Colorado Evaluation & Action Lab
UNIVERSITY OF DENVER
Using data to drive action

Colorado Early Childhood Workforce Data Brief #3
Wage Analysis of Early Childhood Workforce Datasets, 2022–2023

REPORT HIGHLIGHTS:

- **About two-thirds of active early care and education (ECE) workers with a Social Security Number (SSN) in registry data in 2022-2023 could be matched to a wage record** for the employer they were attached to in the registry.

- **The median, annualized wage for ECE workers who could be matched in winter 2023 was $36,209.** This figure ranged from $30,168 for Assistant Teachers to $55,334 for Directors.

- **93% of ECE workers in registry data had only one job according to unemployment insurance (UI) wage data.** Of those who held two or more jobs, 66% of total wages came from ECE jobs, on average.

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Acknowledgements

Introduction

The Colorado Evaluation & Action Lab has partnered with Chapin Hall to analyze early childhood workforce data with the goal of better understanding the preparation, advancement, and retention experiences of workers. These analyses will inform policies and investments to support early care and education (ECE) professionals. The Linked Information Network of Colorado (LINC) was used to bring together datasets from multiple state agencies in Colorado to inform our understanding of the early childhood workforce.

The first brief in this research series explores employment status measures captured in the Professional Development Information System (PDIS) registry and methods for measuring the retention or employment history of ECE workers over time. Following on the recommendations from this brief and conversations with the Colorado Department of Early Childhood (CDEC), the second brief calculates measures of retention, advancement, and growth within the ECE workforce and looks at those patterns across subpopulations. The current brief documents exploratory analyses in linked Unemployment Insurance (UI) wage records and PDIS registry data to understand the quality and analyzability of these linked data.

Key Findings & Recommendations

- **Finding:** About two-thirds of active ECE workers with an SSN in PDIS in 2022-2023 could be matched to a wage record with the same employer.

- **Recommendation:** Extend efforts to identify or collect Federal Employer Identification Numbers (FEINs) for licensed child care providers to improve job-level match rates between PDIS and UI wage data.

- **Finding:** The median, annualized wage at the 50th percentile for ECE workers who could be matched between wage data and PDIS in winter 2023 was $36,209. By role, this figure ranged from $30,168 for Assistant Teachers to $55,334 for Directors.

- **Recommendation:** Compare wages by provider's North American Industry Classification System (NAICS) code for ECE jobs to compare wages between community-based and district-based programs.

- **Finding:** 93% of ECE workers in PDIS had only one job according to UI wage data. Of those who held two or more jobs, 66% of total wages came from ECE jobs, on average.

- **Recommendation:** Analyze wage records for individuals working in family child care homes to understand if these individuals are working multiple jobs or if problems with FEINs are preventing job-level matches for this workforce.

- **Finding:** Wages for workers that were also SNAP recipients were $7,000 less than for non-SNAP recipients ($30,297 vs. $37,231).

Purpose of This Brief

This brief explores wage patterns for ECE workers during school year 2022-2023. Key questions addressed in the brief include:

1. To what extent can we identify wage records in Unemployment Insurance (UI) data associated with ECE jobs from the PDIS registry?

2. What is the baseline wage distribution for active ECE workers overall?

3. How do those patterns differ across roles?

4. How does the wage distribution for SNAP recipients compare to that for non-SNAP recipients?

Methods

The PDIS data for these analyses were prepared by the LINC team. PDIS data contain workforce characteristics, including demographics, qualifications, and job information such as employer and professional role.

Analyses for this brief focused on the 2022-2023 cohort of center-based workers who had a Social Security Number (SSN) that could be matched to UI wage data. Prior work has shown that, due to the inconsistent timing for employment verification among directors, employment status updates in PDIS may be lagged. However, hire and end dates are fairly complete after verification and appear accurate. With this in mind, we incorporated partial data from the 2023-2024 school year and refined the 2022-2023 year's employment dates using the hire and end dates from the 2023-2024 data extract.

The 2022-2023 PDIS cohort was linked to multiple data sources to analyze employment and wages across role, worker characteristics, provider quality, and SNAP benefits. We used a masked FEIN to identify which employers from the wage data were actively licensed ECE centers. Where possible, we matched specific jobs (e.g., employer/employee combinations) from PDIS to the wage data to understand wage information by job characteristics such as role and setting.

UI wage data are reported quarterly, but the PDIS employment information was only available for the full school year. To address this discrepancy, we compared highest quarterly wages, first quarterly wages, and quarterly wages from a specific quarter (see Figure A in the Appendix for this comparison). Wage results presented in this brief are from winter (January-March) of 2023, because quarterly stable employment was highest for that quarter (n=9,679).

All quarterly wage values are annualized (multiplied times 4) to improve interpretability. All analyses of specific wage amounts are restricted only to stable jobs from a given quarter: jobs that were reported in wage data in the quarter of interest as well as the prior quarter and the subsequent quarter. Restricting analyses to stable jobs ensures that reported wage values represent full quarter employment to the greatest extent possible; for a job that begins or ends in a

given quarter, we would expect reported wages for the quarter to underreport expected earnings for that job.

Findings

Matching Jobs between PDIS and UI Wage Data

> **There were 19,856 individuals in 2022-2023 with a SSN. Of these, 67% (13,310) could be matched at the job level (same employer) between PDIS and wage data at some point during the year; 57% (11,410) matched at the job level to a stable job for at least one quarter.**

As shown in Figure 1, 84% of the 2022-2023 cohort with a SSN were matched to wage data, 73% to any active (licensed) early childhood education center, and 67% to a job with the same employer listed within PDIS and the wage data. Over half (57%) were matched to a stable job with the same employer listed within PDIS and the wage data. This population that could be matched at the job level to a stable job was the primary population for whom we could look at wages.

Figure 1. 2022-2023 Cohort PDIS Match to Wage Data
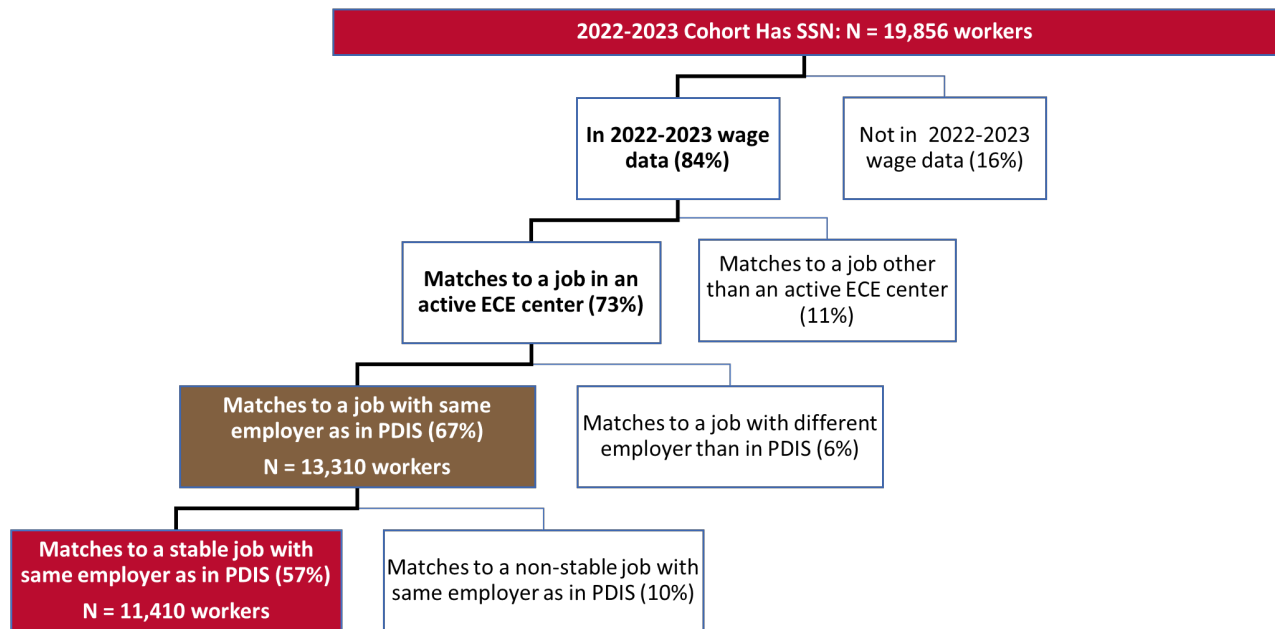
We explored these matches to wage data across the following worker characteristics: role, ages served, race, age, and Quality Rating of employer (Figures 2–5). As shown in Figures 2-5, Assistant Teachers, workers ages 24 and under and ages 65 and above, and those working at employers with a QRIS rating of one tended to be matched at the job level to stable jobs in wage data at a lower rate than the overall cohort. These workers were less likely to have SSNs, less likely to be matched to the wage data at the job level when they did have SSNs, and, when matched at the job level to the wage data, less likely to be in stable jobs. The opposite was true of Lead Teachers and those working at employers with a QRIS rating of three and above, who were matched at the job level to stable jobs at a higher rate than the overall cohort. These patterns extended to stable jobs matched in winter 2023, which are the focus of some of our specific analyses (Figure 5).
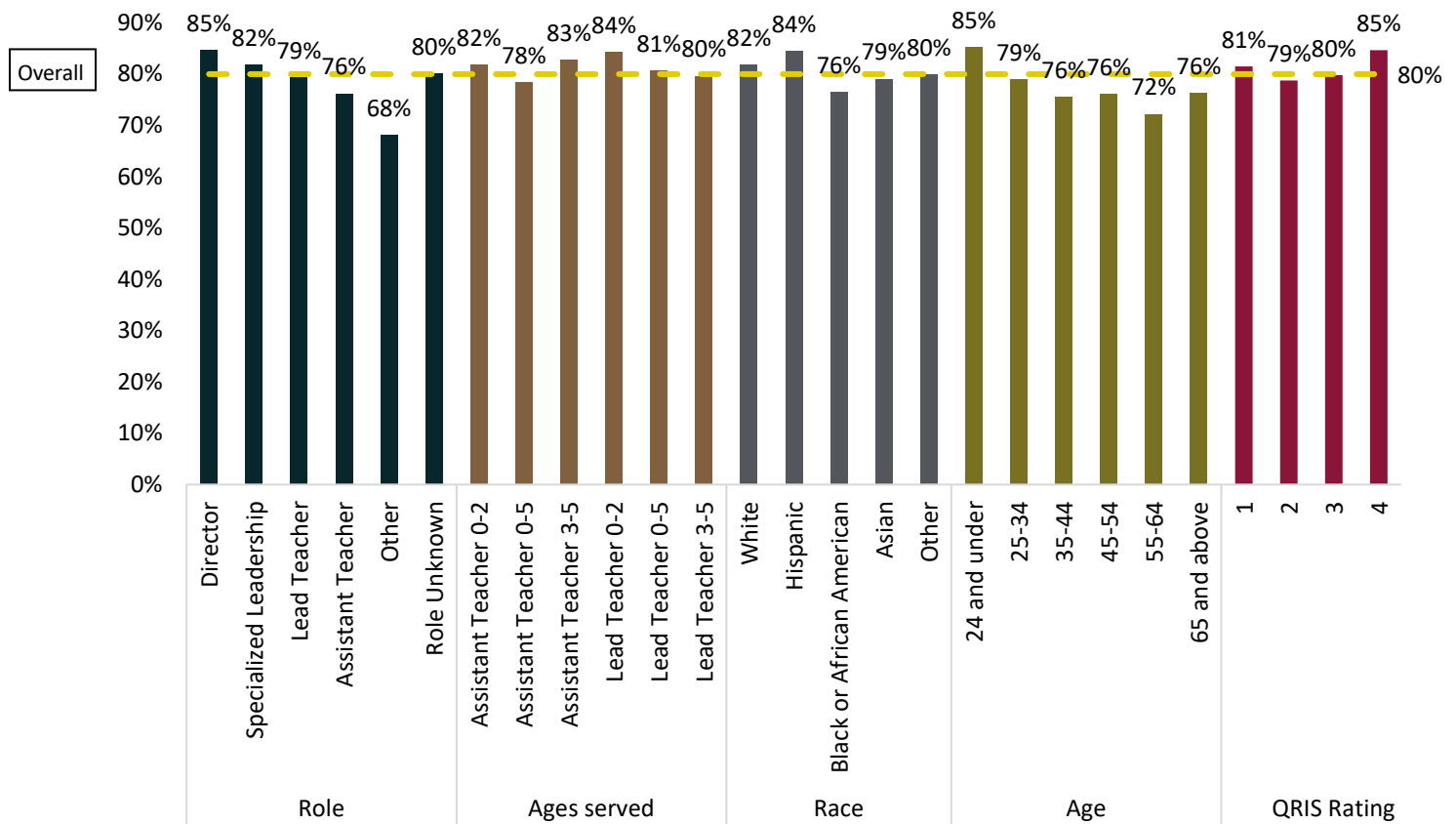
Figure 2. 2022-2023 Cohort, Has SSN

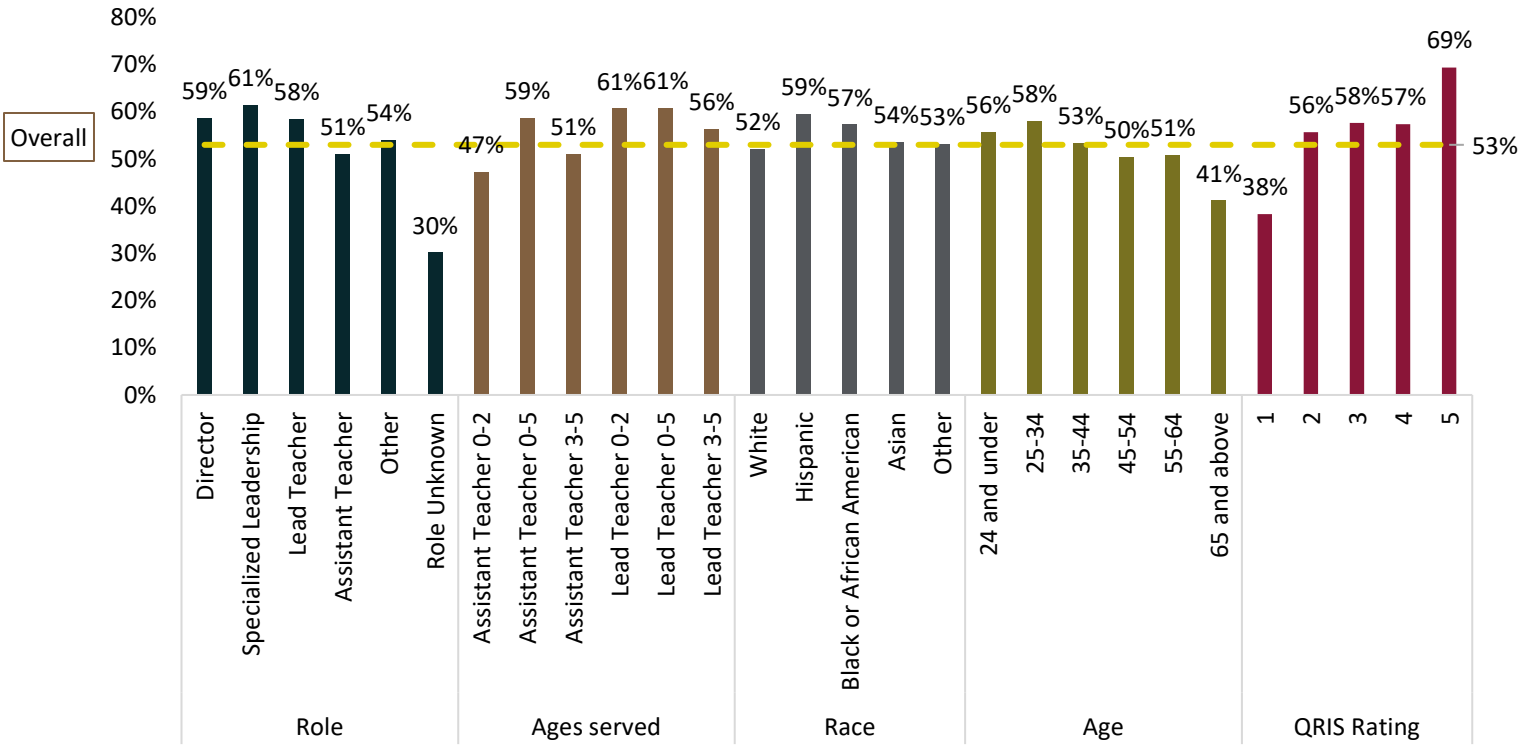**Figure 3. 2022-2023 Cohort, PDIS Job in Wage Data**

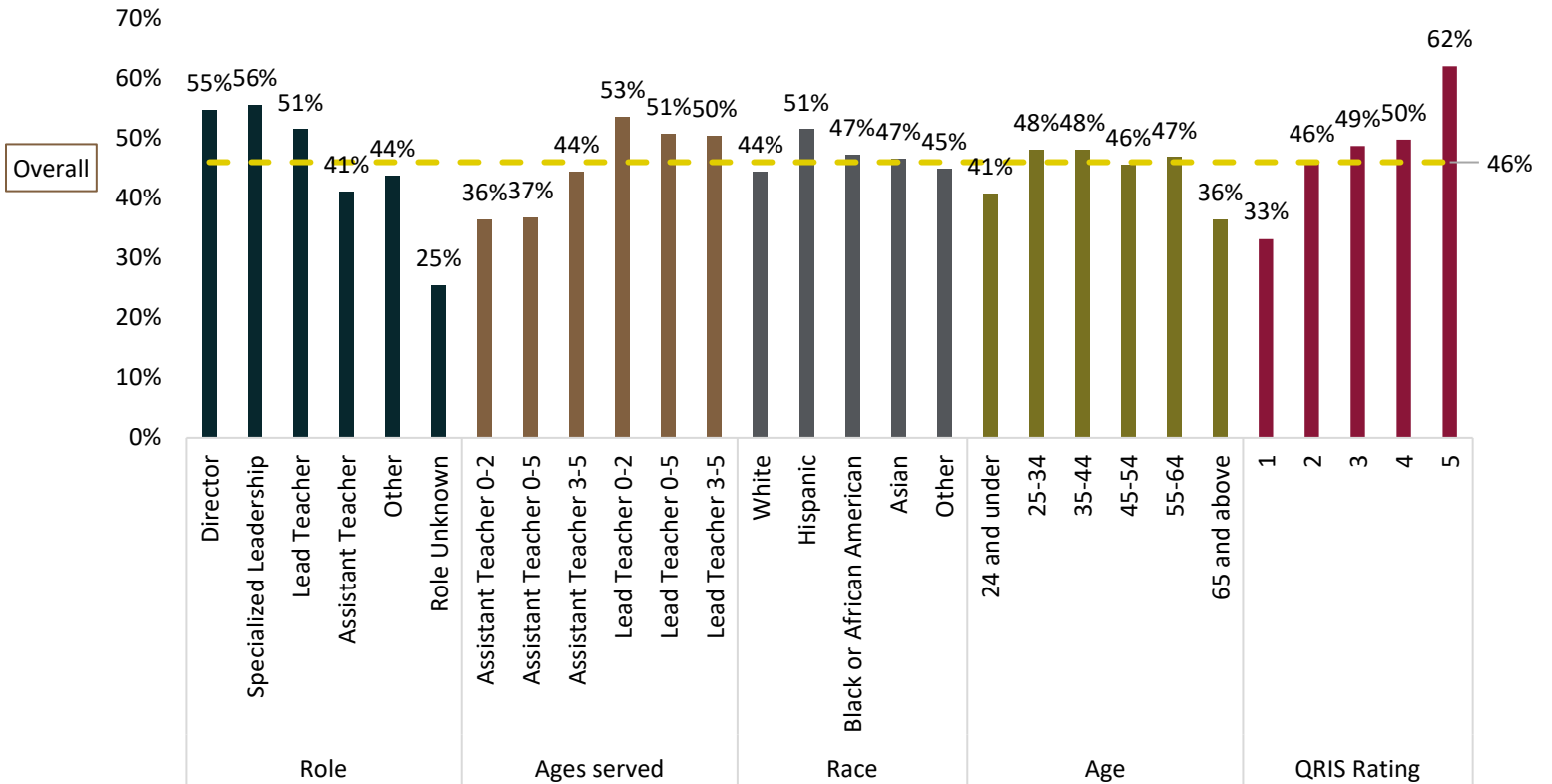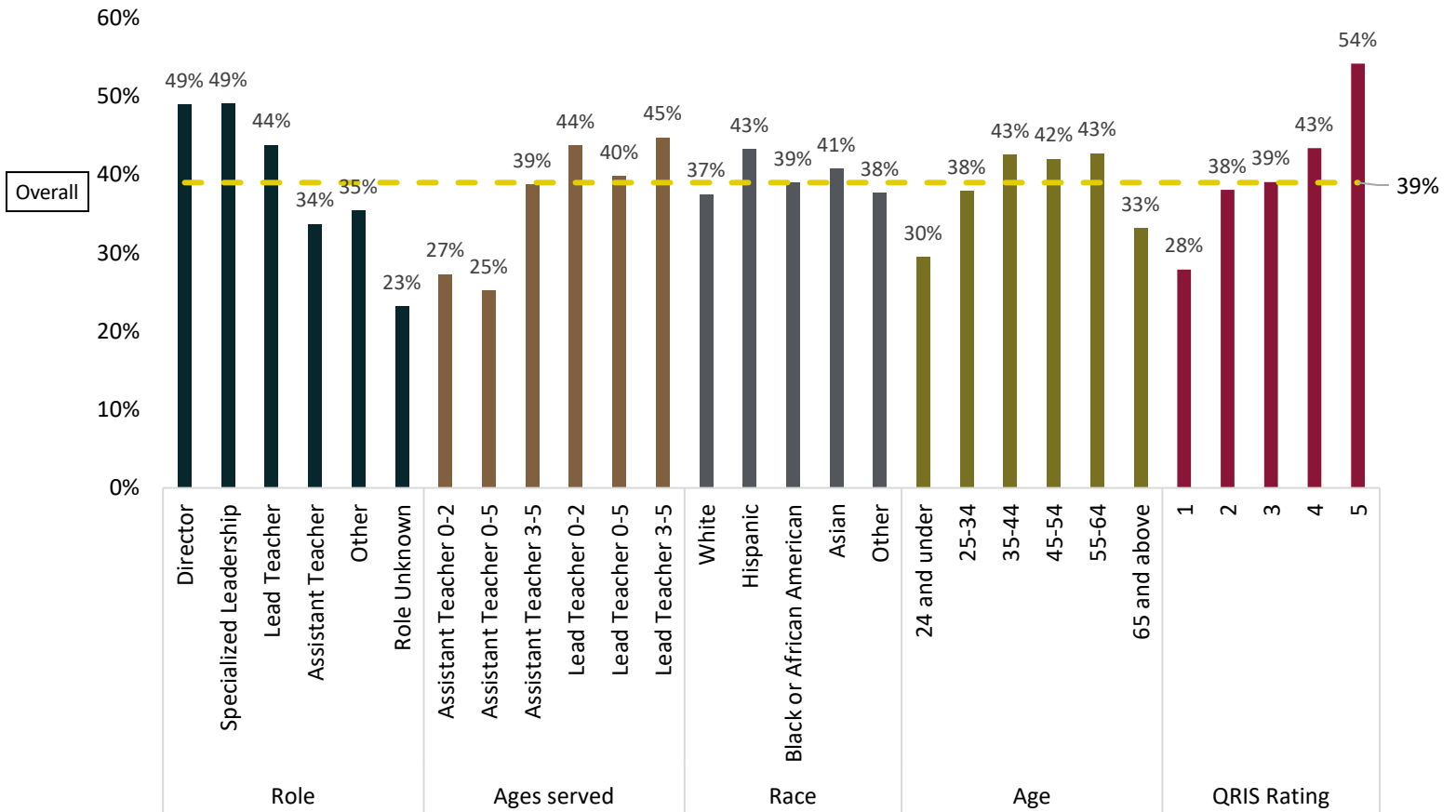**Figure 4. 2022-2023 Cohort, Stable PDIS in Wage Data**

Figure 5. 2022-2023 Cohort, Winter 2023 PDIS Job in Wage Data

For jobs that could be linked between PDIS and wage data, over half were with an employer in wage data whose NAICS code was in child day care services (59%) and almost a third were with an employer classified as K-12 education (31%) (Figure 6). This result confirms that the jobs matched from registry data to wage data include jobs at both community-based and district-based programs. By contrast, analyses of the ECE workforce that use exclusively wage data are not able to identify individuals who work in ECE roles for employers whose primary business is not child care, including grade schools and school districts.

Figure 6. Stable Jobs in PDIS by Industry of Employer
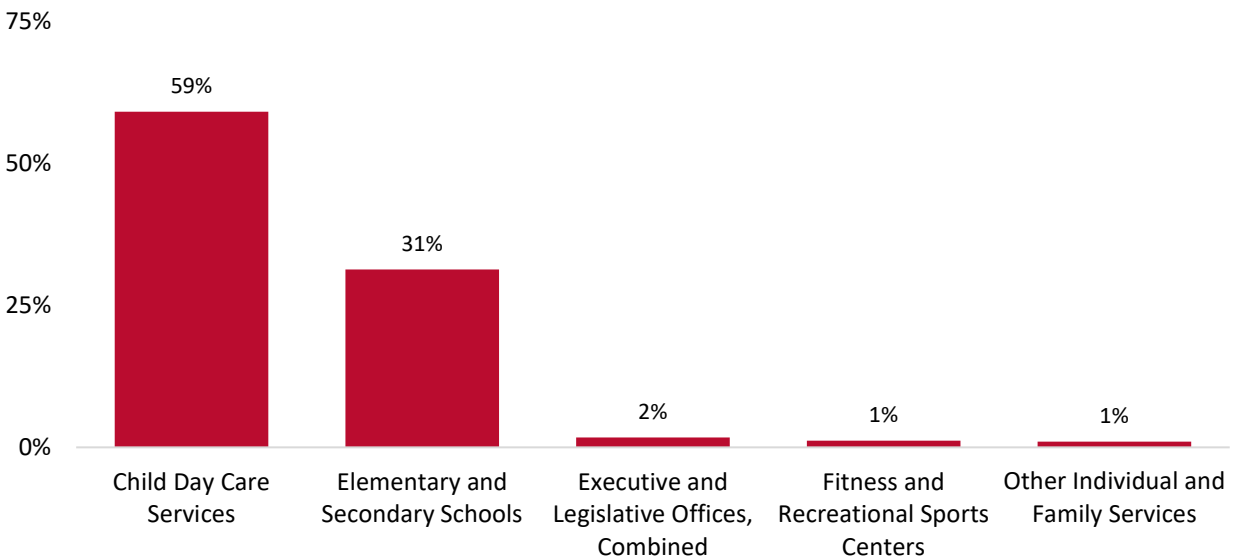
> **93% of workers who held a job matched between PDIS and wage data did not have concurrent jobs in the wage data.**

To gain a better understanding of employment patterns, we examined the prevalence of workers holding jobs with multiple employers. We focused on a subset of workers who had a stable job matched between wage data and PDIS from January-March 2023 (n=9,679). Among these workers, 93% had no other stable jobs in wage data. 6% held two or more stable jobs of which some matched to PDIS—suggesting a mix of employment in ECE and in other industries--1% held two or more stable jobs all matched to PDIS (in other words, multiple jobs, all in ECE). We focus on stable jobs only for this analysis to identify workers who are consistently employed in two or more places, as opposed to those who are changing jobs in a given quarter. Altogether, these results indicate that ECE workers are generally working one primary job, rather than multiple part time jobs. Those who do have multiple jobs are generally working both in ECE and in another industry, but the ECE job seems to be their primary role: For those workers with two or more stable jobs and only some of them in PDIS, their ECE role represented 66% of total wages on average.

Distribution of Wages for Stable Jobs Matched Between Wage Data and PDIS

> **The median, annualized wage in winter 2023 was $36,209. By role, this figure ranged from $30,168 for Assistant Teachers to $55,334 for Directors.**

The median, annualized wage in winter 2023 across all center-based workers in the cohort was $36,209 (Figure 7). By role, it ranged from $30,168 among Assistant Teachers to $55,334 among Directors. Across both Assistant Teachers and Lead Teachers, we see little variation in median salaries between those teaching infants and toddlers and those teaching older children; however,

the 90th percentile for lead teachers in preschool programs is much higher than the infant/toddler equivalent, which may reflect higher wages for lead teachers in district-based preschool programs (Figure 8). Wages for workers that were also SNAP recipients were roughly $7,000 less than for non-SNAP recipients (Figure 9).

Figure 7. Median Annualized Wage by Role for Stable, Matched Jobs in Winter 2023
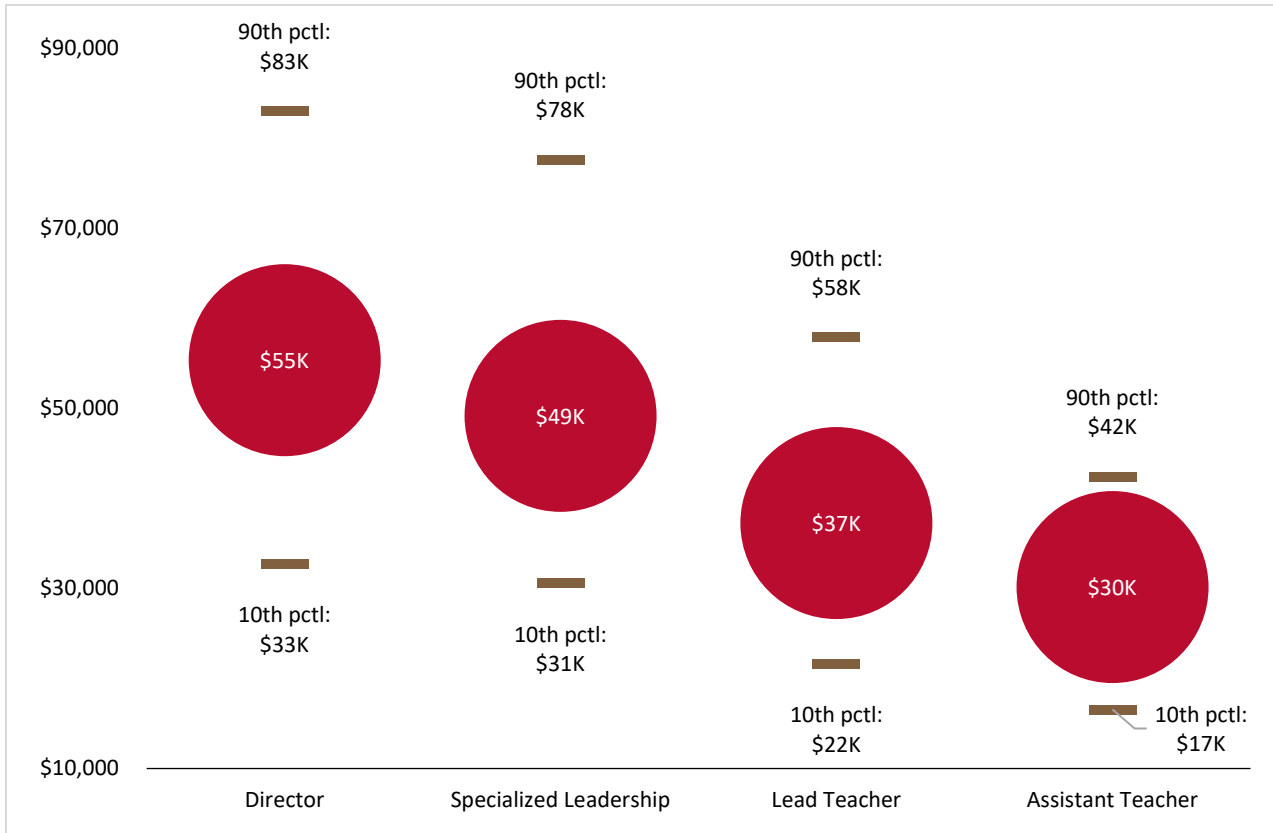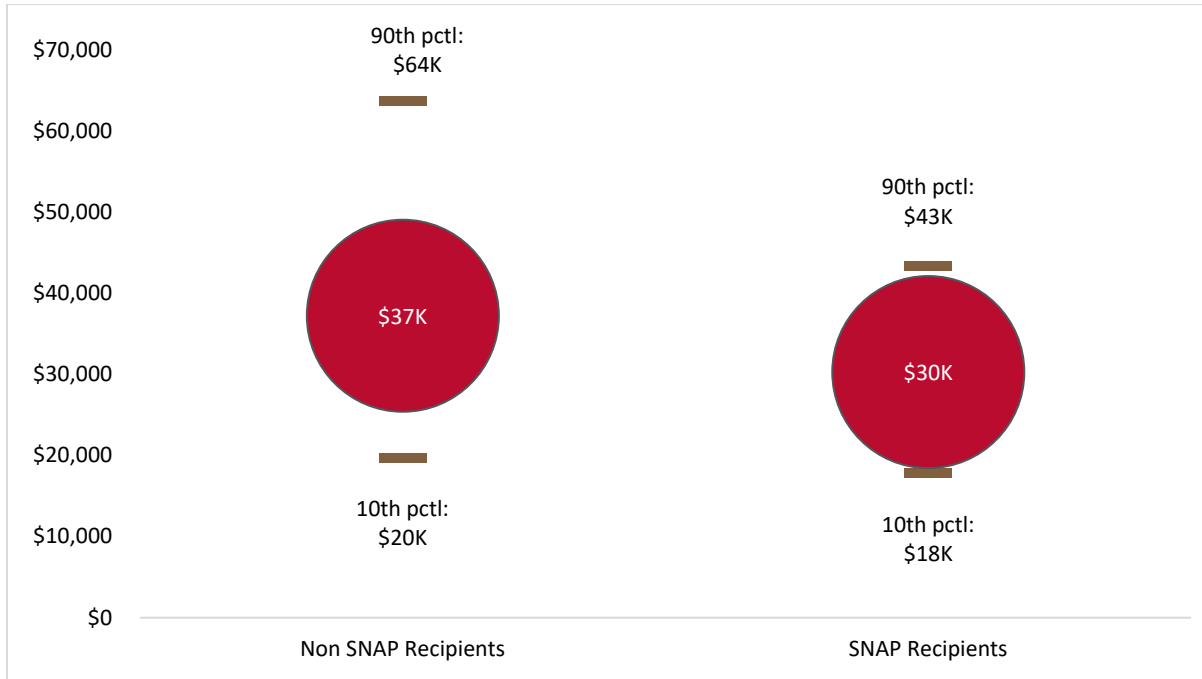

Note: Estimates in the chart represent stable jobs in January-March 2023 (N = 9,679 workers).

Figure 8. Median Annualized Wage for Teachers by Ages Served for Stable, Matched Jobs in Winter 2023
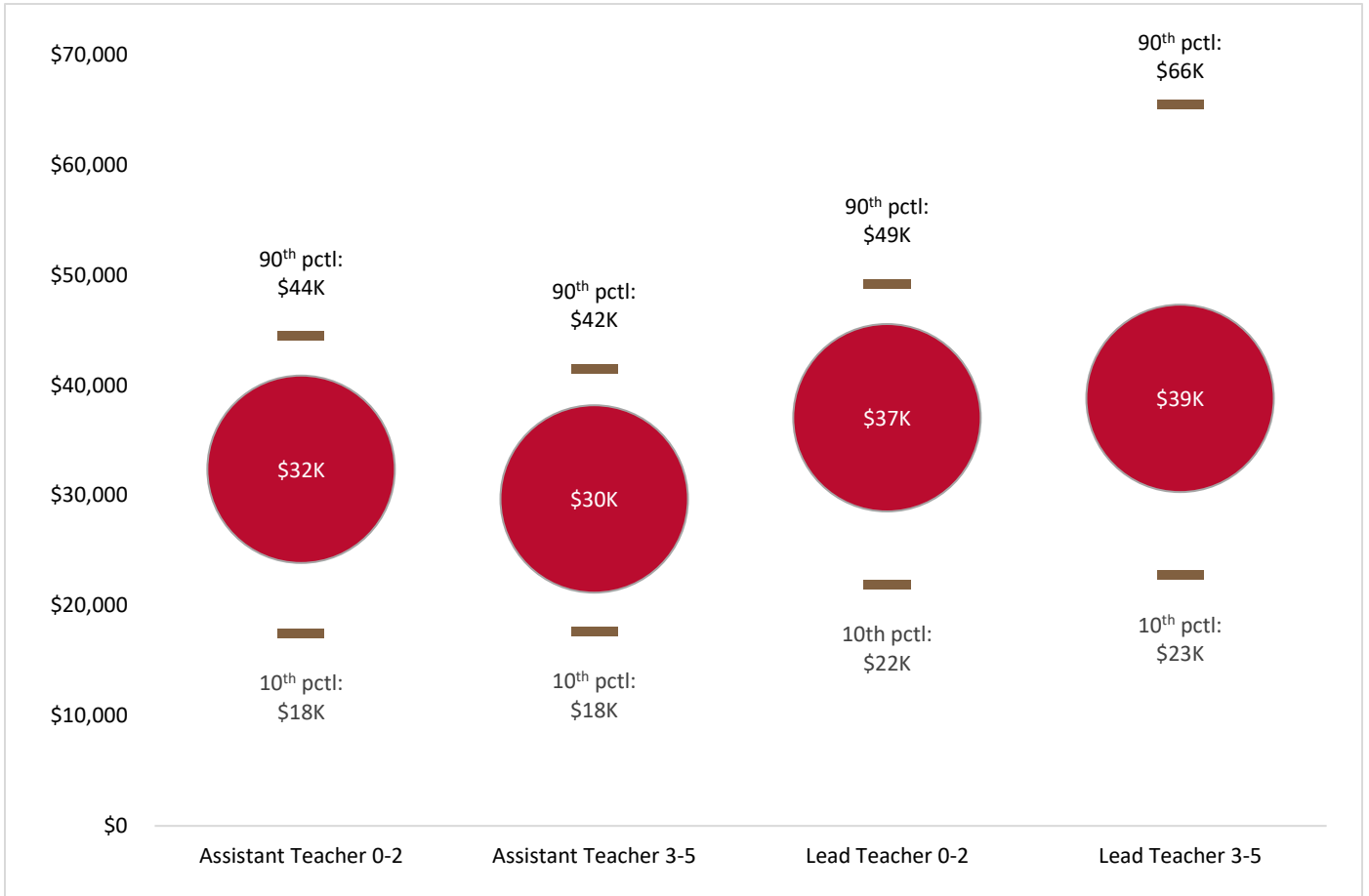

Note: Estimates in the chart represent stable jobs in January-March 2023 (N = 9,679 workers).

Figure 9. Median Annualized Wage by SNAP Receipt for Stable, Matched Jobs in Winter 2023

Note: Estimates in the chart represent stable jobs in January-March 2023 (N = 9,679 workers).

Family Child Care Homes Overview

There were 949 individuals employed at a Family Child Care Home (FCCH) in 2022-2023 with a SSN. Of these, 5% (49) matched to the same employer within PDIS and wage data and 3% (33) matched to a stable job with the same employer.

Figure 10. FCCH 2022-2023 Cohort PDIS Match to Wage Data
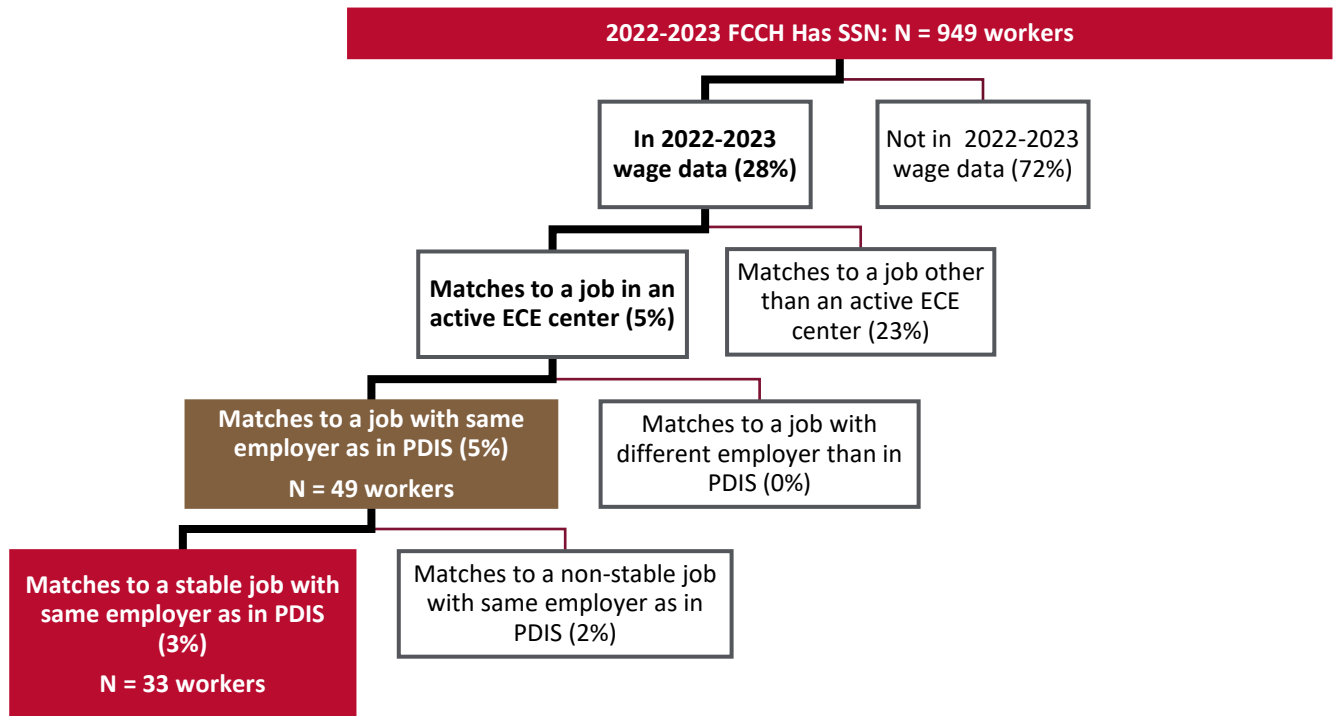
Discussion

The ability to link not only individuals but specific jobs (employer/employee combinations) between ECE workforce registry data and UI wage records and SNAP data at high rates is a significant milestone for Colorado ECE workforce research. Matching these datasets creates the opportunity to conduct much richer longitudinal analyses of workforce employment experiences contextualized by verified wage information. This analysis linked over two-thirds of center-based jobs in PDIS in 2022-2023 to corresponding records in the UI wage data, and we include recommendations below that could further improve that match rate.

Initial analyses of these linked data demonstrate how both median wages and wage distributions vary by role, in both expected and unexpected ways. Of note, the median wage for preschool teachers was not higher than the median for infant/toddler teachers, although the 90th percentile was much higher. This pattern suggests evidence of higher paid teachers in district-based preschools, an area of particular policy interest. The initial look at SNAP participation and wages conforms to expectations that higher SNAP participation occurred among those with lower wages. This expected trend is encouraging with regard to the quality of the LINC project data and the ability to explore ECE workforce SNAP participation in greater detail in future LINC project work.

A [spring 2023 report](#) from a Colorado Early Childhood Benefits & Compensation Task Force estimates an average salary of $19.39/hour or $40,336 annually is needed to meet the average cost of living for a family of three (two working parents and one child). In general, these analyses demonstrate current wages below the average livable wage in Colorado. The same report recommends salary scales based on various cost of living zones across the state, position, and Early Childhood Professional Credential level.

The ability to match workers in family child care homes (FCCHs) to UI wage records is much worse. We do not expect owners of family child care homes to appear in UI wage records for their child care jobs because they would be considered self-employed, which likely explains the 70% of individuals working at FCCHs who have SSNs in PDIS but could not be found in wage data. About 30% of home-based workers do have records in wage data in the 2022-2023 school year, representing either second jobs or individuals who work as assistants in someone else's home. Although very few match to a job at an active ECE provider, this may be because family child care homes do not have FEINs in CDEC's data that can indicate active ECE providers in the wage data (for example, if CDEC has the owner's SSN instead of an FEIN).

Recommendations

This brief describes an initial exploration of the potential to link PDIS and UI wage records. As such, our recommendations focus on next steps to extend the policy-relevance of analytic results.

First, SSNs are present on individual records in PDIS at high rates, but the ability to match particular jobs is limited by the presence and quality of employer FEINs as well. 88 centers were actively licensed in 2022-2023 but did not have an FEIN in their record. **Overall match rates would benefit from further efforts to identify or collect FEINs for these centers.** Some FEINs, such as for nonprofits or publicly traded companies, can be found online.

Second, variation in wages between community-based and district-based programs is a topic of policy relevance. Although these providers cannot easily be distinguished in CDEC data, **a comparison of wage distributions by provider NAICS code for licensed ECE providers** could prove a useful proxy.

Although few FCCH jobs could be identified in wage data, we do see wage records for 30% of these workers. **Further analysis of wage records for individuals working FCCHs**, such as an exploration of employer NAICS code, could identify whether these individuals are working multiple jobs or if problems with FEINs are preventing job-level matches.

Lastly, the CDEC has launched a new annual income & benefits survey within the PDIS that is optional and open to all users starting in 2024, including questions about public assistance. This is a promising data collection strategy that could provide more detailed information about wages, benefits, and public assistance to supplement what is learned from the wages through the LINC project.

Appendix A

Figure 1. Median Annualized Wage, All Stable Jobs Matched between Wage Data and PDIS
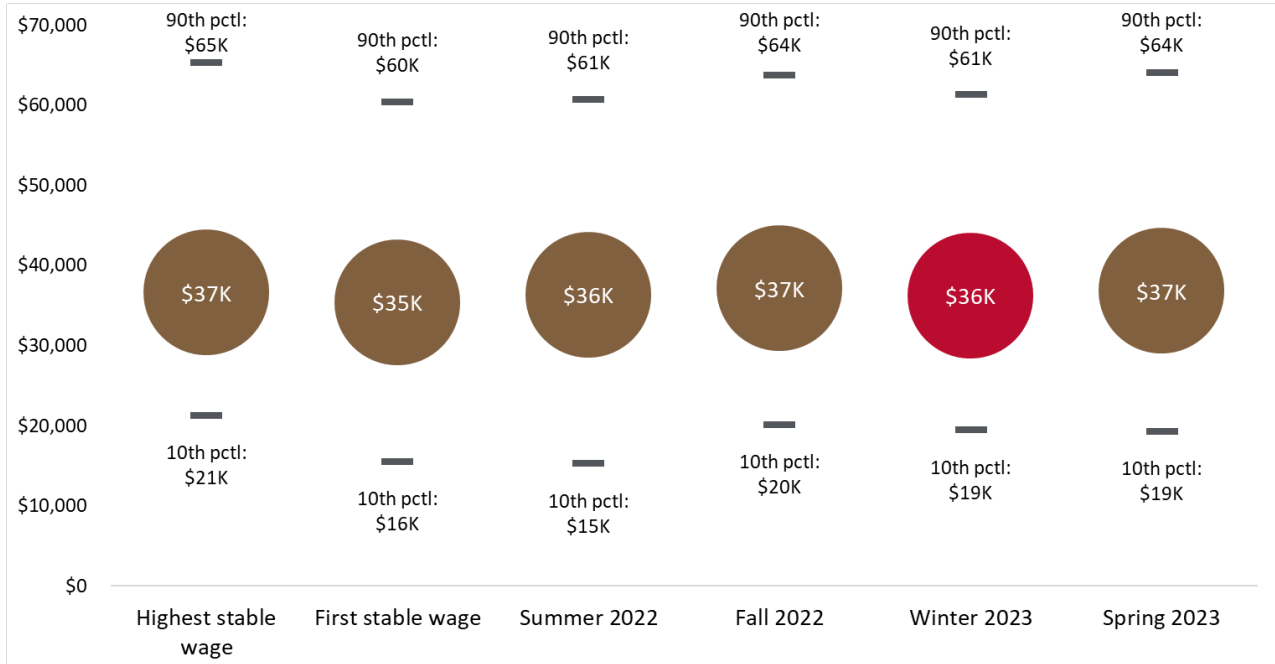
Note: Estimates for highest stable wage and first stable wage represent 11,410 workers. Estimates for Summer 2022 wages represent 8,021 workers. Estimates for Fall 2022 wages represent 9,513 workers. Estimates for Winter 2023 wages represent 9,679 workers. Estimates for Spring 2023 wages represent 9,301 workers.