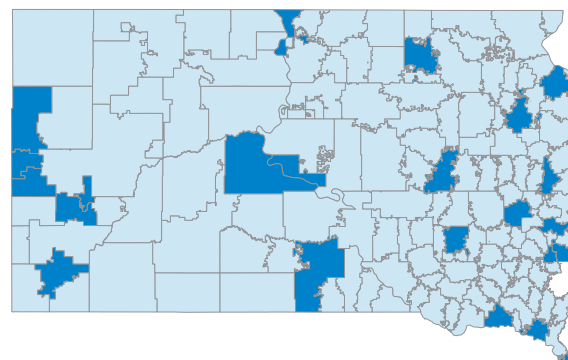
Missouri



Nebraska



South Dakota



■ Rural ■ Nonrural

Source: Authors' analysis of data from National Center for Education Statistics (n.d. a).

Table B3. Summary of teacher variables used in analyses

| Variable | Description |
|--|---|
| Teacher ID | Unique teacher identifier; used to link teacher data across years. |
| District, school position, and grade-level assignments | District identifier, school identifier, and codes corresponding to position (teaching or nonteaching) and grade-level assignments for 2015/16 and 2016/17; categorized according to grade level (early childhood, elementary, preK–8, middle, 6–12, high, preK–12). |
| Time in assignment | Full-time equivalent percentage (course minutes in Missouri) associated with time spent in district, school, position, and grade level in 2015/16 and 2016/17. |

Source: Authors' compilation of administrative data provided by state education agencies.

Analysis methods

Data addressing the research questions were analyzed collectively for all states for which data were available as well as separately for each state.

Rates of classroom teacher retention, mobility, and attrition were calculated to examine the proportions of classroom teachers who remained in a classroom teaching position in the same school, those who transferred to a classroom teaching position in a different school or district, and those who took a nonteaching position or left their state public school system. Data for 2015/16 and 2016/17 were used for these analyses, which involved the same approach as that to identify stayers, movers, and leavers (described in the *Data preparation* section above). Proportions of stayers, movers, and leavers were calculated by dividing the number of teachers in each group in 2016/17 by the total number of teachers in 2015/16. Each teacher was counted as one teacher in the analysis, regardless of full-time equivalent. Proportions were disaggregated by state, district, and school locale. Geographic Information Systems software was used to graphically represent this information in terms of districts within states.

Appendix C. Additional findings

This appendix includes results of additional analyses to identify the proportions of stayers, movers, and leavers in rural–fringe, rural–distant, rural–remote, and nonrural schools across the four REL Central states from 2015/16 to 2016/17. Table C1 contains the data used to create figure 1 in the main text. These analyses also examined, for rural–fringe, rural–distant, rural–remote, and nonrural schools, the proportion of stayers who had the same grade-level assignment and the proportion who had a different grade-level assignment, the proportion of movers who remained in the same district and the proportion who transferred to a different district, and the proportion of leavers who took a nonteaching position and the proportion who left their state public school system. The proportion of stayers was slightly higher in rural–fringe schools than in rural–distant and rural–remote schools (figure C1 and table C1).

Analyses identifying the proportions of stayers, movers, and leavers were disaggregated by type of stayer (same or different grade-level assignment), mover (same or different district), and leaver (nonteaching position or exit from the state public school system). These analyses are also disaggregated by locale (rural or nonrural) and type of rurality (rural–remote, rural–distant, or rural–fringe).

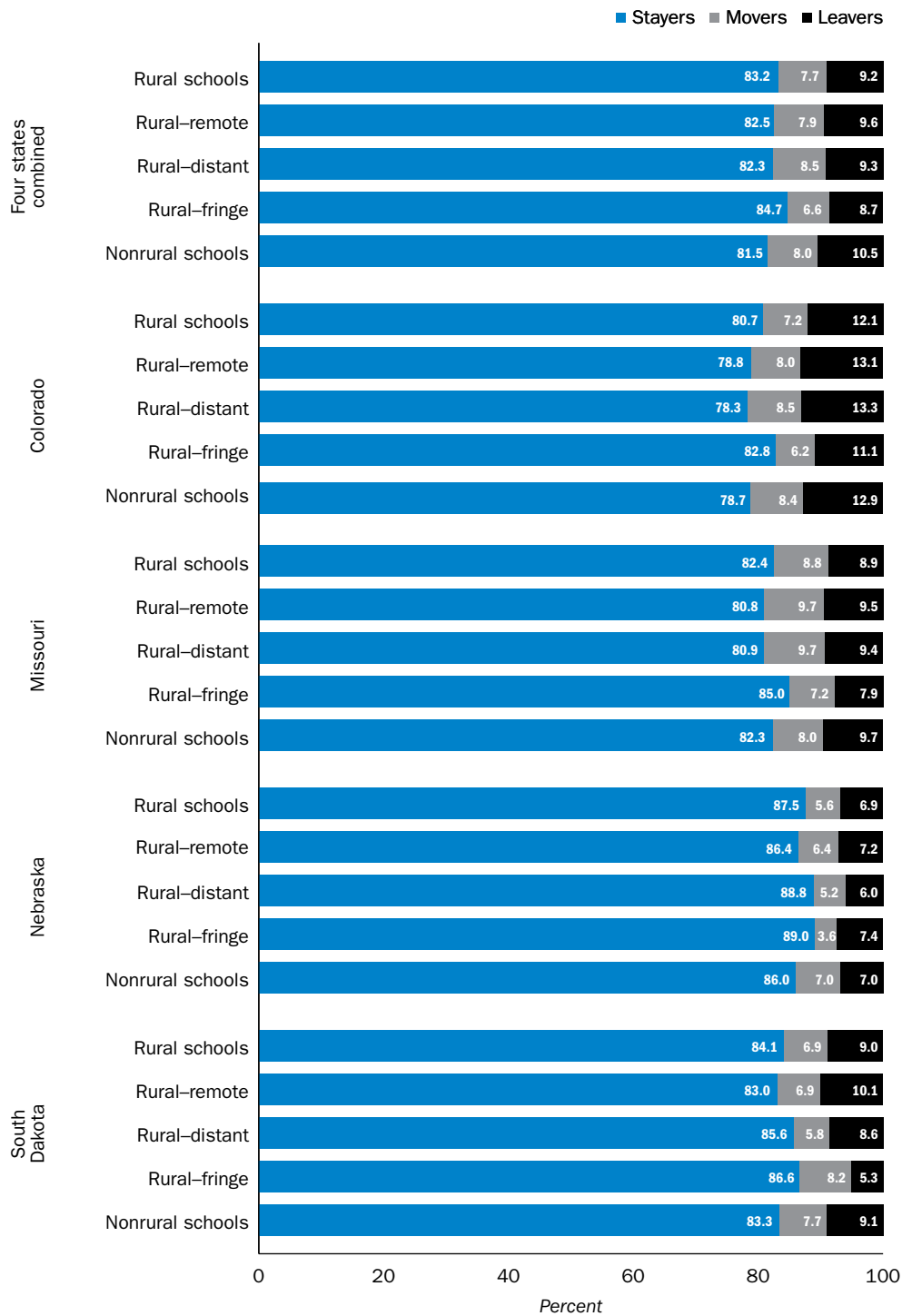
The proportion of stayers in rural schools who had a different grade-level assignment was low, and differences across rural–remote, rural–distant, and rural–fringe schools were small. In rural–fringe schools in Missouri and South Dakota the proportion of movers who remained in the same district was higher than the proportion who transferred to a different district (table C2). In rural–distant and rural–remote schools in Colorado, Missouri, and Nebraska the proportion of movers who transferred to a different district was higher than the proportion who remained in the same district. In Colorado rates of movement between schools in the same district and between schools in different districts were similar across rural–remote, rural–distant, and rural–fringe schools. In Colorado the proportion of leavers who took a nonteaching position in the state public school system was higher in rural–remote schools than in rural–distant and rural–fringe schools. In South Dakota the proportion of leavers who took a nonteaching position in the state public school system was higher in rural–fringe schools than in rural–remote and rural–distant schools.

Information about school and district rurality changes for movers is presented in tables C3–C5. Results are shown for the four states combined as well as disaggregated by state. Differences are apparent for district rurality changes across states (see table C3). For example, the proportion of between-district movers who moved from a rural district to a nonrural district was highest in South Dakota (27 percent), followed by Nebraska (19 percent), Missouri (18 percent), and Colorado (7 percent).

Similarly, differences are apparent for school rurality changes across states (see table C4). For example, the proportion of between-district movers who moved from a rural school to a nonrural school was highest in South Dakota (26 percent), followed by Missouri (19 percent), Nebraska (18 percent), and Colorado (11 percent).

Most teachers who changed districts had a school rurality change that was the same as their district rurality change (see table C5). For example, 94 percent of teachers who moved from a rural district to another rural district between 2015/16 and 2016/17 transferred from a rural school to another rural school. This general pattern was consistent across states.

Figure C1. The proportion of stayers between 2015/16 and 2016/17 was slightly higher in rural–fringe schools than in rural–distant and rural–remote schools



Note: Percentages may not sum to 100 because of rounding. The sample includes all teachers for whom a primary school and district assignment and school locale could be identified.

Source: Authors' analysis of administrative data provided by the state education agencies in Colorado, Missouri, Nebraska, and South Dakota (see appendix B).

Table C1. Stayers, movers, and leavers, by state, school locale, and type of rurality, 2015/16–2016/17

| State and statistic | Stayers | Movers | Leavers | Total |
|------------------------|---------|--------|---------|---------|
| Combined states | | | | |
| Number of teachers | 124,091 | 11,998 | 15,416 | 151,505 |
| Rural schools (%) | 83.2 | 7.7 | 9.2 | 100.0 |
| Rural–remote (%) | 82.5 | 7.9 | 9.6 | 100.0 |
| Rural–distant (%) | 82.3 | 8.5 | 9.3 | 100.0 |
| Rural–fringe (%) | 84.7 | 6.6 | 8.7 | 100.0 |
| Nonrural schools (%) | 81.5 | 8.0 | 10.5 | 100.0 |
| Total (%) | 81.9 | 7.9 | 10.2 | 100.0 |
| Colorado | | | | |
| Number of teachers | 40,873 | 4,268 | 6,597 | 51,738 |
| Rural schools (%) | 80.7 | 7.2 | 12.1 | 100.0 |
| Rural–remote (%) | 78.8 | 8.0 | 13.1 | 100.0 |
| Rural–distant (%) | 78.3 | 8.5 | 13.3 | 100.0 |
| Rural–fringe (%) | 82.8 | 6.2 | 11.1 | 100.0 |
| Nonrural schools (%) | 78.7 | 8.4 | 12.9 | 100.0 |
| Total (%) | 79.0 | 8.2 | 12.8 | 100.0 |
| Missouri | | | | |
| Number of teachers | 55,435 | 5,526 | 6,362 | 67,323 |
| Rural schools (%) | 82.4 | 8.8 | 8.9 | 100.0 |
| Rural–remote (%) | 80.8 | 9.7 | 9.5 | 100.0 |
| Rural–distant (%) | 80.9 | 9.7 | 9.4 | 100.0 |
| Rural–fringe (%) | 85.0 | 7.2 | 7.9 | 100.0 |
| Nonrural schools (%) | 82.3 | 8.0 | 9.7 | 100.0 |
| Total (%) | 82.3 | 8.2 | 9.4 | 100.0 |
| Nebraska | | | | |
| Number of teachers | 19,909 | 1,518 | 1,605 | 23,032 |
| Rural schools (%) | 87.5 | 5.6 | 6.9 | 100.0 |
| Rural–remote (%) | 86.4 | 6.4 | 7.2 | 100.0 |
| Rural–distant (%) | 88.8 | 5.2 | 6.0 | 100.0 |
| Rural–fringe (%) | 89.0 | 3.6 | 7.4 | 100.0 |
| Nonrural schools (%) | 86.0 | 7.0 | 7.0 | 100.0 |
| Total (%) | 86.4 | 6.6 | 7.0 | 100.0 |
| South Dakota | | | | |
| Number of teachers | 7,874 | 686 | 852 | 9,412 |
| Rural schools (%) | 84.1 | 6.9 | 9.0 | 100.0 |
| Rural–remote (%) | 83.0 | 6.9 | 10.1 | 100.0 |
| Rural–distant (%) | 85.6 | 5.8 | 8.6 | 100.0 |
| Rural–fringe (%) | 86.6 | 8.2 | 5.3 | 100.0 |
| Nonrural schools (%) | 83.3 | 7.7 | 9.1 | 100.0 |
| Total (%) | 83.7 | 7.3 | 9.1 | 100.0 |

Note: Percentages may not sum to 100 because of rounding. The sample includes all teachers for whom a primary school and district assignment and school locale could be identified. The total numbers of stayers, movers, and leavers are smaller than in tables 2 and 3 in the main text because those tables include teachers for whom school locale could not be identified.

Source: Authors' analysis of administrative data provided by the state education agencies in Colorado, Missouri, Nebraska, and South Dakota (see appendix B).

Table C2. Subcategories of stayers, movers, and leavers, by state, school locale, and type of rurality, 2015/16–2016/17

| State and statistic | Stayers | | | Movers | | | Leavers | | |
|-----------------------------|-----------------------------|----------------------------------|---------|---------------|--------------------|--------|--|---------------------------------|-------|
| | Same grade level assignment | Different grade level assignment | Total | Same district | Different district | Total | Nonteaching position in state public school system | Left state public school system | Total |
| Four states combined | | | | | | | | | |
| Number of teachers | 100,826 | 1,834 | 102,660 | 6,201 | 5,797 | 11,998 | 339 | 7,110 | 7,449 |
| Rural schools (%) | 97.1 | 2.9 | 100.0 | 40.5 | 59.5 | 100.0 | 2.5 | 97.5 | 100.0 |
| Rural–remote (%) | 96.7 | 3.3 | 100.0 | 38.4 | 61.6 | 100.0 | 3.4 | 96.6 | 100.0 |
| Rural–distant (%) | 96.2 | 3.8 | 100.0 | 35.3 | 64.7 | 100.0 | 2.2 | 97.8 | 100.0 |
| Rural–fringe (%) | 98.1 | 1.9 | 100.0 | 49.5 | 50.5 | 100.0 | 1.9 | 98.1 | 100.0 |
| Nonrural schools (%) | 98.6 | 1.4 | 100.0 | 55.3 | 44.7 | 100.0 | 2.1 | 97.9 | 100.0 |
| Total (%) | 98.2 | 1.8 | 100.0 | 51.7 | 48.3 | 100.0 | 2.2 | 97.8 | 100.0 |
| Colorado | | | | | | | | | |
| Number of teachers | 39,671 | 364 | 40,035 | 2,107 | 2,161 | 4,268 | 236 | 6,361 | 6,597 |
| Rural schools (%) | 99.4 | 0.6 | 100.0 | 39.2 | 60.8 | 100.0 | 5.4 | 94.6 | 100.0 |
| Rural–remote (%) | 99.1 | 0.9 | 100.0 | 40.5 | 59.5 | 100.0 | 8.3 | 91.7 | 100.0 |
| Rural–distant (%) | 99.6 | 0.4 | 100.0 | 36.1 | 63.9 | 100.0 | 6.2 | 93.8 | 100.0 |
| Rural–fringe (%) | 99.4 | 0.6 | 100.0 | 40.2 | 59.8 | 100.0 | 3.3 | 96.8 | 100.0 |
| Nonrural schools (%) | 99.0 | 1.0 | 100.0 | 50.9 | 49.1 | 100.0 | 3.3 | 96.7 | 100.0 |
| Total (%) | 99.1 | 0.9 | 100.0 | 49.4 | 50.6 | 100.0 | 3.6 | 96.4 | 100.0 |
| Missouri | | | | | | | | | |
| Number of teachers | 53,344 | 1,454 | 54,798 | 2,709 | 2,817 | 5,526 | — | — | — |
| Rural schools (%) | 95.6 | 4.4 | 100.0 | 39.0 | 61.0 | 100.0 | — | — | — |
| Rural–remote (%) | 93.9 | 6.1 | 100.0 | 33.6 | 66.4 | 100.0 | — | — | — |
| Rural–distant (%) | 94.9 | 5.1 | 100.0 | 33.6 | 66.4 | 100.0 | — | — | — |
| Rural–fringe (%) | 97.3 | 2.7 | 100.0 | 51.5 | 48.5 | 100.0 | — | — | — |
| Nonrural schools (%) | 98.1 | 1.9 | 100.0 | 53.5 | 46.5 | 100.0 | — | — | — |
| Total (%) | 97.3 | 2.7 | 100.0 | 49.0 | 51.0 | 100.0 | — | — | — |
| Nebraska | | | | | | | | | |
| Number of teachers | — | — | — | 922 | 596 | 1,518 | — | — | — |
| Rural schools (%) | — | — | — | 38.5 | 61.5 | 100.0 | — | — | — |
| Rural–remote (%) | — | — | — | 38.5 | 61.5 | 100.0 | — | — | — |
| Rural–distant (%) | — | — | — | 36.4 | 63.6 | 100.0 | — | — | — |
| Rural–fringe (%) | — | — | — | 43.9 | 56.1 | 100.0 | — | — | — |
| Nonrural schools (%) | — | — | — | 68.4 | 31.6 | 100.0 | — | — | — |
| Total (%) | — | — | — | 60.7 | 39.3 | 100.0 | — | — | — |
| South Dakota | | | | | | | | | |
| Number of teachers | 7,811 | 16 | 7,827 | 463 | 223 | 686 | 103 | 749 | 852 |
| Rural schools (%) | 99.7 | 0.3 | 100.0 | 54.1 | 45.9 | 100.0 | 9.7 | 90.3 | 100.0 |
| Rural–remote (%) | 99.5 | 0.5 | 100.0 | 48.0 | 52.0 | 100.0 | 7.3 | 92.7 | 100.0 |
| Rural–distant (%) | 99.9 | 0.1 | 100.0 | 54.5 | 45.5 | 100.0 | 13.6 | 86.4 | 100.0 |
| Rural–fringe (%) | 99.8 | 0.2 | 100.0 | 75.0 | 25.0 | 100.0 | 19.4 | 80.6 | 100.0 |
| Nonrural schools (%) | 99.9 | 0.1 | 100.0 | 78.4 | 21.6 | 100.0 | 14.3 | 85.7 | 100.0 |
| Total (%) | 99.8 | 0.2 | 100.0 | 67.5 | 32.5 | 100.0 | 12.1 | 87.9 | 100.0 |

— is not available.

Note: Percentages may not sum to 100 because of rounding. The sample includes all teachers for whom a primary school, district, and grade-level assignment and school locale could be identified. The total numbers of stayers, movers, and leavers are smaller than in tables 2 and 3 in the main text and table C1 because those tables include teachers for whom primary grade-level assignments and school locale could not be identified. Data were not available to determine Nebraska teachers' primary grade-level assignments or whether Missouri and Nebraska teachers took a nonteaching position.

Source: Authors' analysis of administrative data provided by the state education agencies in Colorado, Missouri, Nebraska, and South Dakota (see appendix B).

Table C3. District rurality changes for between-district movers, by state, 2015/16–2016/17

| State and district rurality change | Between district movers | |
|------------------------------------|-------------------------|---------|
| | Number | Percent |
| Four states combined | | |
| Rural to rural | 680 | 12.5 |
| Rural to nonrural | 789 | 14.5 |
| Nonrural to rural | 493 | 9.1 |
| Nonrural to nonrural | 3,469 | 63.9 |
| Total | 5,431 | 100.0 |
| Colorado | | |
| Rural to rural | 64 | 3.2 |
| Rural to nonrural | 146 | 7.3 |
| Nonrural to rural | 101 | 5.1 |
| Nonrural to nonrural | 1,682 | 84.4 |
| Total | 1,993 | 100.0 |
| Missouri | | |
| Rural to rural | 434 | 15.9 |
| Rural to nonrural | 491 | 17.9 |
| Nonrural to rural | 265 | 9.7 |
| Nonrural to nonrural | 1,546 | 56.5 |
| Total | 2,736 | 100.0 |
| Nebraska | | |
| Rural to rural | 104 | 21.3 |
| Rural to nonrural | 94 | 19.3 |
| Nonrural to rural | 87 | 17.8 |
| Nonrural to nonrural | 203 | 41.6 |
| Total | 488 | 100.0 |
| South Dakota | | |
| Rural to rural | 78 | 36.4 |
| Rural to nonrural | 58 | 27.1 |
| Nonrural to rural | 40 | 18.7 |
| Nonrural to nonrural | 38 | 17.8 |
| Total | 214 | 100.0 |

Note: The sample includes all teachers for whom a primary school and district assignment and school and district locale could be identified in both 2015/16 and 2016/17. The total number of between-district movers is smaller than in table C2 because that table includes teachers for whom a school and locale could not be identified.

Source: Authors' analysis of administrative data provided by the state education agencies in Colorado, Missouri, Nebraska, and South Dakota (see appendix B).

Table C4. School rurality changes for within- and between-district movers by state, 2015/16–2016/17

| State and school rurality change | Within district movers | | Between district movers | | All movers | |
|----------------------------------|------------------------|---------|-------------------------|---------|------------|---------|
| | Number | Percent | Number | Percent | Number | Percent |
| Four states combined | | | | | | |
| Rural to rural | 799 | 14.4 | 796 | 14.7 | 1,595 | 14.5 |
| Rural to nonrural | 282 | 5.1 | 876 | 16.1 | 1,158 | 10.6 |
| Nonrural to rural | 301 | 5.4 | 710 | 13.1 | 1,011 | 9.2 |
| Nonrural to nonrural | 4,158 | 75.1 | 3,051 | 56.2 | 7,209 | 65.7 |
| Total | 5,540 | 100.0 | 5,433 | 100.0 | 10,973 | 100.0 |
| Colorado | | | | | | |
| Rural to rural | 94 | 4.9 | 89 | 4.5 | 183 | 4.7 |
| Rural to nonrural | 92 | 4.8 | 223 | 11.2 | 315 | 8.1 |
| Nonrural to rural | 106 | 5.6 | 214 | 10.7 | 320 | 8.2 |
| Nonrural to nonrural | 1,616 | 84.7 | 1,467 | 73.6 | 3,083 | 79.0 |
| Total | 1,908 | 100.0 | 1,993 | 100.0 | 3,901 | 100.0 |
| Missouri | | | | | | |
| Rural to rural | 465 | 18.8 | 514 | 18.8 | 979 | 18.8 |
| Rural to nonrural | 153 | 6.2 | 508 | 18.6 | 661 | 12.7 |
| Nonrural to rural | 154 | 6.2 | 363 | 13.3 | 517 | 9.9 |
| Nonrural to nonrural | 1,706 | 68.8 | 1,353 | 49.4 | 3,059 | 58.6 |
| Total | 2,478 | 100.0 | 2,738 | 100.0 | 5,216 | 100.0 |
| Nebraska | | | | | | |
| Rural to rural | 104 | 12.7 | 116 | 23.8 | 220 | 16.8 |
| Rural to nonrural | 20 | 2.4 | 89 | 18.2 | 109 | 8.3 |
| Nonrural to rural | 25 | 3.1 | 92 | 18.9 | 117 | 9.0 |
| Nonrural to nonrural | 669 | 81.8 | 191 | 39.1 | 860 | 65.8 |
| Total | 818 | 100.0 | 488 | 100.0 | 1,306 | 100.0 |
| South Dakota | | | | | | |
| Rural to rural | 136 | 40.5 | 77 | 36.0 | 213 | 38.7 |
| Rural to nonrural | 17 | 5.1 | 56 | 26.2 | 73 | 13.3 |
| Nonrural to rural | 16 | 4.8 | 41 | 19.2 | 57 | 10.4 |
| Nonrural to nonrural | 167 | 49.7 | 40 | 18.7 | 207 | 37.6 |
| Total | 336 | 100.0 | 214 | 100.0 | 550 | 100.0 |

Note: Percentages may not sum to 100 because of rounding. The sample includes all teachers for whom a primary school and district assignment and school and district locale could be identified in both 2015/16 and 2016/17. The number of movers is smaller than in tables 2 and 3 in the main text and table C2 because those tables include teachers for whom a school and locale could not be identified.

Source: Authors' analysis of administrative data provided by the state education agencies in Colorado, Missouri, Nebraska, and South Dakota (see appendix B).

Table C5. School and district rurality changes for movers, by state, 2015/16–2016/17

| State and school rurality change | District rurality change | | | | | | | |
|----------------------------------|--------------------------|---------|-------------------|---------|-------------------|---------|----------------------|---------|
| | Rural to rural | | Rural to nonrural | | Nonrural to rural | | Nonrural to nonrural | |
| | Number | Percent | Number | Percent | Number | Percent | Number | Percent |
| Four states combined | | | | | | | | |
| Rural to rural | 640 | 94.1 | 87 | 11.0 | 37 | 7.5 | 32 | 0.9 |
| Rural to nonrural | 22 | 3.2 | 665 | 84.3 | 4 | 0.8 | 186 | 5.3 |
| Nonrural to rural | 7 | 1.0 | 5 | 0.6 | 429 | 87.0 | 269 | 7.8 |
| Nonrural to nonrural | 11 | 1.6 | 32 | 4.1 | 23 | 4.7 | 2,983 | 86.0 |
| Total | 680 | 100.0 | 789 | 100.0 | 493 | 100.0 | 3,470 | 100.0 |
| Colorado | | | | | | | | |
| Rural to rural | 46 | 71.9 | 19 | 13.0 | 7 | 6.9 | 17 | 1.0 |
| Rural to nonrural | 5 | 7.8 | 116 | 79.5 | 1 | 1.0 | 101 | 6.0 |
| Nonrural to rural | 3 | 4.7 | 1 | 0.7 | 86 | 85.1 | 124 | 7.4 |
| Nonrural to nonrural | 10 | 15.6 | 10 | 6.8 | 7 | 6.9 | 1,440 | 85.6 |
| Total | 64 | 100.0 | 146 | 100.0 | 101 | 100.0 | 1,682 | 100.0 |
| Missouri | | | | | | | | |
| Rural to rural | 421 | 97.0 | 55 | 11.2 | 23 | 8.7 | 15 | 1.0 |
| Rural to nonrural | 10 | 2.3 | 414 | 84.3 | 3 | 1.1 | 81 | 5.2 |
| Nonrural to rural | 2 | 0.5 | 4 | 0.8 | 229 | 86.4 | 128 | 8.3 |
| Nonrural to nonrural | 1 | 0.2 | 18 | 3.7 | 10 | 3.8 | 1,322 | 85.5 |
| Total | 434 | 100.0 | 491 | 100.0 | 265 | 100.0 | 1,546 | 100.0 |
| Nebraska | | | | | | | | |
| Rural to rural | 101 | 97.1 | 9 | 9.6 | 6 | 6.9 | 0 | 0.0 |
| Rural to nonrural | 3 | 2.9 | 83 | 88.3 | 0 | 0.0 | 3 | 1.5 |
| Nonrural to rural | 0 | 0.0 | 0 | 0.0 | 78 | 89.7 | 14 | 6.9 |
| Nonrural to nonrural | 0 | 0.0 | 2 | 2.1 | 3 | 3.4 | 186 | 91.6 |
| Total | 104 | 100.0 | 94 | 100.0 | 87 | 100.0 | 203 | 100.0 |
| South Dakota | | | | | | | | |
| Rural to rural | 72 | 92.3 | 4 | 6.9 | 1 | 2.5 | 0 | 0.0 |
| Rural to nonrural | 4 | 5.1 | 52 | 89.7 | 0 | 0.0 | 1 | 0.0 |
| Nonrural to rural | 2 | 2.6 | 0 | 0.0 | 36 | 90.0 | 3 | 7.9 |
| Nonrural to nonrural | 0 | 0.0 | 2 | 3.4 | 3 | 7.5 | 35 | 92.1 |
| Total | 78 | 100.0 | 58 | 100.0 | 40 | 100.0 | 39 | 100.0 |

Note: Percentages may not sum to 100 because of rounding. The sample includes all teachers for whom a primary school and district assignment and school and district locale could be identified in both 2015/16 and 2016/17. The total number of movers is smaller than in tables 2 and 3 in the main text because those tables include teachers for whom a school and locale could not be identified.

Source: Authors' analysis of administrative data provided by the state education agencies in Colorado, Missouri, Nebraska, and South Dakota (see appendix B).

Notes

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1. Teacher mobility and attrition can also result in positive outcomes such as better matching of teachers to positions and replacement of ineffective teachers with more effective ones.
2. The 2015/16 data for Colorado and Missouri included only classroom teachers. The 2016/17 data for these two states unambiguously identified educators as either classroom teachers or leaders.

References

- Allensworth, E., Ponisciak, S., & Mazzeo, C. (2009). *The schools teachers leave: Teacher mobility in Chicago Public Schools*. Chicago, IL: Consortium on Chicago School Research at the University of Chicago Urban Education Institute. <http://eric.ed.gov/?id=ED505882>
- Atteberry, A., Loeb, S., & Wyckoff, J. (2016). Teacher churning: Reassignment rates and implications for student achievement. *Educational Evaluation and Policy Analysis*, 39(1), 3–30. <http://eric.ed.gov/?id=EJ1129160>
- Barnes, G., Crowe, E., & Schaefer, B. (2006). *The cost of teacher turnover in five school districts: A pilot study*. Arlington, VA: National Commission on Teaching and America's Future. <http://eric.ed.gov/?id=ED497176>
- Borman, G. D., & Dowling, N. M. (2008). Teacher attrition and retention: A meta-analytic and narrative review of the research. *Review of Educational Research*, 78(3), 367–409. <http://eric.ed.gov/?id=EJ896364>
- Cole, C., with Mitchell, R., & Colorado Department of Education. (2017a). *Colorado's teacher shortages: Attracting and retaining excellent educators*. Denver, CO: Colorado Department of Higher Education; Colorado Department of Education. <http://eric.ed.gov/?id=ED586422>
- Cole, C., with Mitchell, R., & Colorado Department of Higher Education. (2017b). *Teacher shortages across the nation and Colorado*. Denver, CO: Colorado Department of Higher Education. Retrieved October 2, 2018, from https://highered.colorado.gov/Publications/Reports/teachereducation/2017/TeacherShortages_Nation_Colorado_Dec2017.pdf
- Gais, T., Malatras, J., Wagner, A., & Park, Y. J. (2017). *By the numbers: Phase one analysis of the teacher workforce in South Dakota*. Albany, NY: Rockefeller Institute of Government. Retrieved October 2, 2018, from <http://rockinst.org/wp-content/uploads/2017/12/Phase-One-on-Teacher-Workforce-in-South-Dakota-2017-10-20-Final.pdf>
- Geverdt, D. E. (2015). *Education Demographic and Geographic Estimates Program (EDGE): Locale boundaries user's manual* (NCES 2016–012). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics. <http://eric.ed.gov/?id=ED577162>
- Goff, P., Carl, B., & Yang, M. (2018). *Supply and demand for public school teachers in Wisconsin* (WCER Working Paper No. 2018–2). Madison, WI: Wisconsin Center for Education Research, School of Education, University of Wisconsin-Madison. Retrieved October 2, 2018, from https://wcer.wisc.edu/docs/working-papers/Working_Paper_No_2018_02.pdf
- Goldring, R., Taie, S., & Riddles, M. (2014). *Teacher attrition and mobility: Results from the 2012–13 Teacher Follow-up Survey: First look* (NCES 2014–077). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics. <http://eric.ed.gov/?id=ED546773>

- Gray, L., & Taie, S. (2015). *Public school teacher attrition and mobility in the first five years: Results from the first through fifth waves of the 2007–08 Beginning Teacher Longitudinal Study: First look* (NCES 2015–337). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics. <http://eric.ed.gov/?id=ED556348>
- Hammer, P. C., Hughes, G., McClure, C., Reeves, C., & Salgado, D. (2005). *Rural teacher recruitment and retention practices: A review of the research literature, national survey of rural superintendents, and case studies of programs in Virginia*. Charleston, WV: Appalachia Educational Laboratory at Edvantia. <https://eric.ed.gov/?id=ED489143>
- Hussar, W. J., & Bailey, T. M. (2018). *Projections of education statistics to 2026* (45th ed.; NCES 2018–019). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics. <http://eric.ed.gov/?id=ED582074>
- Ingersoll, R. (2001). Teacher turnover and teacher shortages: An organizational analysis. *American Educational Research Journal*, 38(3), 499–534.
- Ingersoll, R., & Merrill, L. (2012). *Seven trends: The transformation of the teaching force* (CPRE Working Paper #WP-01). Philadelphia, PA: University of Pennsylvania, Consortium for Policy Research in Education. Retrieved October 2, 2018, from http://repository.upenn.edu/gse_pubs/241/.
- Janulis, E. (2017). *Is there a teacher shortage in Maryland? Examining trends in supply and demand* (Policy Brief). College Park, MD: University of Maryland, College of Education, Maryland Equity Project. Retrieved October 2, 2018, from <https://education.umd.edu/maryland-teacher-pipeline>.
- Keigher, A. (2010). *Teacher attrition and mobility: Results from the 2008–09 Teacher Follow-up Survey: First look* (NCES 2010–353). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics. <http://eric.ed.gov/?id=ED511305>
- Lovett, K. (2016). *Understanding and identifying teacher shortage areas in Oregon: An analysis of statewide data to provide insight into recent trends in teacher supply and demand*. Salem, OR: Oregon Department of Education. Retrieved October 2, 2018, from <https://www.ode.state.or.us/wma/researchteacher-shortage-final-report.pdf>.
- Malkus, N., Hoyer, K. M., & Sparks, D. (2015). *Teaching vacancies and difficult-to-staff teaching positions in public schools* (NCES 2015–065). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics. <http://eric.ed.gov/?id=ED561224>
- McClure, C., & Reeves, C. (2004). *Rural teacher recruitment and retention: Review of the research and practice literature*. Charleston, WV: Appalachia Educational Laboratory. <https://eric.ed.gov/?id=ED484967>
- Murphy, P., DeArmond, M., & Guin, K. (2003). A national crisis or localized problems? Getting perspective on the scope and scale for the teacher shortage. *Education Policy*

Analysis Archives, 11(23). Retrieved October 2, 2018, from <https://epaa.asu.edu/ojs/article/view/251/377>.

National Center for Education Statistics. (2017). Table 4: Number of city, suburban, town, and rural regular, operating public elementary and secondary schools with student membership and percentage distribution of students in membership, by state or jurisdiction: School year 2015–16. In *Selected statistics from the public elementary and secondary education universe: School year 2015–16*. Retrieved October 2, 2018, from https://nces.ed.gov/pubs2018/2018052/tables/table_04.asp.

National Center for Education Statistics. (n.d. a). ElSi: Elementary/Secondary Information System [Web application]. Retrieved October 2, 2018, from <https://nces.ed.gov/ccd/elsi/>.

National Center for Education Statistics. (n.d. b). Table A.1.a.-1: Number of public school districts, by district urban-centric 12-category locale and state or jurisdiction: 2013–14. In *Rural education in America*. Retrieved October 2, 2018, from <https://nces.ed.gov/surveys/ruraled/tables/a.1.a.-1.asp>.

National Commission on Teaching and America's Future. (2003). *No dream denied: A pledge to America's children* (Summary Report). Washington, DC: Author. Retrieved October 2, 2018, from https://nctaf.org/wp-content/uploads/2012/01/no-dream-denied_summary_report.pdf.

Nebraska Department of Education, Adult Program Services. (2017). *Teacher Vacancy Survey report*. Lincoln, NE: Author. Retrieved October 2, 2018, from <https://www.education.ne.gov/wp-content/uploads/2017/07/teacher-shortage-2016Report.pdf>.

Office of Postsecondary Education. (2015). *Enrollment in teacher preparation programs*. Washington, DC: U.S. Department of Education. <http://eric.ed.gov/?id=ED576131>

Player, D. (2015). *The supply and demand for rural teachers*. Boise, ID: Rural Opportunities Consortium of Idaho. Retrieved October 2, 2018, from http://www.rociidaho.org/wp-content/uploads/2015/03/ROCI_2015_RuralTeachers_FINAL.pdf.

Plecki, M. L., Elfers, A. M., Loeb, H., Zahir, A., & Knapp, M. S. (2005). *Teacher retention and mobility: A look inside and across districts and schools in Washington State*. Seattle, WA: University of Washington, College of Education. Retrieved October 2, 2018, from <http://www.education.uw.edu/ctp/content/teacher-retention-and-mobility-look-inside-and-across-districts-and-schools-washington-state>.

Podgursky, M., Ehlert, M., Lindsay, J., & Wan, Y. (2016). *An examination of the movement of educators within and across three Midwest Region states* (REL 2017–185). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Midwest. Retrieved from <https://ies.ed.gov/ncee/edlabs/projects/project.asp?projectID=387>.

Podolsky, A., Kini, T., Bishop, J., & Darling-Hammond, L. (2016). *Solving the teacher shortage: How to attract and retain excellent educators*. Palo Alto, CA: Learning Policy

Institute. Retrieved October 2, 2018, from <https://learningpolicyinstitute.org/product/solving-teacher-shortage>.

Ronfeldt, M., Loeb, S., & Wyckoff, J. (2013). How teacher turnover harms student achievement. *American Education Research Journal*, 50(1), 4–36. <http://eric.ed.gov/?id=EJ995828>

South Dakota Department of Education. (2015). *Trends in educator preparation and employment: A report for the Governor's Blue Ribbon Task Force on Teachers and Students*. Pierre, SD: Author. Retrieved October 2, 2018, from <http://blueribbon.sd.gov/docs/9-9%20SEPT%202015%20Educator%20Analysis%20Report.pdf>.

Sutcher, L., Darling-Hammond, L., & Carver-Thomas, D. (2016). *A coming crisis in teaching? Teacher supply, demand, and shortages in the U.S.* Palo Alto, CA: Learning Policy Institute. Retrieved October 2, 2018, from <https://learningpolicyinstitute.org/product/coming-crisis-teaching>.

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