Research Report

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Differences in Cost of Living and Military Pay Growth for Army Personnel

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Published by the RAND Corporation, Santa Monica, Calif.

About This Report

This report documents research and analysis conducted as part of a project entitled *Reducing Personnel Costs Through More Efficient Military Compensation*, sponsored by the Assistant Secretary of the Army for Manpower and Reserve Affairs. The purpose of the project was to provide information on how the Army can get personnel readiness, such as recruiting and retention, more efficiently or achieve current readiness with lower personnel costs through better setting of military compensation.

This research was conducted within RAND Arroyo Center's Personnel, Training, and Health Program. RAND Arroyo Center, part of the RAND Corporation, is a federally funded research and development center (FFRDC) sponsored by the United States Army.

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Acknowledgments

We are grateful for the help, comments, and guidance of our action officer, Larry Anderson, Assistant Deputy for Military Pay, Compensation, and Entitlements in the Office of the Assistant Secretary of the Army (Manpower and Reserve Affairs). We also gratefully acknowledge the assistance of Chris Lyons, Chief of Staff of the Defense Commissary Agency, for providing information on commissaries and commissary utilization data for this project. We also would like to thank Sonia Malik and Joseph O'Connor in the Allowances Division of the Military Compensation Directorate in the Office of the Under Secretary of Defense for Personnel and Readiness for providing information on inputs to the military Cost of Living Allowance. We are especially grateful for the help of Don Svendsen in the Military Compensation Directorate in the Office of the Under Secretary of Defense for Personnel and Readiness. We thank our RAND colleagues Samuel Absher, Jonas Kempf, Christina Panis, and Anton Shenk for their contribution in data construction and analysis. We would also like to thank Heather Krull and Katharina Best, Director and Associate Director, respectively, of RAND Arroyo Center's Personnel, Training, and Health Program. Finally, we gratefully acknowledge the thoughtful comments of the two peer reviewers, Jeff Wenger at RAND and Saul Pleeter, formerly of the

Office of Compensation in the Office of the Under Secretary of Defense for Personnel and Readiness.

Summary

The research reported here was completed in November 2023, followed by security review by the sponsor and the U.S. Army Office of the Chief of Public Affairs, with final sign-off in March 2025.

In an effort to evaluate whether military compensation has been effective and efficient in addressing cost-of-living changes, we explore the extent to which military compensation growth has kept up with cost-of-living changes over time, across geographic areas, and across subgroups of soldiers. Cost-of-living changes are relevant not only because of concerns about military pay keeping its purchasing power during periods of inflation, as has been experienced since 2021, but also because the frequent moves made by military personnel mean that the purchasing power of pay may depend on where a member is assigned. As stated by the Seventh Quadrennial Review of Military Compensation in 1992,

> A pay structure established to be attractive, motivating, and economical on average may be undermined by geographic variations in prices. The effects on the compensation system of local variations in prices should be minimized to prevent undermining the overall system. (Office of the Assistant Secretary of Defense, Force Management and Personnel, 1992, p. 23)

In this report, we compute the trends in changes to cost of living and pay for Army personnel from 2018 to 2022 and examine subgroup differences and geographic variations. The study relied on Army personnel and pay data provided by the Defense Manpower Data Center and cost-of-living data provided by the Council for Community and Economic Research (C2ER). The latter dataset includes a quarterly cost-of-living index (COLI) since 1992 for more than 300 locations in the United States. We constructed a COLI for each soldier reflecting that soldier's cost of living where they live and shop, adjusted for access to and savings associated with military commissaries. Because of limitations with these COLI data, we also used tabulations from the Office of the Secretary of Defense to compute the military's annual Cost of Living Allowance in the continental United States (CONUS COLA, referred to as *COLA data* in this report), as well as basic allowance for housing (BAH) data. These COLA data also have limitations, so we used them to assess the robustness of our findings using the C2ER COLI data and alternative methods of measuring cost of living. To measure pay growth, we considered basic pay, the BAH, the basic allowance for subsistence, and CONUS COLA for each soldier in each year.

The advantage of using individual-level soldier data to compare pay growth and cost-of-living growth is that we can make comparisons among subgroups of soldiers and locations. However, our metrics of pay growth capture not just annual adjustments made by Congress to

reflect changes in costs, such as annual changes in BAH, but also promotions and changes in the experience mix from year to year. Because promotions and longevity pay increases improve the purchasing power of pay, our measure of pay growth arguably should include these sources of pay increases. On the other hand, these sources of pay growth are not explicitly intended to address cost-of-living changes. We conducted sensitivity analyses to illustrate how our results would differ if we controlled for grade and experience mix changes from year to year.

Findings

We find that, from 2018 to 2020, Army pay growth exceeded the change in cost of living at the national level. Across the U.S. Department of Defense, basic pay growth outpaced inflation between 2000 and 2020, rising by 70.7 percent versus a 51.9 percent increase in inflation. But in 2021 and 2022, exceptionally high inflation levels resulted in cost-of-living increases that exceeded the growth in Army pay. Region-level analysis shows that cost of living and cost-of-living changes in locations where Army personnel are assigned do not always follow the national or regional averages, suggesting that Army personnel live in different neighborhoods and locations than the general population.

We also find that some installations experienced significantly slower pay growth than cost-of-living growth since 2020, while others experienced faster pay growth than cost-of-living growth despite high inflation. For example, at Joint Base Lewis-McChord in Washington, cost of living increased by 22.9 percent in 2021 and by 15.9 percent in 2022 relative to the previous year, while total pay only increased by 6.7 percent and 9 percent, respectively, in these two years for this location. In contrast, Army personnel based at Fort Eisenhower (formerly Fort Gordon) in Georgia experienced faster pay growth than the change in cost of living in these years at this location, meaning soldiers assigned to this installation had an increase in purchasing power despite high inflation.

We also find differences in the purchasing power of pay across different subgroups defined by grade and family status. Specifically, married individuals and those with more dependents experienced a greater loss of purchasing power in 2021 and 2022 than never-married soldiers or those without dependents. We find that the loss of purchasing power was greater for enlisted personnel than for officers in 2021, but the loss was about the same for enlisted personnel as it was for officers in 2022. On the other hand, pay growth exceeded cost-of-living growth in 2018 for all grades, with the biggest gain in purchasing power occurring for enlisted soldiers compared with officers.

Implications

The results suggest that the current system of adjusting for cost of living in the military was effective through 2020 for Army personnel, to the extent that Army personnel did not lose purchasing power at the national level between 2018 and 2020. On the other hand, Army pay

growth fell short of cost-of-living growth in 2021 and 2022, though there were some installations where this was not the case. That said, real wages did not rise for private sector workers either in 2021 or 2022; the growth of nominal pay of private industry wage and salary workers fell short of the increase in the Consumer Price Index (U.S. Bureau of Labor Statistics, 2023a).

The results also imply that the system was less effective in equalizing the purchasing power of military pay across Army installations. We found installations where pay growth significantly fell short of cost-of-living increases in 2021 and 2022, installations where pay growth and cost-of-living changes were roughly equal, and installations where military pay growth exceeded changes in cost of living in these high-inflation years. Furthermore, purchasing power differed across subgroups of personnel, again suggesting that the current approach falls short.

Determining why the current system falls short and considering policy options for addressing the issue was beyond the scope of our analysis. The charter of the 14th Quadrennial Review of Military Compensation includes a requirement to review the current methodologies for setting military allowances. That said, our analysis highlights the important role of commissaries in reducing cost of living. We find that increasing the commissary use rate among Army personnel, as well as increasing the amount of savings achieved, significantly reduces their cost of living. Therefore, the Army should encourage soldiers to make more extensive use of commissaries, especially during periods of high inflation.

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Differences in Cost of Living and Military Pay Growth for Army Personnel

Introduction

Military personnel costs account for roughly one-quarter of the U.S. Department of Defense's (DoD's) budget, so Army personnel costs are a significant part of the Army's budget (Congressional Budget Office, undated). Given force size, grade, and experience mix, the major driver of personnel costs is military compensation, which includes basic pay, allowances, special and incentives pays, retirement accrual, and an array of other benefits. Military compensation is used by DoD as a strategic human resources tool to attract, retain, and motivate high-quality personnel to stay and seek advancement and eventually separate from service (Under Secretary of Defense for Personnel and Readiness, 2018). Given that a unique feature of military service is frequent moves to new locations, the success of military pay as a human resources management tool can be hampered by geographic cost-of-living differences. As stated by the Seventh Quadrennial Review of Military Compensation in 1992,

> A pay structure established to be attractive, motivating, and economical on average may be undermined by geographic variations in prices. The effects on the compensation system of local variations in prices should be minimized to prevent undermining the overall system. (Office of the Assistant Secretary of Defense, Force Management and Personnel, 1992, p. 23)

Between 2000 and 2020, military basic pay grew faster than inflation, by 70.7 percent versus a 51.9 percent increase in the Consumer Price Index (CPI; Kapp, 2017; Kapp, 2022; World Bank, 2023). Since 2021, however, cost of living has been particularly salient in discussions about the adequacy and cost of military compensation, owing to historic rates of inflation nationally and to uneven rates of inflation across geographic areas (World Bank, 2023). For example, rural areas were particularly affected by high inflation rates between 2021 and 2022 (Chakrabarti, Garcia, and Pinkovskiy, 2023). With concerns about the high cost of living and geographic disparities, especially in rural areas, the Army requested an analysis of how military pay growth across locations in the continental United States (CONUS) was keeping up with cost-of-living differences as part of a larger RAND Arroyo Center project on reducing compensation costs and improving the efficiency of military compensation. This report summarizes the results of this analysis.

Overview of Four Elements of Military Pay

Since the 1962 Gorham Commission, the military equivalent of civilian cash compensation has been defined as *regular military compensation* (RMC), equal to basic pay, the basic

allowance for housing (BAH), the basic allowance for subsistence (BAS), and the federal tax advantage of receiving BAH and BAS tax-free (Under Secretary of Defense for Personnel and Readiness, 2018). In our analysis of whether and how military pay growth has kept up with cost-of-living differences across geographic areas, we focus on the first three elements of RMC. Furthermore, we add a fourth element of military compensation, the CONUS Cost-of-Living Allowance (CONUS COLA) that is paid to eligible military personnel. Thus, our metric of military pay includes the sum of these four elements.

Basic pay is the foundation of military compensation, and every active-duty service member is entitled to it, though the specific amount at any point in time depends on pay grade and years of service. U.S. Code, Title 37, Section 1009c provides a formula for the annual increase in basic pay that is indexed to the annual increase in the Employment Cost Index (ECI) for private industry wage and salary workers. The change in ECI is meant to guide the recommendation for the annual increase in basic pay, though DoD and Congress (informed by recruiting and retention outcomes) can deviate from the recommendation. Importantly, the ECI change used to inform the annual pay raise is the national ECI, leaving out geographic differences altogether.

Every service member is also entitled to receive BAH (or quarters in kind) and BAS. BAH rates are based on permanent duty station zip code, pay grade, and whether the member has dependents (DoD, 2023). BAH is designed to compensate members for median rental costs in the area, along with the cost of utilities, and BAH rates are set annually based on an area housing survey that tracks the market price of rental housing in a wide range of areas. These areas are defined by a group of zip codes that are referred to as a *military housing area* (MHA). For about half the zip codes in the United States (with few or no military personnel), groups of zip codes are assigned to county cost groups (CCG). There are about 300 MHAs and 30 CCGs, with only 2 percent of military members covered by CCGs (DoD, 2023).

BAS is meant to offset the member's cost of food. Since 2002, all enlisted members receive full BAS and pay for their meals, even meals provided by the government (Under Secretary of Defense for Personnel and Readiness, Office of Compensation, undated). Enlisted members get a higher BAS than officers, but otherwise BAS does not vary across personnel or geographic locations. BAS is adjusted annually based on the U.S. Department of Agriculture food cost index, which means it is designed to reflect changes in the cost of food items nationally.

Of the three elements (basic pay, BAH, and BAS), only BAH varies geographically and only to the extent that median rental rates vary as reflected in the DoD area housing survey. CONUS COLA is a taxable allowance that is designed to offset expenses in locations that are deemed particularly expensive. An area is considered particularly expensive if nonhousing cost of living is at least 8 percent above the national average cost of living (Defense Travel Management Office, undated-b). The CONUS COLA amount is based on spendable income by grade, years of service, and dependents' status and is set by MHA, if the MHA meets the 8 percent threshold. CONUS COLA is updated each calendar year according to several data sources, including local market price data from a private contractor and information on the availability, savings, and

utilization of commissaries and exchanges. BAS rates are deducted from the cost of living, acknowledging that part of the food cost is already addressed by BAS. CONUS COLA does not affect personnel in places where cost of living is less expensive than the national average or is more expensive but less than 8 percent above the national average.

Overview of Approach

In this report, we evaluate whether the growth of military pay across locations and subgroups of soldiers, measured by the sum of the four elements discussed in the previous subsection, reflects differences in cost of living. We study alternative metrics of pay and cost of living and compare annual growth in each year from 2017 through 2022, across geographic areas. We calculate military pay using individual-level data on Army soldiers in each year to measure military pay and pay growth by location, drawing from data provided by the Defense Manpower Data Center (DMDC). We compare annual pay growth with annual cost-of-living changes in the same location, estimated using Historical Cost-of-Living Index (COLI) data provided by the Council for Community and Economic Research (C2ER). To assess whether the empirical patterns we observe are robust to alternative data (since the COLI data have limitations), we also constructed cost-of-living indices using tabulations provided by the Office of the Secretary of Defense (OSD), which it uses to compute the annual CONUS COLA by MHA. (We refer to these data as *COLA data* in this report). Our main results rely on estimates of cost of living using the COLI data, adjusted to reflect soldiers' access to commissaries and the average savings they receive by shopping at the commissary, and we show results using the COLA data in Appendix B. We then show comparisons by location for different types of Army personnel (e.g., junior enlisted versus officers) and for different metrics of pay growth and cost of living. Finally, we show how our results about the extent to which military pay growth across locations reflects cost-of-living differences would change if a larger share of soldiers took advantage of commissary savings. As expected, when commissary use is assumed to increase, military pay growth does a better job of keeping up with cost-of-living differences, as we show later.

Organization of Report

In the next section, we describe our methodology in greater detail, including the data sources we used. Then, we show our results and summarize our main conclusions. In the appendixes, we include additional information on our methodology and show figures and tables using different measures of cost of living and pay growth and for additional locations.

Methodology

In this section, we describe the methodology and data we used to compare cost-of-living changes with growth in military pay across locations for Army personnel. We begin with an overview of the approach we used in working with the COLI data from C2ER, which involves

three major steps and several substeps; in the process, we describe the data we used. We discuss key assumptions and the analyses we conducted to assess sensitivity to these assumptions. We also discuss the limitations of the COLI data and our use of CONUS COLA data instead, which have advantages over the COLI data but also have limitations, as we discuss later in this section. We present our results in the section that follows.

As mentioned, our approach with the COLI data involved three steps:

1. Measure the change in cost of living for each Army soldier based on their mailing address zip code.
2. Measure the change in military pay for each soldier using individual-level pay data.
3. Compare COLI growth with the percentage change in military pay.

Implementing this three-step approach involved deciding whether to make comparisons with aggregate data by location or with disaggregated individual-level soldier data. The aggregate approach would involve measuring the change in cost of living for each area where an Army installation was located and comparing the change with the change in pay for representative soldiers. For example, we might measure the change in cost of living between 2020 and 2021 for Killeen, Texas, near Fort Cavazos and compare the change with the change in pay for those years for an E-5 with, say, five years of service who received BAH at the "with dependents" rate in the MHA for Fort Cavazos.

We found that this aggregate approach had several disadvantages. First, soldiers with a duty location at Fort Cavazos may live in more rural areas, where Killeen prices and access to commissaries are less relevant. Second, the geographic areas used to compute cost of living do not always overlap directly with MHAs and CCGs, which are used for setting BAH rates. Third, our ability to conduct the analysis for relevant subgroups could be limited. For example, we cannot calculate the cost-of-living changes for all junior enlisted from aggregate data because they live in different parts of the country. Finally, aggregate data would only enable counterfactual analyses of scenarios that affect all soldiers in the same way, such as increasing or decreasing access to commissaries. Thus, the aggregate approach would be more limited in analyses that explore scenarios that affect subgroups differently.

Because of these disadvantages, we used disaggregated individual-level data on soldiers to identify locations, measure cost-of-living changes, and measure changes in pay, as we describe next in our description of the three-step approach.

Measuring the Change in Cost of Living for Each Soldier

Cost of living refers to the cost of a basket of goods and services chosen to represent the goods and services considered necessary for everyday life, such as groceries and transportation. Cost of living is computed as

$$COL = \Sigma_i P_i * W_i, \quad \text{(Equation 1)}$$

where the price of item i in the basket is P_i and the weight assigned to each item is given by W_i. The weights are intended to reflect the relative importance of an item in the basket and usually are measured by their share in total household expenditures or consumption.[1] As a result, differences in cost of living for individuals come from facing different prices and different consumption patterns. The change in the cost of living is computed as the percentage change relative to the previous year, or

$$Change\ in\ COL = \frac{(COL_{t+1} - COL_t)}{COL_t}. \quad \text{(Equation 2)}$$

In this report, we calculate the change in cost of living for each soldier with four substeps, as follows.

1. Identifying Where Soldiers Live

First, we identified where each active-duty soldier lives so we can compute cost-of-living indices for the specific locations where they live. We used monthly pay and personnel data provided by DMDC for each active-duty Army member present for the full month of September for each year from 2017 to 2022. We used monthly data rather than annual data to avoid concerns about soldiers serving less than a full year, either because they joined or left the Army or because they moved during the year. We chose September because it is the end of the fiscal year, when the Army's end strength is measured in terms of meeting congressional mandates. We identified where each soldier lives by their mailing address zip code.

2. Computing COLI

The second substep is computing the cost of living for each soldier using their zip code. The CPI is the most used measure for cost of living in the United States, developed and maintained by the U.S. Bureau of Labor Statistics (BLS). BLS calculates CPI from the prices for a basket of approximately 80,000 goods and services. Data are collected each month from housing units and retail establishments. The downside of CPI for our purposes is that it only covers 75 areas across the country and focuses on urban areas (BLS, 2023b). The BLS CPI basket is designed to reflect the consumption patterns and prices of urban residents and is not as applicable to non-urban residents, such as Army personnel (who often live outside urban areas). This also means that the BLS CPI is better for measuring cost-of-living changes over time than for measuring cross-sectional changes that involve many different locations.

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[1] This type of COLI, including the commonly used CPI, has been extensively studied. The Boskin Commission identified biases in fixed-basket indices for which consumption weights remain constant (Boskin et al., 1996). To address some of the biases, most cost-of-living data, including the COLI data we used, adjust the consumption basket over time to reflect consumption changes. Notably, our analysis looks at a relatively short period, so biases coming from quality improvements or the introduction of new products are less concerning. That said, COLI data have their limitations, which we discuss later in the report.

To highlight the cross-sectional cost-of-living differences required for our analysis, we relied on Historical COLI data provided by C2ER. The dataset includes a quarterly COLI since 1992 for more than 300 locations in the United States, which are referred to as *core-based statistical areas* (CBSAs); this dataset provides the only local level of COLI available in the United States (C2ER, undated; C2ER, 2017). A CBSA in the COLI data contains at least one urban center with a population of 10,000 or more and includes that center's adjacent counties that are economically and socially integrated with it. The Historical COLI data also include a "non-metro" location that is a single index for areas outside these CBSAs. A drawback of the Historical COLI data is that the market basket only includes about 60 items, much smaller than the CPI basket. The COLI basket includes six categories of consumer expenditures: grocery, housing, health care, utility, transportation, and miscellaneous goods and services. Aside from COLI calculated from the entire market basket, the dataset provides the prices and weights of each category, allowing for the calculation of additional cost-of-living indices that include only a subset of the basket. Thus, we use the COLI data by category to compute different metrics of cost of living and changes in cost of living across locations, as discussed further below.

The COLI data have the advantage of providing information on 300 locations, more than the 75 locations covered by the CPI. But these data also have several limitations for our purposes. First, the COLI data use consumption weights for "moderately affluent professional and managerial households," usually in the top income quintile (C2ER, 2017), so the weights are not representative of the purchases of military families, who typically are enlisted personnel. Second, the data focus on urban areas, whereas many Army locations are in more rural areas. Third, the source of the data is participants who provide price data, and the data are not gathered systematically by a third party with expertise in such data collection. Lastly, to merge COLI data into DMDC data by zip code, we used the mailing zip codes of soldiers instead of their assignment locations, but mailing zip codes reflect soldiers' choices about where to live rather than where they are assigned by the Army. Different soldiers may make different trade-offs with respect to location amenities versus distance from their assigned locations. As we discuss below, we used an alternative data source that addresses these issues but has limited coverage across locations in order to provide robustness checks of our results using the COLI data.

Because individual-level data provide information on where each soldier lives, we can separate soldiers living farther away from their installation from others and, importantly for our analysis, from those living outside CBSAs. While most soldiers live in a CBSA (as shown in Table 1), about 22 percent of soldiers in our data live outside a CBSA. Because not all soldiers live in the CBSA, the COLI for the CBSA may be less relevant than it is for soldiers who live in the CBSA. Consequently, we adjusted the COLI for each soldier based on their distance from the CBSA.

We computed the haversine distance between a soldier's mailing zip code and the closest CBSA to estimate how *exposed* the soldier is to the COLI for that CBSA versus the non-metro COLI (Appendix A describes the calculation of distance). For the 78 percent of Army personnel

in our data who live in a CBSA, we make no such adjustment, and their COLI is the COLI for their CBSA. For those living outside any CBSA but within a reasonable distance to the closest CBSA, we adjusted the COLI to reflect that the cost of living in that CBSA would still affect their cost of living, but by a lesser amount. We assumed people living within twice the radius of a CBSA to be affected by its cost of living.[2] For example, the average radius of a CBSA in the United States is 25 miles. People living between 25 miles and 50 miles from the center of an average-size CBSA would shop sometimes inside and sometimes outside that CBSA. These people account for around 14 percent of our study population. We used the average of CBSA COLI and the non-metro COLI as their cost of living. For the remaining 7 percent of soldiers who live even farther away from their closest CBSA, we used the non-metro COLI for their cost of living.

Table 1. Assumed Cost-of-Living Adjustment, by Distance to Closest CBSA

Distance to CBSA center	Sample Percentage	Index Adjustment
Within CBSA radius	78.26%	CBSA
Between one- and two-CBSA radius	13.90%	0.5 × CBSA + 0.5 × non-metro
Outside two-CBSA radius	7.84%	Non-metro

SOURCES: Features DMDC data, COLI data from C2ER, and distance data collected for this project.
NOTE: Data restricted to September 2021 for people who were serving in the Army, were included in military strength, had an Army organization code, and had U.S. presence (based in CONUS or received BAH) with a valid residential mailing zip code. CBSA radius is calculated based on the latest available CBSA area from the 2000 and 2010 U.S. Census. A CBSA without area estimates in the U.S. Census is assumed to have an average radius of 25 miles, with a few exceptions.

3. Adjusting COLI to Permit Cross-Year Comparisons

In COLI data, the average cost of living across all locations is normalized to equal 100 each quarter, and the cost of living in each location is presented as a percentage of the national average. This allows the comparison of COLI in different areas at a point in time; however, because the national average is always set to 100, indices from different points in time cannot be compared. Thus, we took an additional step to further adjust COLI in each year with the BLS CPI to allow comparisons over time. BLS provides CPI information monthly and normalizes the CPI to the national average CPI in 1982–1983. Because our Army personnel data were for September, we used the September BLS CPI from 2017 to 2022 to adjust COLI so that the national averages of the adjusted third-quarter COLI were consistent with the CPI. Specifically, we adjusted the COLI computation as follows:

[2] Other assumptions of "reasonable" distance could be used. However, the effects of this assumption are limited because nearly 80 percent of soldiers in our data live within the CBSA radius, and only 7.8 percent live outside the two-CBSA radius, so relatively few are affected by using the weighted approach shown in Table 1.

$$COLI_{adj} = \frac{COLI_t}{100} * CPI_t. \quad \text{(Equation 3)}$$

4. Adjusting for Commissary Use

Active-duty military personnel and their families, as well as military retirees, have access to discounted groceries through a commissary on military installations. By having access to discounted groceries, the cost of living that military personnel face is lower than what the raw COLI computations suggest. We requested and received tabulations from the Defense Commissary Agency (DeCA) within OSD on commissary utilization rates by MHA, derived from the agency's 2021 CONUS Living Pattern Survey. The survey's response rate was 7 percent. The tabulations indicate the percentage of respondents in each MHA who purchased goods from the commissary, by item category (such as meat or auto parts). We met with DeCA representatives in December 2022, and they informed us that DeCA had achieved or nearly achieved its goal of a 23.7 percent target savings rate for commissaries since 2016. That is, DeCA estimates that the average patron saves 23.7 percent on categories of goods and services due to shopping at the commissary.

We used these tabulations of utilization rate by MHA to further adjust the COLI computation for each soldier to incorporate the commissary discount. First, we manually categorized the commissary items into one of the five nonhousing COLI categories. Thus, meat falls under the grocery category in the COLI data. Second, we calculated the COLI, adjusted for commissary utilization, as follows:

$$COLI_{commissary} = \Sigma_i P_i * (1 - 23.7\% * U_i) * W_i, \quad \text{(Equation 4)}$$

where P_i is the raw price index of item i from COLI, W_i is its normalized weight in the consumption basket, and U_i reflects how much the cost of item i is affected by commissary pricing (or the commissary utilization rate of item i). For goods that are not sold in the commissary, such as housing, utilization is set to zero so that commissary savings do not apply.

Third, we recognize that a soldier's use of the commissary could vary by their distance to the commissary. That is, we do not assume that the utilization rate for every soldier in an MHA is identical and equal to the utilization rate for that MHA. Instead, we calculated the haversine distance between a soldier's mailing zip code and its closest commissary. (Appendix A describes the calculation of distance). We find that many Army personnel in our data live reasonably close to a commissary. Specifically, more than 75 percent of personnel live within 25 miles of a commissary. We assume that personnel who live farther away from a commissary will have a lower utilization rate, implying a smaller commissary savings associated with the COLI computation. Table 2 shows the assumed adjustment of utilization we make based on distance. People who live within five miles of a commissary will take advantage of the full 23.7 percent savings from the commissary, such that, for the fraction of people who shop in the commissaries, the rate applies to the categories of the goods and services they purchase. For people who live

more than 100 miles from a commissary, their cost of living is not affected by the savings rate at all. These assumptions affect the resulting adjusted COLI, and we will explore the implications of these assumptions later in this section.

Table 2. Assumed Cost-of-Living Adjustment, by Distance from Commissary

Distance to Closest Commissary	Percentage of Army Personnel	Assumed Index Adjustment
Less than 5 miles	44.18%	Commissary COLI
5–25 miles	31.52%	0.8 × Commissary COLI + 0.2 × COLI
25–50 miles	4.05%	0.5 × Commissary COLI + 0.5 × COLI
50–100 miles	2.83%	0.2 × Commissary COLI + 0.8 × COLI
More than 100 miles	1.70%	COLI

SOURCES: Features DMDC data and distance data collected for this project.
NOTE: Data restricted to September 2021 for people who were serving in the Army, were included in military strength, had an Army organization code, and had U.S. presence (based in CONUS or received BAH) with a valid residential mailing zip code.

Our approach to adjusting COLI for commissary utilization, as shown in Table 2, has limitations. First, we assume the utilization rates provided by DeCA are for those personnel who live closest to the commissary. The adjustments we make in Table 2 will underestimate the effect of commissary utilization if the utilization rates are averages for all personnel. Second, commissary utilization data we received are aggregated by MHA; it is likely that utilization is highly varied in MHAs that are particularly large, and our adjustments would not reflect the actual utilization by the soldiers. Third, we assume the target savings rate, 23.7 percent, applies for all personnel and all categories of goods and services sold at the commissaries. However, we learned from our conversation with DeCA that not all prices are discounted at this target rate in the commissaries. Furthermore, the U.S. Government Accountability Office (GAO) in 2022 found that the commissary savings rate in CONUS fell below the target rate in recent years and that the savings rate could be more reliably estimated at 17.7 percent for these consumers (GAO, 2022). As we discuss below, we conducted robustness checks of our results using an alternative data source, the CONUS COLA data inputs provide by OSD, which provides commissary savings rates that adjust for differences in the attractiveness of commissaries versus the local economy in each MHA.

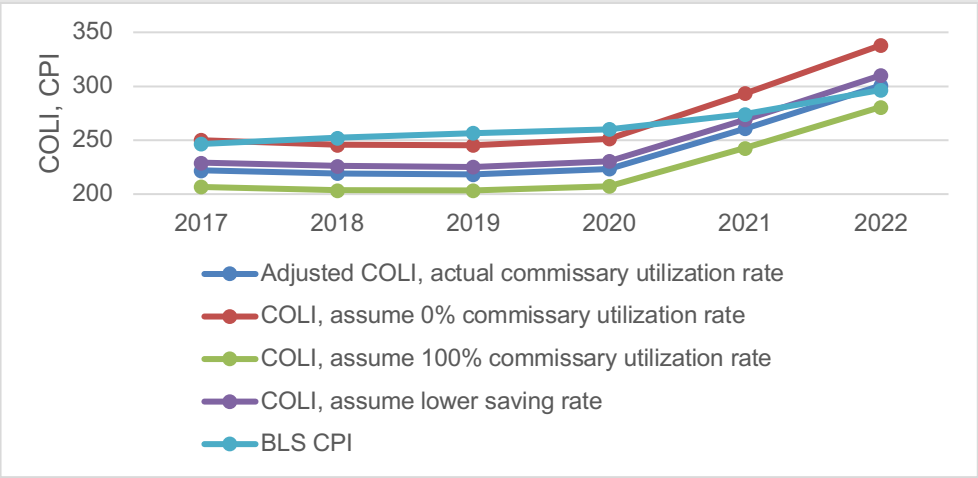
Figure 1 plots the adjusted COLI with the commissary utilization rates and assumptions shown in Table 2 and described in Equation 4, averaged across soldiers by year. The adjusted COLI (dark blue line) is based on the commissary utilization rates from DoD's 2021 CONUS Living Pattern Survey and a commissary savings rate reported by DoD of 23.7 percent. To show how our assumptions affect the COLI, the figure shows four other relevant cost-of-living

metrics.[3] Two of the metrics show the adjusted COLI if the utilization rate is 0 percent (red line; i.e., no one has access to commissaries) and if the utilization rate is 100 percent (green line; i.e., all personnel make all nonhousing purchases from the commissaries). For these two metrics, we assume the 23.7 percent target savings rate. A third metric shows the adjusted COLI with the lower 17.7 percent commissary savings rate reported by GAO (purple line). Lastly, we show the national average CPI in September of each year computed by BLS (light blue line).

As expected, given the low inflation rates prior to 2020, all measures of COLI before 2020 were relatively stable but then increased dramatically afterward. The figure illustrates the substantial effect that commissary use can have in lowering the cost of living for Army personnel. When we assume the commissary utilization rate is 100—i.e., when all Army personnel are assumed to purchase all nonhousing items from a commissary—the COLI is substantially lower (green line) than when we assume that no soldier uses the commissary, and the rate is 0 percent (the red line). In reality, according to the 2021 CONUS Living Pattern Survey, commissary utilization averaged about 70 percent before 2021 and increased slightly to 71 percent in 2022. Thus, the adjusted COLI using the actual commissary utilization rate, shown as the dark blue line in Figure 1, lies between these two extreme cases. Not surprisingly, cost of living is also higher when the savings rate is assumed to be 17.7 percent compared with when we assume the savings rate equals the higher 23.7 percent target rate, so the purple line in Figure 1 is higher than the benchmark dark blue line. The trend in the BLS CPI tracks the COLI trend before 2020, but the two indices diverge after 2020. As discussed earlier, the methods used to construct the BLS CPI and the COLI differ in terms of the market baskets, population samples and locations, and design because the goal of COLI is to compare cost of living cross-sectionally, whereas the BLS CPI is constructed to measure how cost of living changes over time. As a result, BLS CPI was higher than COLI before 2020 but increased slower afterward and stopped at a similar level as the adjusted benchmark COLI in 2022. We will discuss more comparisons between BLS CPI and COLI later in the report.

[3] Commissary utilization rates can vary from location to location based on utilization patterns and the specific goods offered. Furthermore, utilization rates can be driven by cost-of-living changes, and military families can rely more heavily on commissary shopping to reduce their cost of living when inflation is high.

Figure 1. Average COLI and CPI, by Year



SOURCES: Features Historical COLI data, 2021 CONUS Living Pattern Survey data, and BLS data for CPI.
NOTE: Data restricted to September 2021 for people who were serving in the Army, were included in military strength, had an Army organization code, and had U.S. presence (based in CONUS or received BAH) with a valid residential mailing zip code.

Use of CONUS COLA Data to Check Robustness of Results

As noted above, the COLI data from C2ER have several limitations, as does our methodology for incorporating commissary savings. To address these limitations, we calculated cost-of-living indices and related measures using the spreadsheets produced by OSD to determine CONUS COLA by MHA by year. Military members receive CONUS COLA if the nonhousing monthly cost of living in their MHA is at least 8 percent higher than the national average. The monthly cost is calculated from local prices collected by a private contractor (Defense Travel Management Office, undated-b), and consumption weights for computing the cost of living are estimated for military families using the Armed Forces Extract of the Consumer Expenditure Survey (Safir and Dorfman, 2021). Unlike the COLI data, the CONUS COLA information covers the MHA where members are assigned (in contrast with where they choose to live), it uses consumption weights specific to military members, and the data are collected by a third-party contractor. Furthermore, the computation of CONUS COLA adjusts cost of living to account for receipt of BAS and monthly commissary savings for the MHA. The estimated commissary savings for the MHA reflect not only differences in utilization rates across locations but also the specific goods and services the commissary carries.

The COLA data from OSD have many advantages, but we found that they do not include all MHAs or Army personnel over the 2017–2022 period.[4] As shown in Table B.1, only about half

[4] Because CONUS COLA is paid to service members living in areas with cost of living that is significantly higher than national averages, the lack of COLA data coverage in some areas does not necessarily affect CONUS COLA calculations or availability to service members.

of MHAs were covered by the data from 2017 to 2019, increasing in 2021–2022; similarly, only about half of Army personnel, or fewer, were covered by the data from 2017 to 2020. Consequently, we used the COLA data to conduct robustness checks of the findings using the COLI data from C2ER and report the results from the COLI data in the main report.

To conduct the robustness check using the COLA data, we had to adjust our methodology in two main ways. First, for areas without cost-of-living estimates from the COLA data, we used the national average for that year to impute cost of living.[5] Second, because the COLA data do not include housing costs, we added the average BAH rate in the soldier's MHA as an estimate of housing cost in our comparisons of Army pay with cost of living that includes housing costs.[6] We merged the CONUS COLA data and BAH data into our analysis file of Army personnel constructed from DMDC pay and personnel data. We present results using the COLA data in Appendix B and discuss results using the COLI data in the "Results" section below.

Measuring the Change in Pay for Each Soldier

We compared cost-of-living changes with changes in military pay for Army personnel. We measured military pay by summing four components of military cash compensation: basic pay, BAH, BAS, and CONUS COLA (for those who qualify). Although the last three components are allowances intended to offset the costs of housing, food, and unusually high cost of living, respectively, they are paid in cash, not as reimbursements. Service members are free to spend less, or more, on these items than the allowance they receive. Thus, we would not necessarily expect service members' expenditures on these items to equal the allowance. Nonetheless, it may be of interest to consider how subcategories of cost of living compare with subcategories of military pay. To facilitate such comparisons, we developed four metrics of cost of living and four metrics of compensation that roughly correspond to those COLI metrics, as outlined in Table 3. For each cost-of-living metric, we reweighted the categories included, so the indices can be interpreted as different consumption baskets.

[5] In determining CONUS COLA, areas without COLA data are assumed to have the standard national average prices. We conducted robustness checks for all analysis that only included areas with COLA data to make sure the imputation using national average did not drive the results.

[6] We merged COLI data with DMDC personnel data by mailing zip codes. Most soldiers have mailing zip codes within the MHA they are assigned to, but this is not always the case.

Table 3. Cost-of-Living and Military Pay Metrics Used in Our Comparisons

Cost-of-Living Metrics	Categories Included	Corresponding Pay Metrics	
Composite index	All categories	Total pay	Basic pay, BAS, CONUS COLA, BAH
No-health Index	All minus health care	Total pay	Basic pay, BAS, CONUS COLA, BAH
No-housing Index	All minus housing	Nonhousing pay	Basic pay, BAS, CONUS COLA
No-housing, no-health index	All minus health care and housing	Nonhousing pay	Basic pay, BAS, CONUS COLA

Specifically, we first considered the composite index that includes all categories of expenditures, and we compared growth in the composite index with the growth of *total pay*, defined as the sum of the four components of military cash compensation. This is the main metric we use in this report. Second, we considered an index that excludes health care because, unlike their civilian counterparts, active members and their dependents are eligible to receive health care at virtually no cost. The third index we constructed excludes housing, and we compared its growth with a metric of military pay that excludes BAH; such a comparison might be relevant to service members who are in government-provided housing and do not receive BAH. Finally, we considered an index that excludes both health costs and housing costs and compared it with a metric of military pay that excludes BAH, as indicated in the final row of Table 3.

Comparing Cost-of-Living Index Growth with Military Pay Growth

To compare the changes in cost of living with changes to pay, we limited the data to include only Army personnel who remained in one location for any two consecutive periods. We did this to avoid having location changes and personnel moves confound our computations of cost of living and pay changes in each location. It is important to recognize that our analysis throughout compares changes in cost of living with changes in pay, not the levels of cost of living and levels of pay. By focusing on changes instead of levels, we control for historical differences in the levels. Our presentation of results focuses on the composite cost-of-living metric and total pay, shown in the first row of Table 3. This metric is all-inclusive. The other metrics exhibit similar empirical patterns, and we show them in Appendix B. Finally, because the composite metrics in the first row include housing costs in the case of COLI and BAH in the case of military pay, we exclude from the analysis those service members who did not receive full BAH in both consecutive periods or who received extreme values in BAH (e.g., data errors).

Results

This section presents the results of our comparisons of COLI and military pay changes among Army personnel. We start with comparisons at the national level to provide a "big picture" of how military pay growth kept up with cost-of-living changes at the aggregate level. Next, we take advantage of our ability to consider subgroups of soldiers and provide comparisons, first by geographic region and for selected Army installations. We then show comparisons based on grade, marital status, and dependent status. We summarize our main conclusions in the next section.

Big Picture

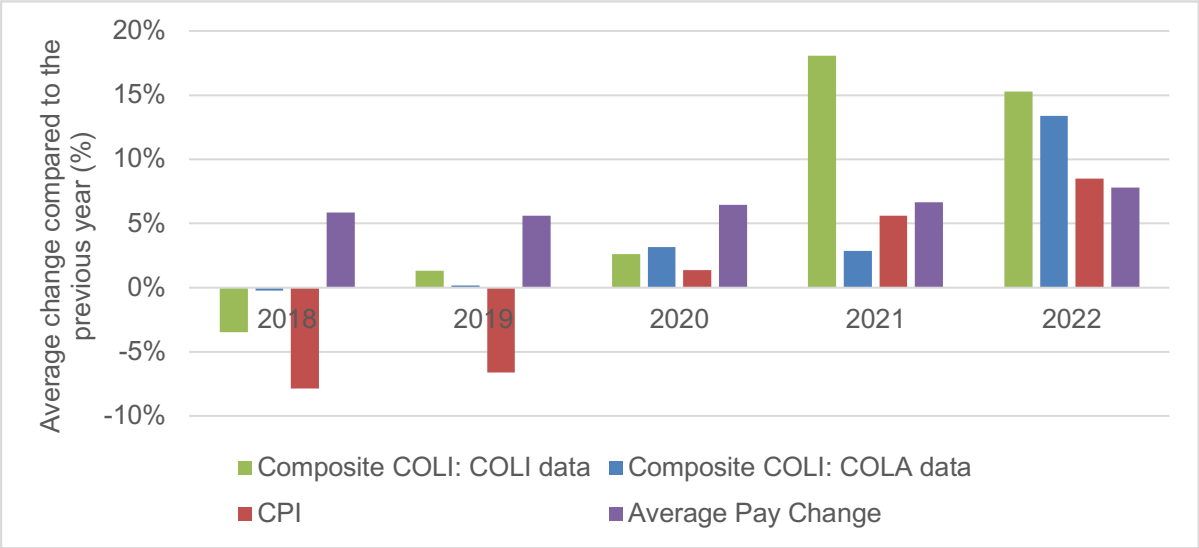
We start by investigating the extent to which average military pay increases for Army personnel have been in line with cost-of-living increases nationally. Figure 2 shows a comparison of annual changes in the composite cost of living and total pay indices from September 2018 to September 2022. The components of the composite cost-of-living and total pay indices are shown in the first row of Table 3. The composite COLI change using COLI data (green bar), composite COLI change using COLA data (blue bar), CPI change (red bar), and average pay change (purple bar) all are calculated as averages of the changes experienced by individual soldiers. Note that because of the differences in data and methods, the composite COLI using the COLI data varies by soldier, but the composite COLI using the COLA data is the same for soldiers living in the same MHA or CCG, and the CPI is the same for soldiers living in the same state. In the case of pay, changes will reflect not just increases to specific components of pay, such as a change in BAH rates, but also changes in the experience mix and grade mix of Army personnel over this period. Later, we show comparisons controlling for grade and experience mix to illustrate how the results change.

We find that the growth in pay for Army personnel nationally outpaced the change in cost of living from 2018 to 2020. Using the COLI data, we find that average pay changes for Army personnel fell short of the change in cost of living for 2021 and 2022. On average, total pay for Army personnel increased 5.6 percent to 7.8 percent each year over the five years. Cost of living decreased in 2018 and increased by 1.3 percent and 2.6 percent in 2019 and 2020, respectively. However, cost of living increased by 18.1 percent and 15.3 percent in 2021 and 2022, respectively, reflecting significantly higher inflation in those years. Thus, pay increased more than cost of living before 2020 but increased less than cost of living in 2021 and 2022.[7] The COLI using COLA data and the CPI tell a very similar story, except for the year 2021. The COLA data did not capture the price changes in 2021 at all, possibly due to the timing of data collection, as price surges happened after mid-2021. The CPI change shows more modest price

[7] As shown in Figures B.1–B.3 in Appendix B, we find similar patterns when we use COLA data with the alternative definitions of pay shown in Table 3. For the remainder of this report, we focus on the composite cost of living and total pay metrics.

increases in 2021 and 2022 compared with the COLI changes using either the COLI data or the COLA data in 2022, which could mean that cost-of-living changes experienced by Army personnel differed from the national averages. We discuss the comparison of results using the CPI and COLI data in more detail later in this section.

Figure 2. Annual Change in Composite Cost of Living and Army Pay, by Year (2018–2022)



SOURCES: Features DMDC data, COLI data, distance data collected for this project, COLA data, and BAH rates.
NOTE: Data restricted to people who were serving in the Army in September of each year from 2017 to 2022, were included in military strength, had an Army organization code, and had U.S. presence (based in CONUS or received BAH) with a valid residential mailing zip code and who did not move between any two consecutive observations and received full BAH.

The Army pay changes shown in Figure 2 could reflect changes in the pay grade and experience mix of Army personnel over our data period or changes in the share of soldiers with dependents. Both basic pay and BAH depend on grade, while basic pay also depends on years of service. BAH rates increase further for members with dependents.[8] To control for shifts in the grade, years of service, and dependency status in our comparisons, we estimated the following regressions:

$$log(total\ pay) = \Sigma\beta\bar{X}_{total} + \Sigma\beta_y i.year + \epsilon \quad \text{(Equation 5)}$$

and

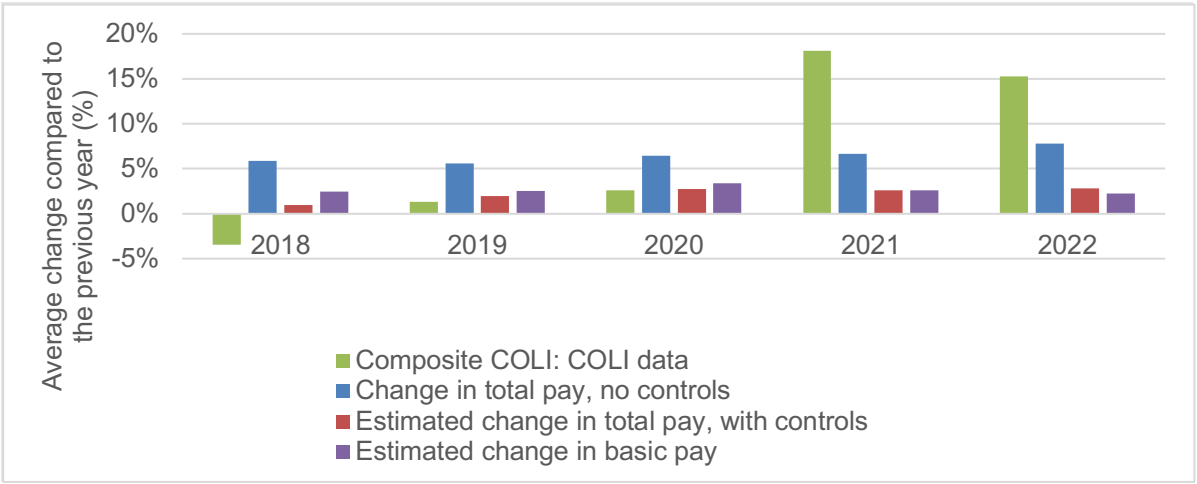
[8] For example, it is possible that retention increased and/or enlistments decreased over the 2017–2022 period, implying that the force became more senior. Table B.2 in Appendix B shows the grade distribution of active Army personnel by year. We find that the share of enlisted personnel in grades E1–E4 decreased from 46 percent in 2017 to 42 percent in 2022.

$$log(basic\ pay) = \Sigma\beta\bar{X}_{basic} + \Sigma\beta_y i.year + \epsilon, \quad \text{(Equation 6)}$$

where $\bar{X}_{total}$ includes pay grade, years of experience, and dependency status and $\bar{X}_{basic}$ includes pay grade and years of experience. The parameter estimates for the coefficients of the year dummies in these equations provide estimates of percentage change in total pay and in basic pay, by year, controlling for these other factors.

Figure 3 shows the annual increase in basic pay (purple bar) and total pay (red bar) for Army personnel, controlling for pay grade, years of experience, and dependency status. For comparison's sake, the figure also shows the annual increase in total pay from Figure 2, for which we do not control for shifts in these other factors (blue bar), and the annual change in COLI based on the COLI data (green bar). Comparing the red and blue bars, we find that controlling for pay grade, years of experience, and dependency status reduces the estimated pay growth in total pay in each year. Nonetheless, when comparing these changes with the change in COLI, we continue to find that the change in pay outgrew cost-of-living growth in 2018–2020 but fell short in 2021 and 2022. We also computed the change in estimated basic pay, controlling for grade and experience mix, so that we could compare our results with the actual changes in basic pay—a way of checking whether our regressions are producing sensible results. We find that, in each of these five years, the estimated growth in basic pay shown in Figure 3 is consistent with the actual increase in basic pay in each year (Kapp, 2022).

Figure 3. Year-to-Year Changes in Composite COLI and Army Pay, Controlling for Grade, Experience, and Dependency Status (2018–2022)



SOURCES: Features DMDC data, COLI data from C2ER, and distance data collected for this project.
NOTE: Data restricted to people who were serving in the Army in September of each year from 2017 to 2022, were included in military strength, had an Army organization code, and had U.S. presence (based in CONUS or received BAH) with a valid residential mailing zip code.

Results by Location

The national comparisons provide overall context for our analysis of how well changes in military compensation for Army personnel reflect the changes in cost of living across the locations where personnel live. To investigate how closely pay changes for Army personnel reflect cost-of-living changes across locations, we computed the percentage change in pay minus the percentage change in the corresponding COLI using the COLI data, and we report this difference by location by year. Computations for which we computed cost of living using the COLA data to test robustness are shown in Appendix B. When pay increases more than cost of living, purchasing power increases; when pay increases less than cost of living, purchasing power is lost. In the following subsections, we first compare pay changes and cost-of-living changes by region and then for selected Army installations.

By Region

Figure 4 shows the differences in the change in Army total pay and change in cost of living by region (Midwest, Northeast, South, and West), excluding Hawaii and Alaska. As with the national results shown in Figures 2 and 3, total pay growth outpaced cost-of-living growth in 2018–2020 in each region but fell short in 2021 and 2022. However, the magnitudes differ by region. The Northeast experienced the most noticeable change in purchasing power with the largest differences across regions in three of the five years. Specifically, we find a 16.7 percent gain in purchasing power in 2018, a 19.1 percent loss in 2021, and an 11 percent loss in 2022. The West and the South were also affected significantly in 2021, with losses in purchasing power of 11.3 percent and 11.5 percent, respectively, in these regions. The losses were less severe in these two regions in 2022 (3.7 percent and 8.3 percent, respectively). We find that the West was the least affected in terms of lost purchasing power in 2022 and experienced the largest gain in purchasing power, nearly 9 percent, in 2020.[9]

A possible explanation for the large regional differences shown in Figure 4 is differences in the types of neighborhoods where Army bases are located for different regions relative to the general population. We explored this explanation by examining how the COLI estimated for Army personnel compared with the COLI for the general population in each region. Figure 5 shows the difference in the COLI (no commissary) for Army personnel and the BLS CPI, by region, as a percentage of BLS CPI.[10]

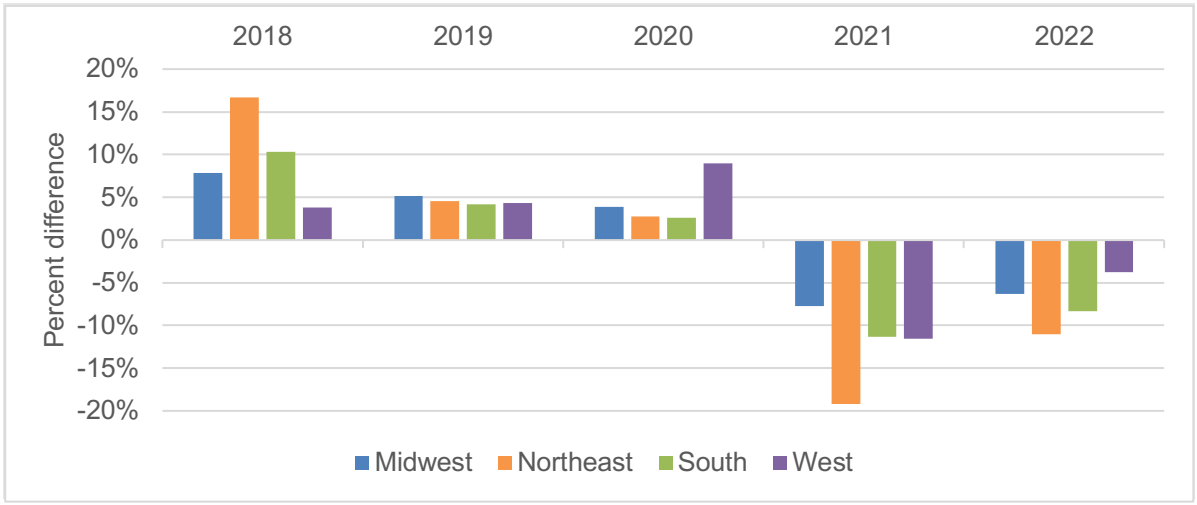
The comparisons in Figure 5 suggest that Army personnel faced a lower COLI before 2021 relative to the general population, as the COLI (excluding commissary savings) was lower than the BLS CPI. For example, the COLI for Army personnel was 10.6 percent to 18.3 percent lower

[9] We did not use COLA data to check regional differences in cost-of-living changes because of uneven coverages, shown in Table B.1.

[10] The national average comparison of the two indices is shown in Figure 1. Recall that both indices are normalized to the 1982–1983 national average CPI.

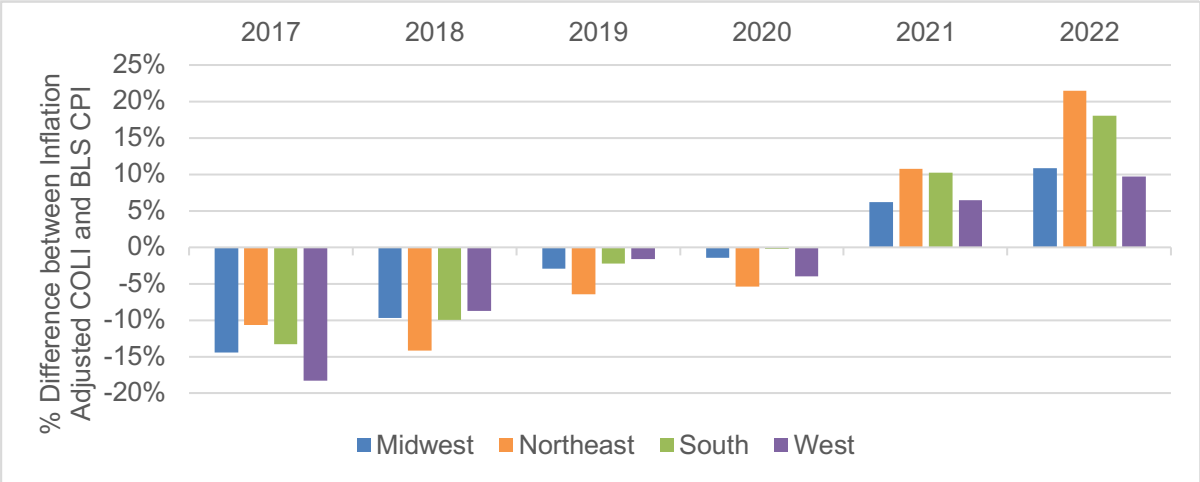
in 2017, depending on the region. The differences between the two indices shrunk quickly over time. In 2019 and 2020, the COLI for Army personnel was only 0 percent to 6.5 percent lower than the BLS CPI. Eventually, in 2021 and 2022, the COLI for Army personnel in all regions was at least 6.2 percent higher than the BLS CPI and was especially higher in the Northeast and the South. These results imply that the distribution of Army personnel across locations and neighborhoods within each region differed from the distribution of the general population in these regions, resulting in different estimates of cost of living for the same region.

Figure 4. Difference in the Change in Army Total Pay and the Composite COLI, by Region (Total Pay Growth − COLI Change)



SOURCES: Features DMDC data, COLI data from C2ER, and distance data collected for this project.
NOTE: Data restricted to people who were serving in the Army in September of each year from 2017 to 2022, were included in military strength, had an Army organization code, and had U.S. presence (based in CONUS or received BAH) with a valid residential mailing zip code and who did not move between any two consecutive observations and received full BAH.

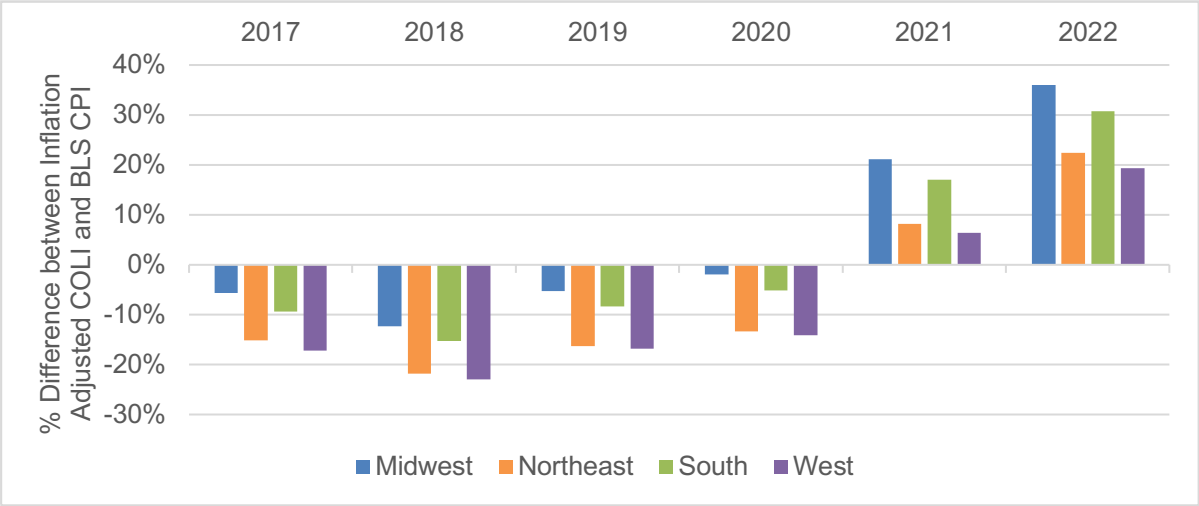
Figure 5. Percentage Difference in Adjusted COLI and BLS CPI, by Region (COLI − BLS CPI) for Army Personnel



SOURCES: Features DMDC data, COLI data from C2ER, and distance data collected for this project.
NOTE: Data restricted to people who were serving in the Army in September of each year from 2017 to 2022, were included in military strength, had an Army organization code, and had U.S. presence (based in CONUS or received BAH) with a valid residential mailing zip code and who did not move between any two consecutive observations and received full BAH.

To rule out that this pattern is a result of the way we constructed COLI, we also made comparisons using data on Army personnel living inside CBSAs only, so that their cost-of-living data is directly from COLI (shown in Figure 6) and not constructed. We would expect the COLI for CBSAs to be higher than our constructed COLI if CBSAs have higher cost of living within a given region. We find this to be the case but continued to find the same pattern of results shown in Figure 5, as shown in Figure 6.

Figure 6. Percentage Difference in Adjusted COLI and BLS CPI, by Region (CBSA only) for Army Personnel



SOURCES: Features DMDC data, COLI data from C2ER, and distance data collected for this project.
NOTE: Data restricted to people who were serving in the Army in September of each year from 2017 to 2022, were included in military strength, had an Army organization code, and had U.S. presence (based in CONUS or received BAH) with a valid residential mailing zip code and who did not move between any two consecutive observations and received full BAH.

The differences in methodology and sample used by COLI and BLS could also contribute to the discrepancies between the indices. But if the effect of the methodological differences is not random in direction and size, then the locations of Army personnel partially caused those personnel to face cost-of-living indices that cannot be characterized by national or regional averages. As we show in the next subsection, results also differ significantly by Army installation. This finding highlights the heterogeneous nature of cost-of-living measures and the importance of employing small units of analysis in related research.

By Base

For a soldier considering whether their pay growth is keeping up with cost-of-living changes, arguably the more relevant unit of geography is their local installation rather than a broadly defined region. This section presents results for a selected set of Army bases to illustrate differences in how locations are affected by cost-of-living and pay changes. Analysis of results by installation revealed that some installations experienced high cost-of-living increases over our data period, while others experienced relatively modest increases or even decreases. This section shows examples of these different cases.

Figure 7 shows results for Joint Base Lewis-McChord on Puget Sound near Tacoma, Washington. For Army personnel with a duty location of Joint Base Lewis-McChord, we find that cost of living increased by 22.9 percent in 2021 and 15.9 percent in 2022 relative to the previous year. However, total pay only increased by 6.7 percent and 9 percent, respectively, in

these two years for this location. Across all Army soldiers assigned to Joint Base Lewis-McChord, cost of living increased by 16.2 percent more than total pay in 2021 and by 6.9 percent more than total pay in 2022, as shown in Figure 7, Panel A. Figure 7, Panel B shows the difference in the growth in total pay and in cost of living at Joint Base Lewis-McChord by pay grade (thereby showing the difference in the bars, by grade, illustrated in Panel A). We find that faster cost-of-living growth relative to pay growth was a common feature across grades, with only those in O1 to O3 experiencing somewhat less loss in purchasing power in 2021 and 2022 relative to soldiers in other grades. Joint Base Lewis-McChord is also one of the few installations where the COLA data had good coverage over the study period, and we present the pay and cost-of-living comparisons using the COLA data for Joint Base Lewis-McChord in Appendix B. As with our observations at the national level, the COLA data showed a small 2.7 percent cost-of-living increase in 2021 (in contrast with the 22.9 percent increase according to the COLI data) and a 13 percent increase in 2022 (comparable with the 15.9 percent increase using the COLI data). An example of a major installation with large populations of Army personnel that showed similar results as Joint Base Lewis-McChord is Fort Bragg (formerly Fort Liberty) in North Carolina, as shown in Appendix B.

We found different results for other installations. Army personnel based at Fort Eisenhower (formerly Fort Gordon) in Augusta, Georgia (Figure 8), experienced faster pay growth than the change in cost of living, meaning soldiers assigned to this installation had an increase in purchasing power, even in 2021 and 2022. We estimated total pay growth of 5.3 percent to 7.3 percent between 2018 and 2022 in this location, yet cost-of-living increases did not reach these levels. The largest increase in cost of living was 6.7 percent in 2022, with an average pay increase of 7 percent that year.

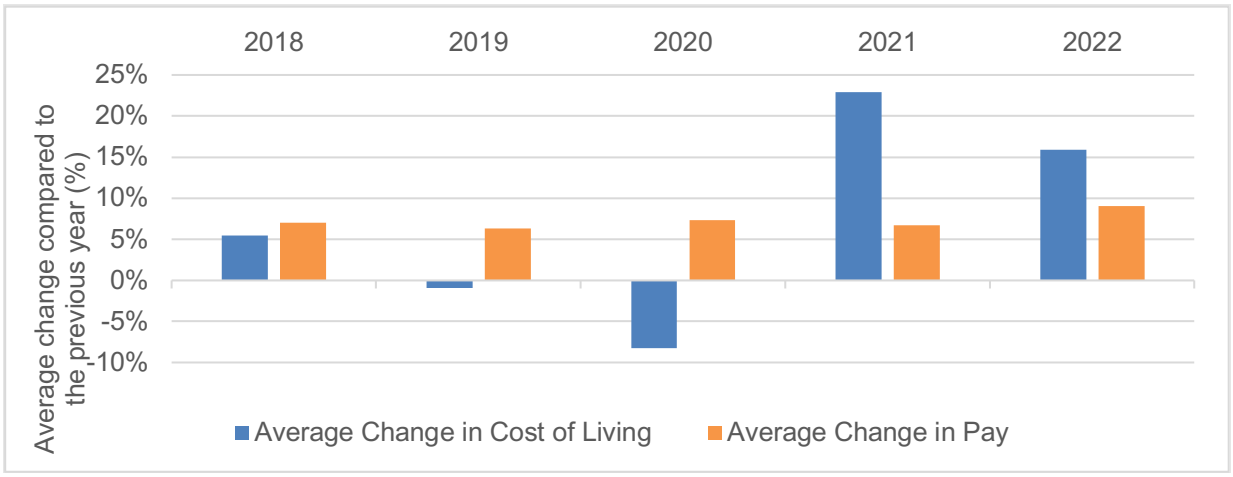
On the other hand, soldiers assigned to Fort Gregg-Adams (formerly Fort Lee) in Virginia lost purchasing power in 2021 and 2022 (Figure 9), but the loss was much more modest than it was for soldiers at Joint Base Lewis-McChord (Figure 7, Panel A) or Fort Bragg. Before 2020, pay increased for soldiers at Fort Gregg-Adams by 4 percent to 5 percent, while cost of living increased by less than 3 percent each year. In 2021 and 2022, pay increases closely matched the increases in cost of living among soldiers assigned to Fort Gregg-Adams, resulting in less than 1 percent loss of purchasing power in either of these years. That said, we find that, even when the average pay increase and cost-of-living increase are relatively similar, experiences vary by pay grade (Figure 9, Panel B).

For soldiers assigned to Joint Base Myer–Henderson Hall in the Arlington, Virginia, area (Figure 10), we find that, on average, soldiers experienced an increase in purchasing power in 2021, while pay growth roughly equaled cost-of-living growth in 2022, although results vary by pay grades. In 2022, those in O1 to O3 experienced a 4.6 percent increase in purchasing power, those in E5 to E7 had pay growth matching cost-of-living growth, and other groups experienced a 1 percent to 2 percent loss in purchasing power. We show the results for Joint Base Myer–Henderson Hall using COLA data in Appendix B. Interestingly, contrary to national averages,

the COLA data suggest higher increases in cost of living for Army personnel in Joint Base Myer–Henderson Hall than the COLI data do; we find a 7.4 percent increase in 2021, compared with a 4.3 percent increase using COLI data, and a 7.8 percent increase in 2022, compared with a 5.4 percent increase using COLI data. At the pay grade level, we still observe purchasing power gains, albeit smaller, using the COLA data for those in O1 to O3 but observe a loss of purchasing power for soldiers in other pay grades. Overall, the results for subgroups using the COLA data are generally consistent with those using the COLI data, giving us confidence that our results are robust to different measures of cost of living.

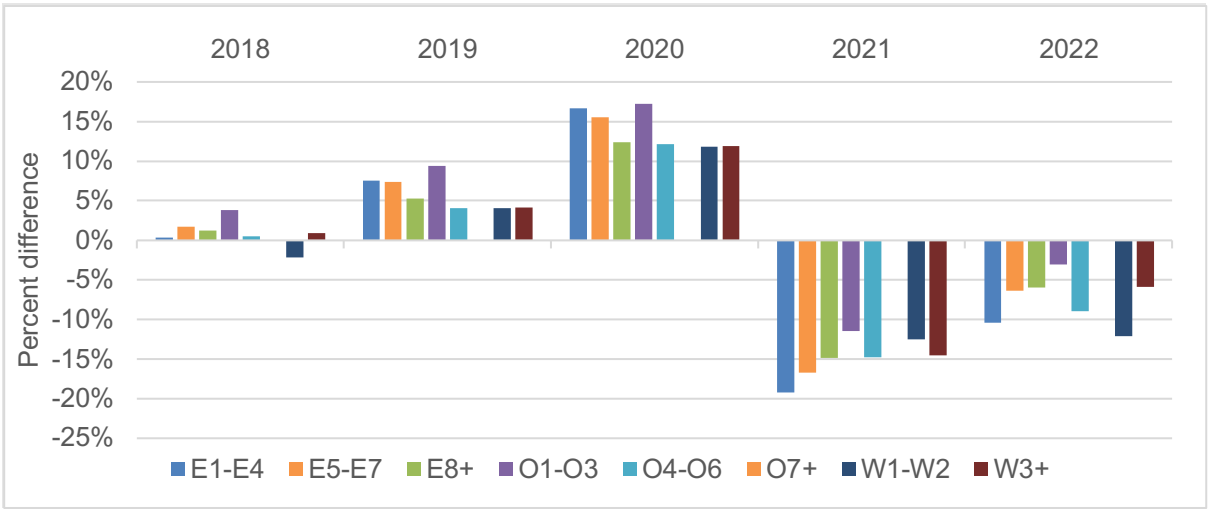
Figure 7. Results for Joint Base Lewis-McChord

Panel A. Average Change in the Composite COLI and Army Total Pay, by Year



SOURCES: Features DMDC data, COLI data from C2ER, and distance data collected for this project.
NOTE: Data restricted to people who were serving in the Army in September of each year from 2017 to 2022, were included in military strength, had an Army organization code, and had U.S. presence (based in CONUS or received BAH) with a valid residential mailing zip code and who did not move between any two consecutive observations and received full BAH.

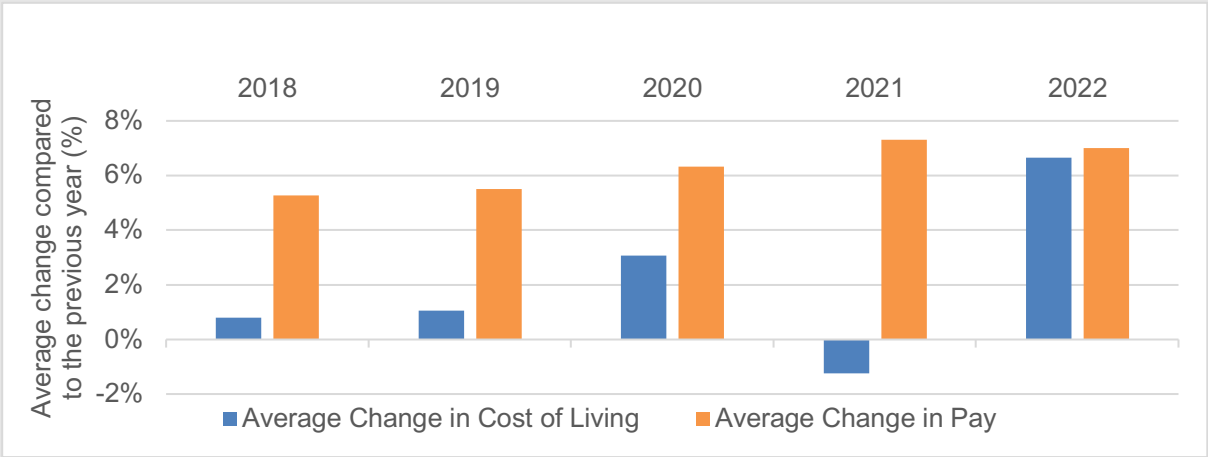
Panel B. Difference in the Change in Army Total Pay and the Composite COLI, by Grade (Total Pay Growth − COLI Change)



SOURCES: Features DMDC data, COLI data from C2ER, and distance data collected for this project.
NOTE: Data restricted to people who were serving in the Army in September of each year from 2017 to 2022, were included in military strength, had an Army organization code, and had U.S. presence (based in CONUS or received BAH) with a valid residential mailing zip code and who did not move between any two consecutive observations and received full BAH. Some pay grades were dropped due to small sample sizes on the base.

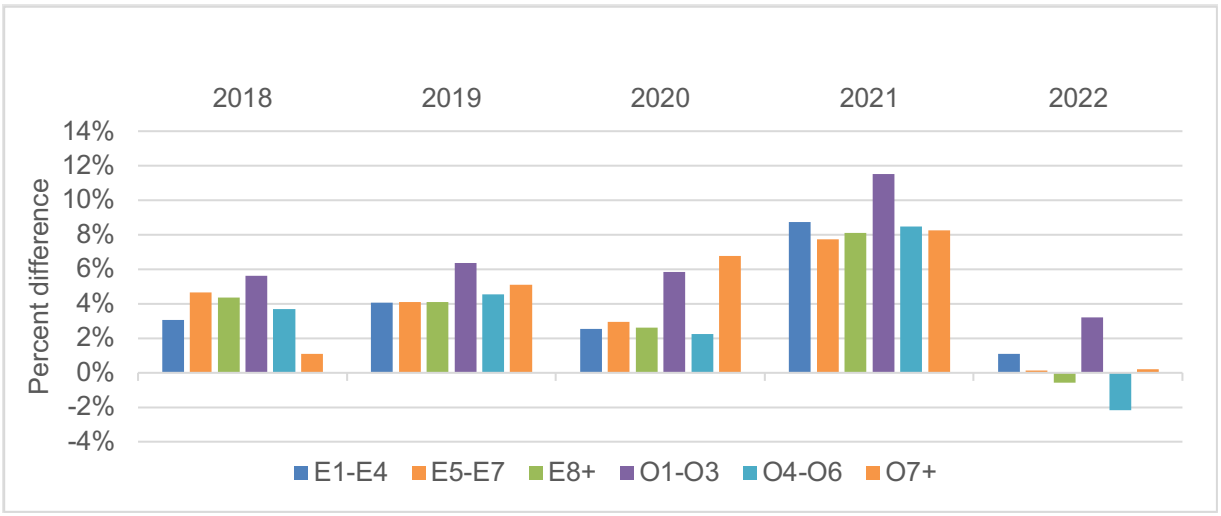
Figure 8. Results for Fort Eisenhower

Panel A. Average Change in the Composite COLI and Army Total Pay, by Year



SOURCES: Features DMDC data, COLI data from C2ER, and distance data collected for this project.
NOTE: Data restricted to people who were serving in the Army in September of each year from 2017 to 2022, were included in military strength, had an Army organization code, and had U.S. presence (based in CONUS or received BAH) with a valid residential mailing zip code and who did not move between any two consecutive observations and received full BAH.

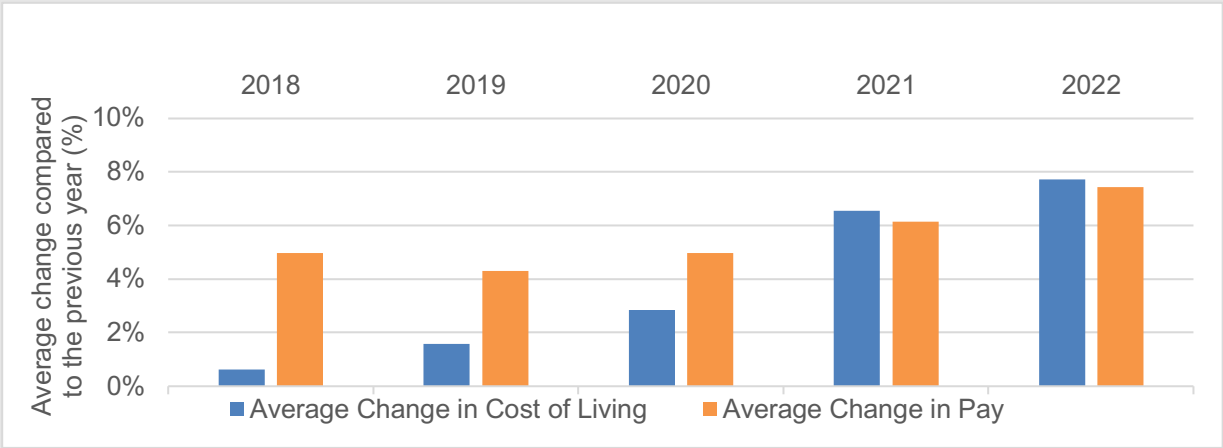
Panel B. Difference in the Change in Army Total Pay and the Composite COLI, by Grade (Total Pay Growth − COLI Change)



SOURCES: Features DMDC data, COLI data from C2ER, and distance data collected for this project.
NOTE: Data restricted to people who were serving in the Army in September of each year from 2017 to 2022, were included in military strength, had an Army organization code, and had U.S. presence (based in CONUS or received BAH) with a valid residential mailing zip code and who did not move between any two consecutive observations and received full BAH. Some pay grades were dropped due to small sample sizes on the base.

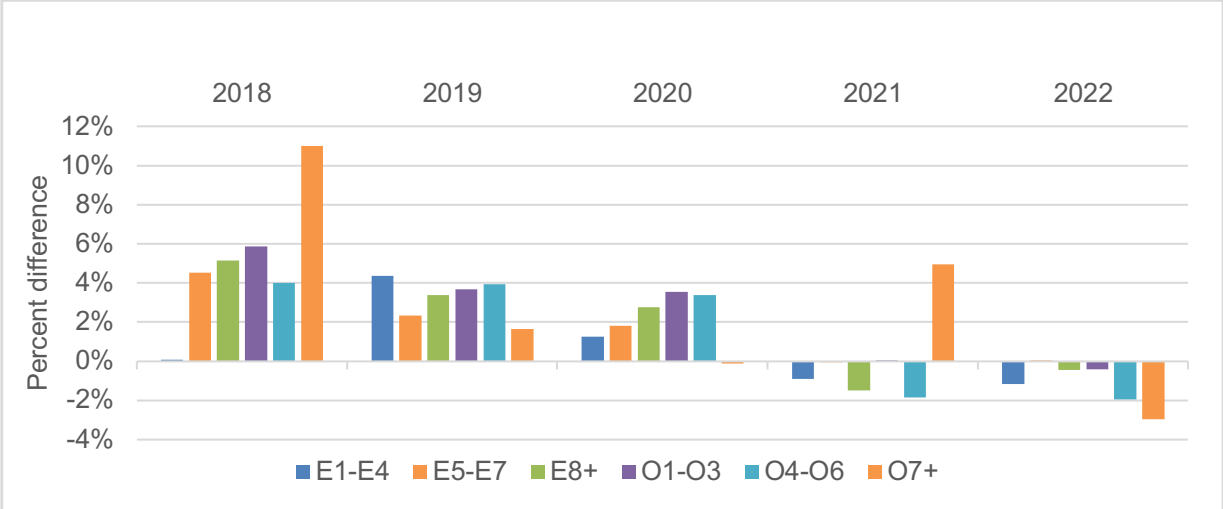
Figure 9. Results for Fort Gregg-Adams

Panel A. Average Change in the Composite COLI and Army Total Pay, by Year



SOURCES: Features DMDC data, COLI data from C2ER, and distance data collected for this project.
NOTE: Data restricted to people who were serving in the Army in September of each year from 2017 to 2022, were included in military strength, had an Army organization code, and had U.S. presence (based in CONUS or received BAH) with a valid residential mailing zip code and who did not move between any two consecutive observations and received full BAH.

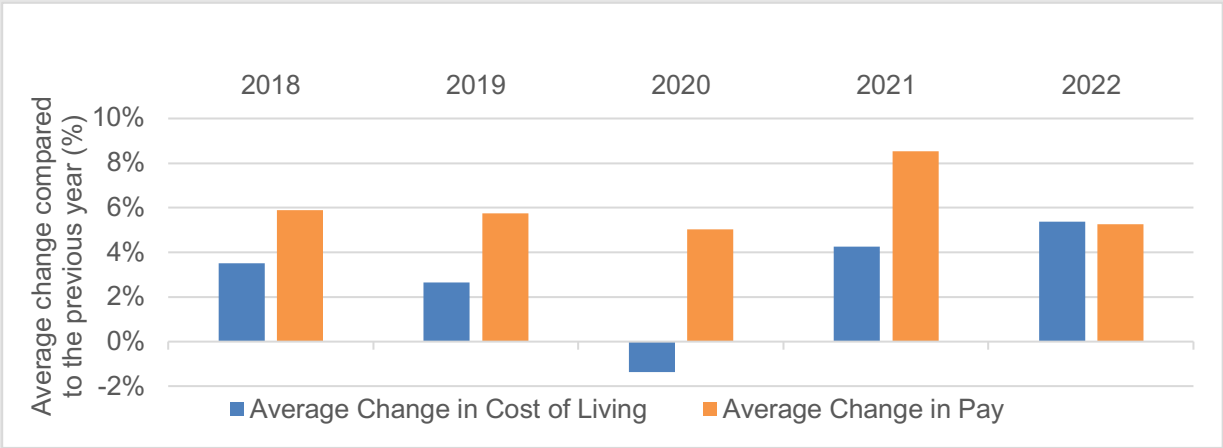
Panel B. Difference in the Change in Army Total Pay and the Composite COLI, by Grade (Total Pay Growth − COLI Change)



SOURCES: Features DMDC data, COLI data from C2ER, and distance data collected for this project.
NOTE: Data restricted to people who were serving in the Army in September of each year from 2017 to 2022, were included in military strength, had an Army organization code, and had U.S. presence (based in CONUS or received BAH) with a valid residential mailing zip code and who did not move between any two consecutive observations and received full BAH. Some pay grades were dropped due to small sample sizes on the base.

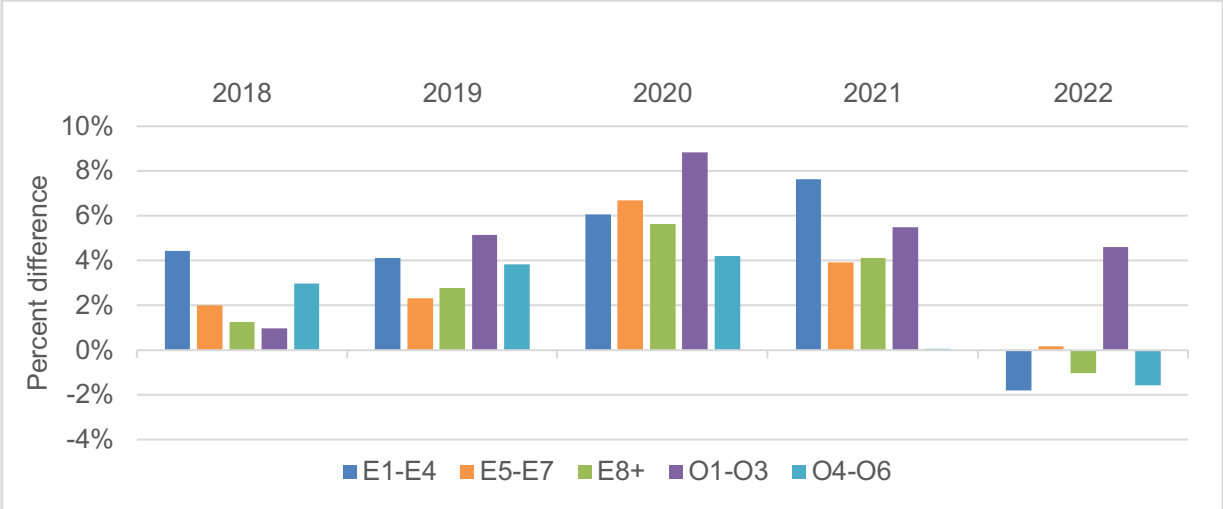
Figure 10. Results for Joint Base Myer–Henderson Hall

Panel A. Average Change in the Composite COLI and Army Total Pay, by Year



SOURCES: Features DMDC data, COLI data from C2ER, and distance data collected for this project.
NOTE: Data restricted to people who were serving in the Army in September of each year from 2017 to 2022, were included in military strength, had an Army organization code, and had U.S. presence (based in CONUS or received BAH) with a valid residential mailing zip code and who did not move between any two consecutive observations and received full BAH.

Panel B. Difference in the Change in Army Total Pay and the Composite COLI, by Grade (Total Pay Growth − COLI Change)



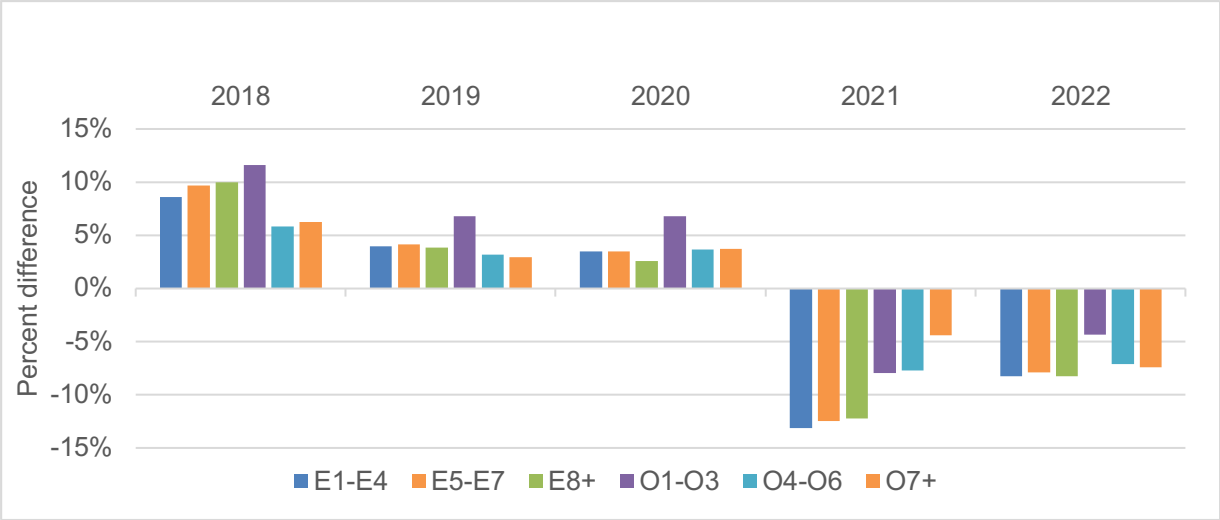
SOURCES: Features DMDC data, COLI data from C2ER, and distance data collected for this project.
NOTE: Data restricted to people who were serving in the Army in September of each year from 2017 to 2022, were included in military strength, had an Army organization code, and had U.S. presence (based in CONUS or received BAH) with a valid residential mailing zip code and who did not move between any two consecutive observations and received full BAH. Some pay grades were dropped due to small sample sizes on the base.

Results by Soldier Characteristics

Given inflation since 2020 and the geographic variations shown above, a question of interest is whether loss of purchasing power of military pay has fallen more on specific subgroups of soldiers, such as junior enlisted members or members with larger families. We investigate this issue by comparing the national average COLI growth with the growth in total pay for Army soldiers, by pay grade, marital status, and dependent status.

Figure 11 shows the difference between the composite COLI change and the total pay change by pay grade. We find that pay growth fell short of COLI growth in 2021 and 2022 for all pay grades and was quite similar across grades in 2022 except for junior officers. However, in 2021, the loss of purchasing power was greater for enlisted personnel relative to officers. On the other hand, in 2018, the gain in purchasing power, owing to total pay rising faster than COLI, was greater among enlisted personnel than officers. Except for junior officers, growth in total pay relative to COLI was relatively similar across grades in 2019 and 2020. Because BAH rates differ by pay grade, we also compared purchasing power changes from the nonhousing cost of living and pay without BAH, and we find the same pattern (see Figure B.6 in Appendix B).

Figure 11. Difference in the Change in Army Total Pay and the Composite COLI, by Grade (Total Pay Growth − COLI Change)

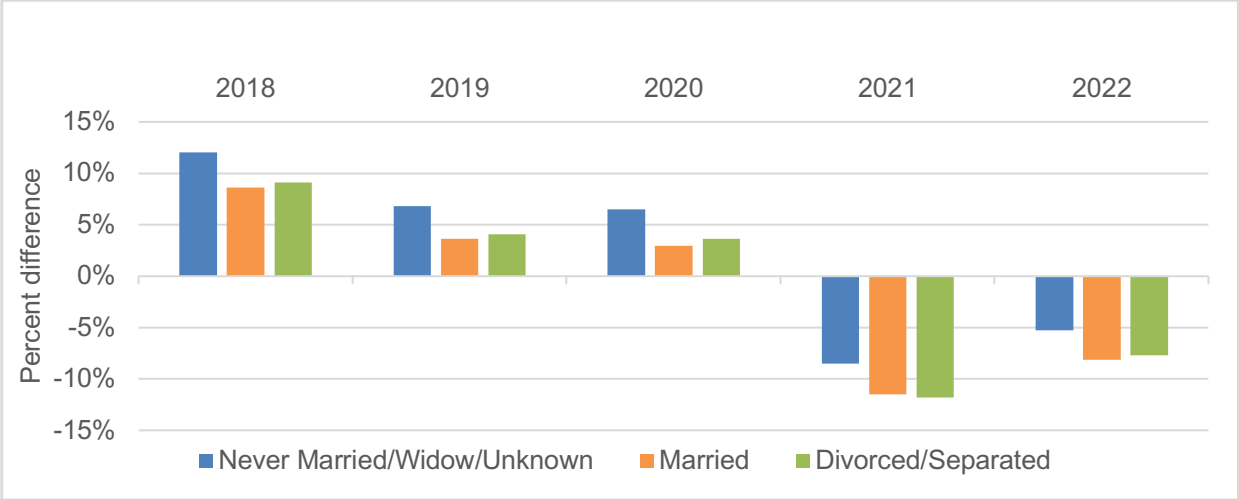


SOURCES: Features DMDC data, COLI data from C2ER, and distance data collected for this project.
NOTE: Data restricted to people who were serving in the Army in September of each year from 2017 to 2022, were included in military strength, had an Army organization code, and had U.S. presence (based in CONUS or received BAH) with a valid residential mailing zip code and who did not move between any two consecutive observations and received full BAH. Some pay grades were dropped due to small sample sizes on the base.

Figures 12 and 13 show results by family status. Figure 12 uses marital status, while Figure 13 uses number of dependents. We find that those who are neither married nor divorced or separated fare better in terms of purchasing power. Pay grew faster than cost of living, regardless

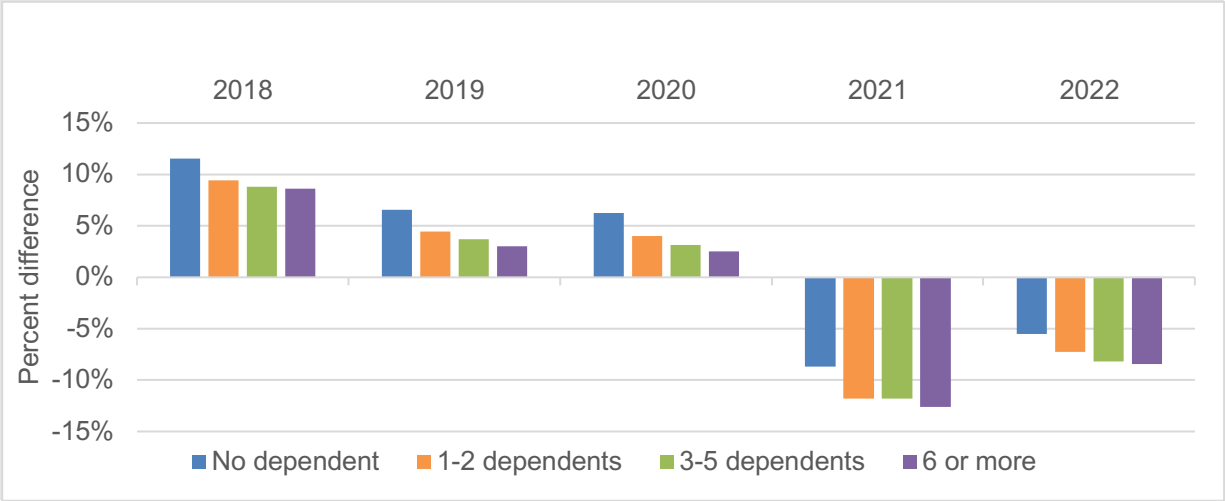
of marital status, in 2018–2020, but pay growth was greatest (relative to cost of living) for those who were neither married nor divorced or separated. Similarly, pay growth fell short of cost-of-living growth in 2021 and 2022, but the unmarried or never married group lost the least purchasing power. From the standpoint of total pay, those who are married can receive a higher BAH but may have higher expenses. Figure 13 shows results by number of dependents, for which we observe a similar pattern. Those with more dependents experienced less purchasing power gains before 2020 and more losses afterward. Nonhousing cost of living and pay without BAH comparisons in Figure B.7 in Appendix B show the same pattern. We also conducted robustness checks of the comparisons using the COLA data in Appendix B. Because COLA data suggest smaller increases in cost of living, the loss in purchasing power is smaller for all subgroups. That said, the differences across subgroups using the COLA data are consistent with the differences indicated by the COLI data, suggesting that these patterns are robust.

Figure 12. Difference in the Change in Army Total Pay and the Composite COLI, by Marital Status (Total Pay Growth − COLI Change)



SOURCES: Features DMDC data, COLI data from C2ER, and distance data collected for this project.
NOTE: Data restricted to people who were serving in the Army in September of each year from 2017 to 2022, were included in military strength, had an Army organization code, and had U.S. presence (based in CONUS or received BAH) with a valid residential mailing zip code and who did not move between any two consecutive observations and received full BAH.

Figure 13. Difference in the Change in Army Total Pay and the Composite COLI, by Number of Dependents (Total Pay Growth − COLI Change)



SOURCES: Features DMDC data, COLI data from C2ER, and distance data collected for this project.
NOTE: Data restricted to people who were serving in the Army in September of each year from 2017 to 2022, were included in military strength, had an Army organization code, and had U.S. presence (based in CONUS or received BAH) with a valid residential mailing zip code and who did not move between any two consecutive observations and received full BAH.

Final Thoughts

Army personnel frequently move locations, and ensuring that members are held harmless with respect to geographic variations in prices is an important objective of the military compensation system, as articulated by the Seventh Quadrennial Review of Military Compensation. In this report, we examined how pay growth for Army personnel compares with cost-of-living changes by location and for other subgroups of personnel. We focused on *total pay*, defined as the sum of basic pay, BAS, BAH, and CONUS COLA (for those who receive it). Of these four elements, only BAH and CONUS COLA vary by geographic location, with BAH reflecting rental rates across MHAs and CONUS COLA reflecting nonhousing cost-of-living differences for particularly high-cost areas. One benefit offered to military personnel is access to commissaries, which provide groceries and other consumables at substantial cost savings, although this access is not considered an element of military compensation. Our focus was on how military pay growth compares with cost-of-living differences across locations, but we also considered comparisons for other subgroups, given concerns about how inflation has affected junior enlisted members and those with families. Thus, we also made comparisons by grade and family status.

Findings

We find that, nationally, pay growth generally exceeded cost-of-living increases from 2018 to 2020 but fell short of cost-of-living increases in 2021 and 2022, when inflation reached historic levels. The extent to which military pay growth fell short was less in 2022 than in 2021 because the growth of inflation slowed. Our analysis shows significant regional differences in cost of living for Army personnel, as well as differences across Army installations. The analysis revealed that some installations experienced significantly slower pay growth than cost-of-living growth since 2020, whereas others experienced faster pay growth than cost-of-living growth despite high inflation. We found that soldiers at Joint Base Lewis-McChord and Fort Bragg had higher cost-of-living growth than pay growth in recent years. At Joint Base Lewis-McChord, cost of living increased by 22.9 percent in 2021 and 15.9 percent in 2022 relative to the previous year, while total pay only increased by 6.7 percent and 9 percent, respectively, in these two years for this location. In contrast, Army personnel based at Fort Eisenhower experienced faster pay growth than the change in cost of living, meaning soldiers assigned to this installation had an increase in purchasing power, even in 2021 and 2022. We estimated total pay growth of 5.3 percent to 7.3 percent from 2018 to 2022 in this location, yet cost-of-living increases never reached these levels.

We find that comparisons between pay growth and cost-of-living growth vary somewhat by pay grade. We find that the loss of purchasing power was greater for enlisted personnel than for officers in 2021, but the loss was about the same for enlisted personnel as officers in 2022. On the other hand, pay growth exceed cost-of-living growth in 2018 for all grades, with the biggest gain in purchasing power occurring for enlisted soldiers compared with officers. With respect to family structure, we find that those who were never married fared better than those who are married or divorced or separated, though we note that our comparisons with pay growth do not include spouse earnings for those who are married. While all groups had faster pay growth for the soldier than cost-of-living growth in 2018–2020, the never-married group had the fastest pay growth relative to cost-of-living growth. Similarly, while all groups had slower military pay growth than cost-of-living growth in 2021–2022, the never-married group fared the best. We also find that those without dependents fared the best in terms of pay growth relative to cost-of-living growth, experiencing less loss of purchasing power in 2021 and 2022, while those with the most dependents fared the worst. Given the limitations of our primary data source (the COLI data), we examined our findings with an alternative data source (the COLA data). The consistency between empirical patterns derived from these two data sources gives us confidence in the robustness of the results.

Implications

The results suggest that the current system of adjusting for cost of living in the military was effective through 2020 for Army personnel, to the extent that Army personnel did not lose

purchasing power at the national level between 2018 and 2020. On the other hand, Army pay growth fell short of cost-of-living growth in 2021 and 2022, though there were some installations where this was not the case. Nominal wages among U.S. private industry workers also grew in 2021, but the growth fell short of the increase in the CPI, resulting in a decline in real wages, as measured by the Employment Cost Index (BLS, 2023a). Real wages began to rise in June 2022 but did not make up the lost ground relative to December 2021. The implication is that real wages did not rise for private sector workers in either 2021 or 2022.

However, the system is less effective in equalizing the purchasing power of military pay across installations. We found installations where pay growth fell significantly short of cost-of-living increases in 2021 and 2022, installations where pay growth and cost-of-living changes were roughly equal, and installations where military pay growth exceeded changes in cost of living in these high-inflation years. Furthermore, purchasing power differed across subgroups of personnel, again suggesting that the current approach falls short.

Analyzing why the current system falls short and considering policy options for addressing the issue was beyond the scope of our analysis. The charter of the 14th Quadrennial Review of Military Compensation includes a requirement to review the current methodologies for setting military allowances (White House, 2023). Our analysis does, however, highlight the important role of commissaries in reducing cost of living. As shown in Figure 1, increasing the utilization rate among Army personnel, as well as increasing the amount of savings achieved, significantly reduces the COLI. The Army should encourage soldiers to make more extensive use of commissaries, especially during periods of high inflation.

Appendix A. Identifying the Closest CBSAs and Commissaries to U.S. Zip Codes

In this appendix, we describe our process to determine the closest CBSA or commissary to each U.S. zip code. We started with two input location datasets, one containing zip code location data and the other containing CBSA or commissary location data. We calculated the distance between the zip code and the target location to generate the closest target location and its distance to the zip code. We used two essential libraries in Python to process the data: pandas for data manipulation and analysis and geopy for calculating geographical distances between coordinates. All data were sampled in January 2023.

The zip code database contains the zip code location data under a Creative Commons Attribution 4.0 license. Latitude and longitude coordinates were determined using an algorithm that searches the place names in the GeoNames database, considering administrative divisions and the numerical vicinity of the postal codes as factors in the distinguishing of place names. Postal codes and place names not in the GeoNames database use an average latitude and longitude of neighboring postal codes. The CBSA dataset contains information about CBSAs with COLI data from 2019 to 2021. The location data for CBSAs were derived from the center point of urban areas using forward geocoding with the OpenCage API and then validated with Google Maps. The commissary dataset takes the list of commissaries from DeCA, and we used Google Maps to collect location data for each commissary in the list.

We took the following steps to identify the nearest CBSA or commissary to each zip code:

- *Data preparation*. Two input datasets (zip code and either the CBSA or commissary data) were read in using the pandas library for data manipulation and analysis.
- *Distance calculation*. We defined a function to calculate the geographical distance between two sets of coordinates, applying the haversine formula, which accounts for the Earth's curvature. The haversine formula estimates the shortest distance between two points along the Earth's surface, taking into consideration the curvature.
- *Nearest neighbor identification*. We iterated through each row in the zip code data and, for each observation, looped over each row in the CBSA or commissary data to find the CBSA or commissary with the shortest distance to the given zip code.

Appendix B. Additional Tables and Figures

This appendix provides additional tables and figures referred to in the report. Table B.1 shows the COLA data coverage, and Table B.2 shows the grade distribution of Army personnel during the period of our analysis. Figures B.1–B.3 show alternative measures of cost-of-living indices and corresponding pay changes as indicated in Table 3. The rest of the figures show that the empirical patterns described in the report are robust to alternative assumptions and methods, first with alternative measures based on COLI data (Figures B.4–B.7) and then with composite COLI based on COLA data (Figures B.8–B.12).

Table B.1. Number (Percentage) of MHAs and of Army Active-Duty Personnel Covered by COLA Data, by Year

		Army Personnel				
Year	Number of MHAs	Total	West	Midwest	Northeast	South
2017	158 (47%)	215,341 (54%)	41,596 (58%)	2,724 (8%)	6,197 (28%)	144,865 (60%)
2018	180 (53%)	242,176 (55%)	61,650 (77%)	4,595 (14%)	6,533 (30%)	146,348 (61%)
2019	188 (55%)	158,205 (36%)	43,034 (59%)	25,952 (81%)	21,500 (94%)	59,814 (25%)
2020	124 (37%)	193,313 (44%)	63,519 (84%)	2,626 (8%)	6,974 (31%)	103,377 (42%)
2021	292 (86%)	398,441 (90%)	72,711 (94%)	29,110 (90%)	22,356 (96%)	242,566 (97%)
2022	238 (70%)	275,849 (66%)	64,877 (88%)	27,126 (85%)	20,795 (93%)	150,137 (62%)

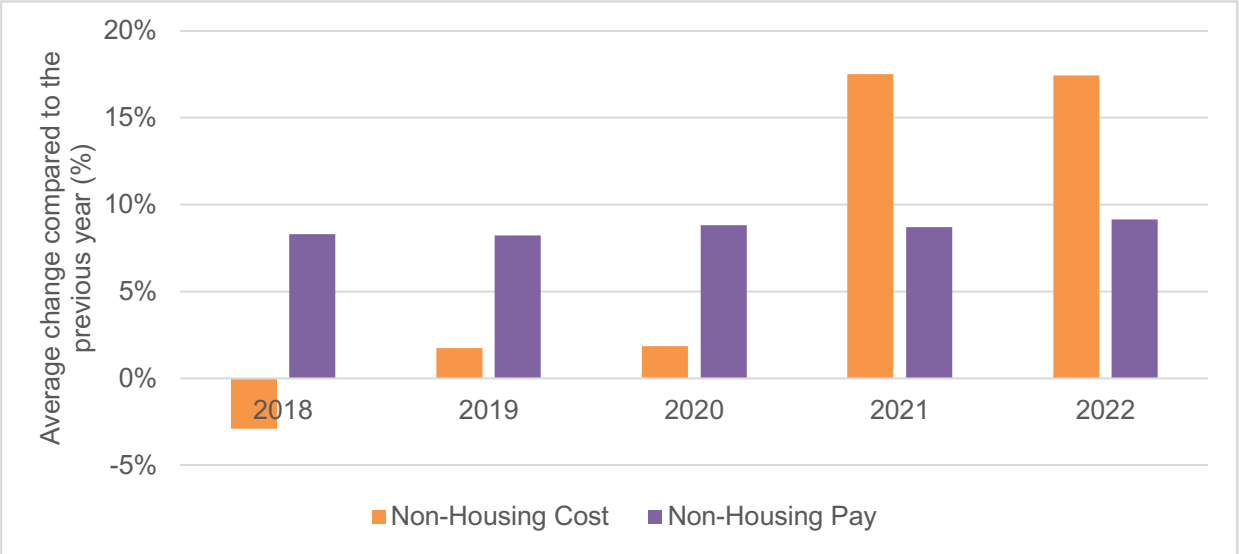
SOURCE: Features COLA data.
NOTE: Personnel data restricted to people who were serving in the Army in September of each year from 2017 to 2022, were included in military strength, had an Army organization code, and had U.S. presence (based in CONUS or received BAH).

Table B.2. Grade Distribution of Army Active-Duty Personnel, by Year

Year	E1–E4	E5–E7	E8+	O1–O3	O4–O6	O7+
2017	179,502 (45.99%)	129,457 (33.17%)	12,300 (3.15%)	39,846 (10.21%)	23,109 (5.92%)	276 (0.07%)
2018	199,412 (46.86%)	139,397 (32.75%)	12,819 (3.01%)	43,152 (10.14%)	25,203 (5.92%)	287 (0.07%)
2019	193,966 (45.69%)	143,246 (33.74%)	13,475 (3.17%)	43,516 (10.25%)	25,534 (6.01%)	274 (0.06%)
2020	192,370 (45.13%)	147,549 (34.61%)	13,144 (3.08%)	42,800 (10.04%)	26,249 (6.16%)	266 (0.06%)
2021	192,357 (44.91%)	149,773 (34.97%)	12,816 (2.99%)	43,091 (10.06%)	26,561 (6.2%)	269 (0.06%)
2022	170,253 (41.87%)	148,800 (36.6%)	13,011 (3.2%)	45,061 (11.08%)	26,254 (6.46%)	259 (0.06%)

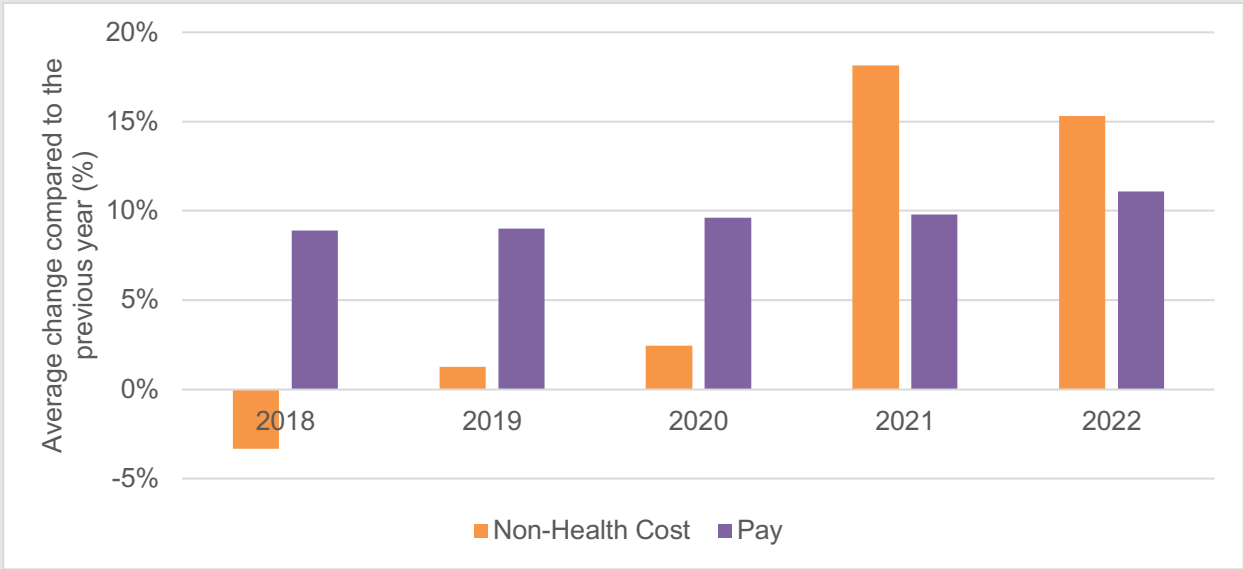
SOURCE: Features DMDC data.
NOTE: Data restricted to September 2021 for people who were serving in the Army, were included in military strength, had an Army organization code, and had U.S. presence (based in CONUS or received BAH).

Figure B.1. Army Cost-of-Living and Pay Changes When Housing Is Excluded



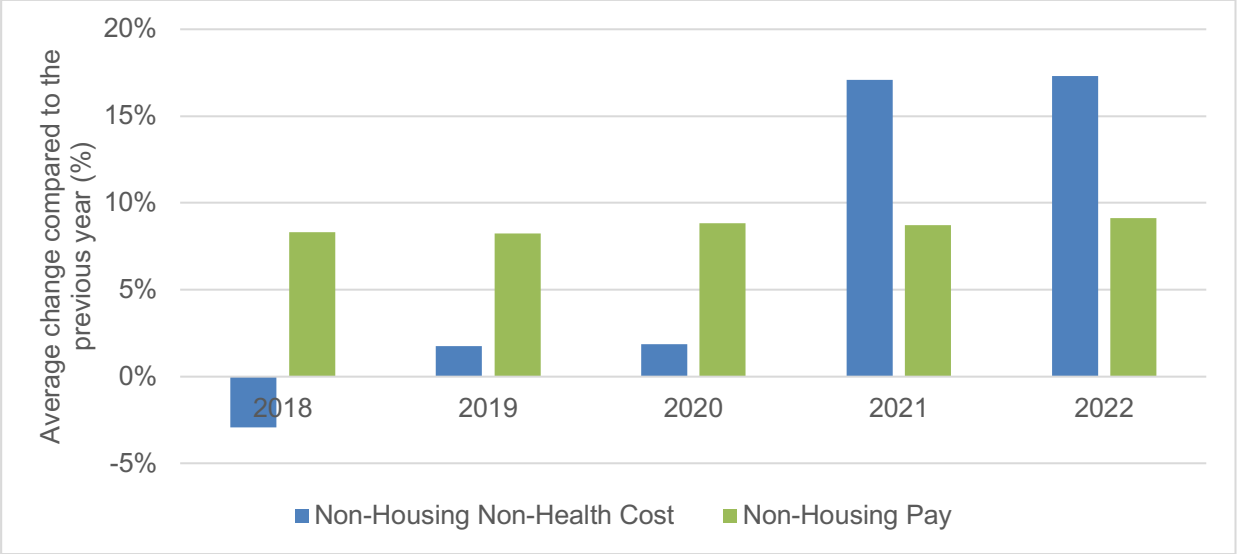
SOURCES: Features DMDC data, COLI data from C2ER, and distance data collected for this project.
NOTE: Data restricted to people who were serving in the Army in September of each year from 2017 to 2022, were included in military strength, had an Army organization code, and had U.S. presence (based in CONUS or received BAH) with a valid residential mailing zip code and who did not move between any two consecutive observations.

Figure B.2. Army Cost-of-Living and Pay Changes When Health Care Costs Are Excluded



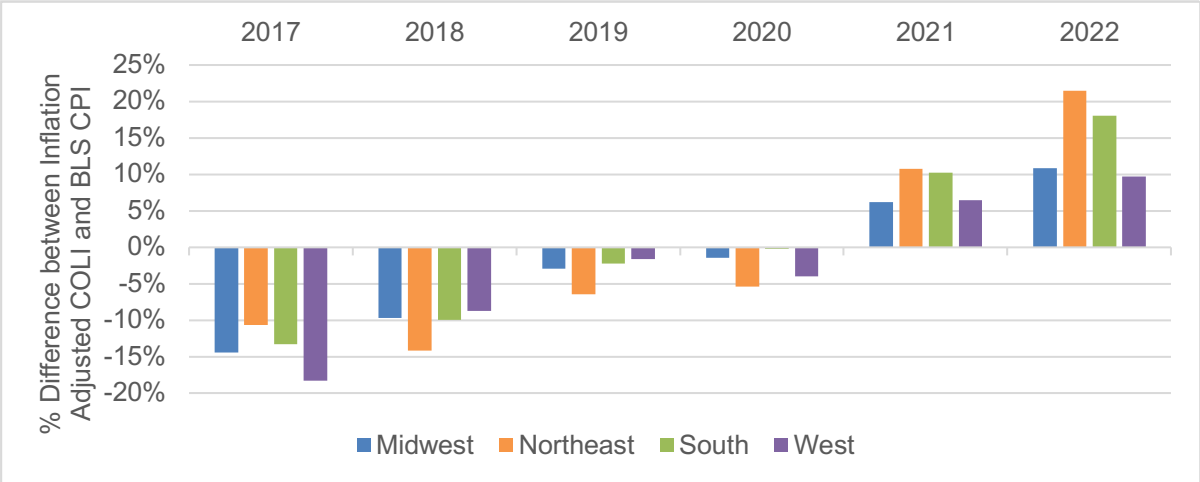
SOURCES: Features DMDC data, COLI data from C2ER, and distance data collected for this project.
NOTE: Data restricted to people who were serving in the Army in September of each year from 2017 to 2022, were included in military strength, had an Army organization code, and had U.S. presence (based in CONUS or received BAH) with a valid residential mailing zip code and who did not move between any two consecutive observations and received full BAH.

Figure B.3. Army Cost-of-Living and Pay Changes When Housing and Health Care Costs Are Excluded



SOURCES: Features DMDC data, COLI data from C2ER, and distance data collected for this project.
NOTE: Data restricted to people who were serving in the Army in September of each year from 2017 to 2022, were included in military strength, had an Army organization code, and had U.S. presence (based in CONUS or received BAH) with a valid residential mailing zip code and who did not move between any two consecutive observations.

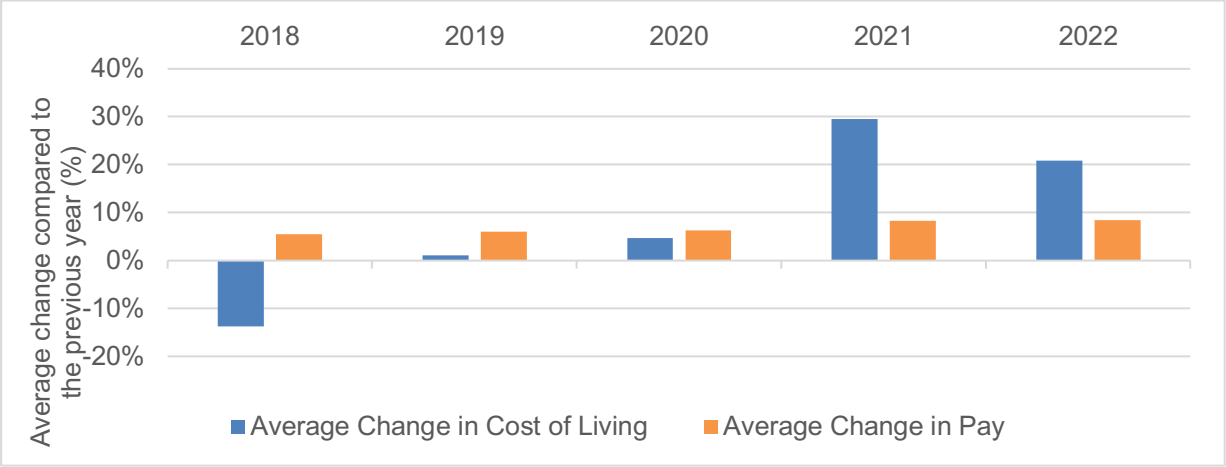
Figure B.4. Percentage Difference in Adjusted COLI and BLS CPI, by Region (COLI − BLS CPI) for Army Personnel



SOURCES: Features DMDC data, COLI data from C2ER, and distance data collected for this project.
NOTE: Data restricted to people who were serving in the Army in September of each year from 2017 to 2022, were included in military strength, had an Army organization code, and had U.S. presence (based in CONUS or received BAH) with a valid residential mailing zip code and who did not move between any two consecutive observations and received full BAH.

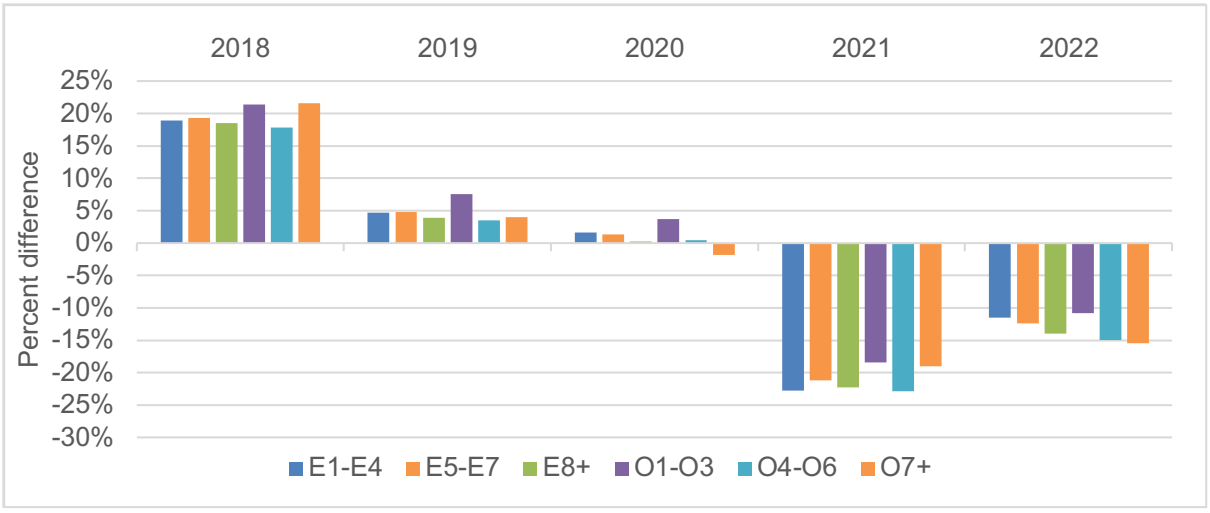
Figure B.5. Supplementary Results for Fort Bragg

Panel A. Average Change in the Army Composite COLI and Total Pay, by Year



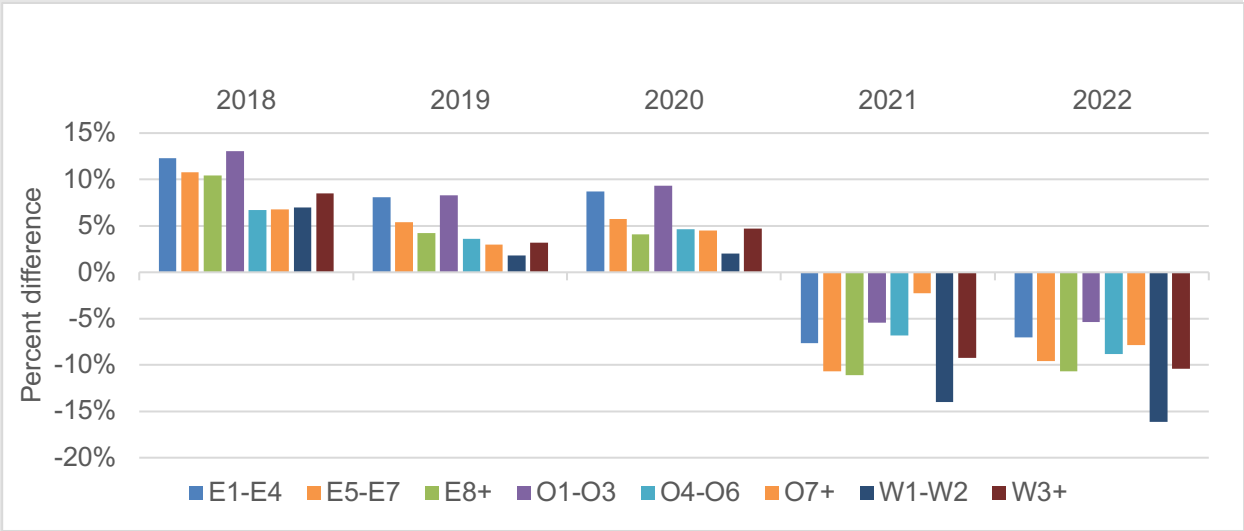
SOURCES: Features DMDC data, COLI data from C2ER, and distance data collected for this project.
NOTE: Data restricted to people who were serving in the Army in September of each year from 2017 to 2022, were included in military strength, had an Army organization code, and had U.S. presence (based in CONUS or received BAH) with a valid residential mailing zip code and who did not move between any two consecutive observations and received full BAH.

Panel B. Difference in the Change in Army Total Pay and the Composite COLI, by Grade (Total Pay Growth − COLI Change)



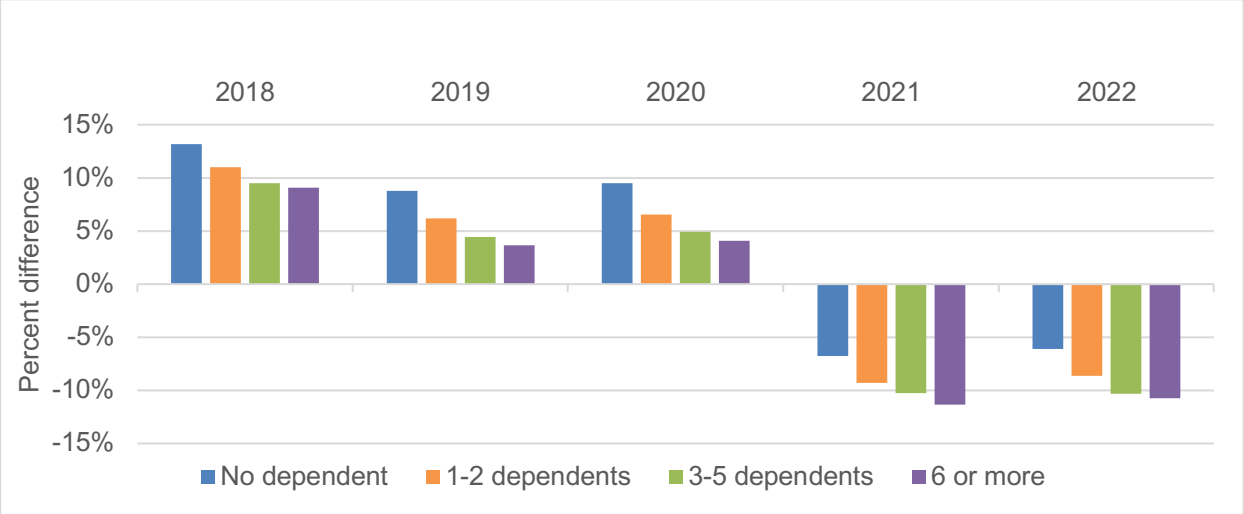
SOURCES: Features DMDC data, COLI data from C2ER, and distance data collected for this project.
NOTE: Data restricted to people who were serving in the Army in September of each year from 2017 to 2022, were included in military strength, had an Army organization code, and had U.S. presence (based in CONUS or received BAH) with a valid residential mailing zip code and who did not move between any two consecutive observations and received full BAH. Some pay grades were dropped due to small sample sizes on the base.

Figure B.6. Nonhousing Cost-of-Living and Pay Differences for Army Personnel, by Pay Grade



SOURCES: Features DMDC data, COLI data from C2ER, and distance data collected for this project.
NOTE: Data restricted to people who were serving in the Army in September of each year from 2017 to 2022, were included in military strength, had an Army organization code, and had U.S. presence (based in CONUS or received BAH) with a valid residential mailing zip code and who did not move between any two consecutive observations.

Figure B.7. Nonhousing Cost-of-Living and Pay Differences for Army Personnel, by Number of Dependents

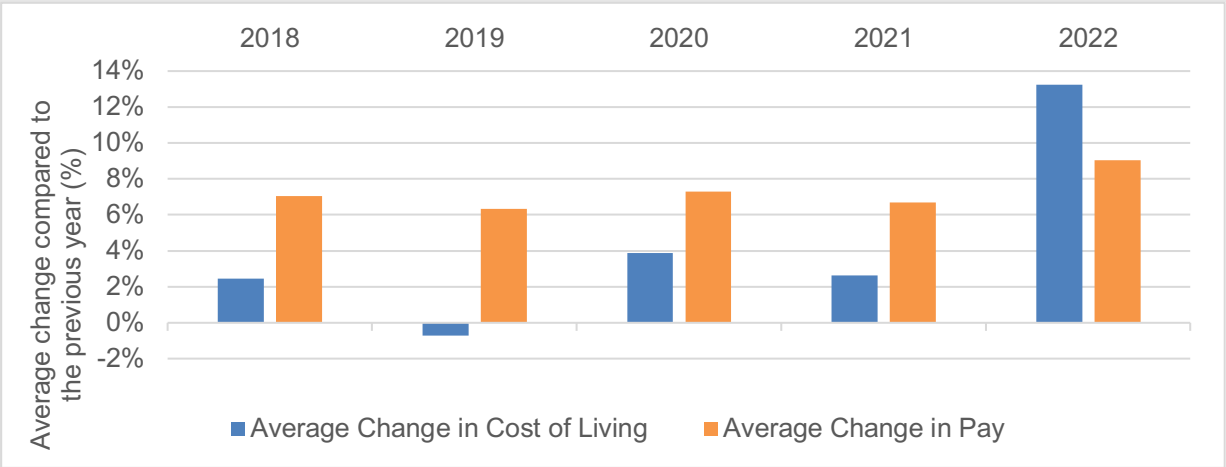


SOURCES: Features DMDC data, COLI data from C2ER, and distance data collected for this project.
NOTE: Data restricted to people who were serving in the Army in September of each year from 2017 to 2022, were included in military strength, had an Army organization code, and had U.S. presence (based in CONUS or received BAH) with a valid residential mailing zip code and who did not move between any two consecutive observations.

In Figures B.8–B.12, we present our results in the report using COLA data to construct composite COLI, first by base and then the national average by pay grade, marital status, and dependency status.

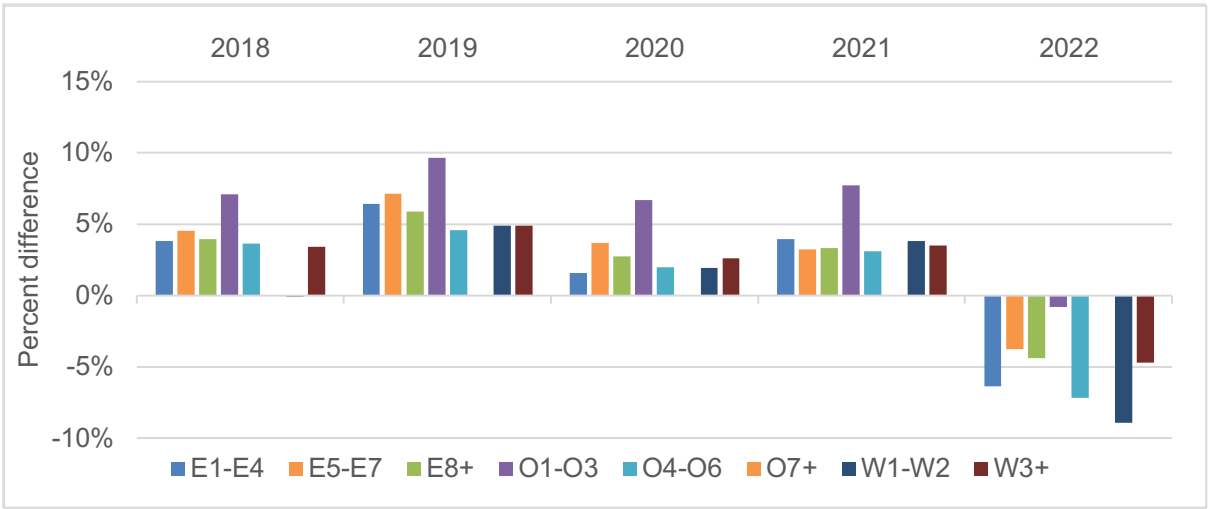
Figure B.8. Supplementary Results for Joint Base Lewis-McChord

Panel A. Average Change in the Army Composite COLI Using COLA Data and Total Pay, by Year



SOURCES: Features DMDC data, COLA data, and BAH rates.
NOTE: Data restricted to people who were serving in the Army in September of each year from 2017 to 2022, were included in military strength, had an Army organization code, and had U.S. presence (based in CONUS or received BAH) with a valid residential mailing zip code and who did not move between any two consecutive observations and received full BAH.

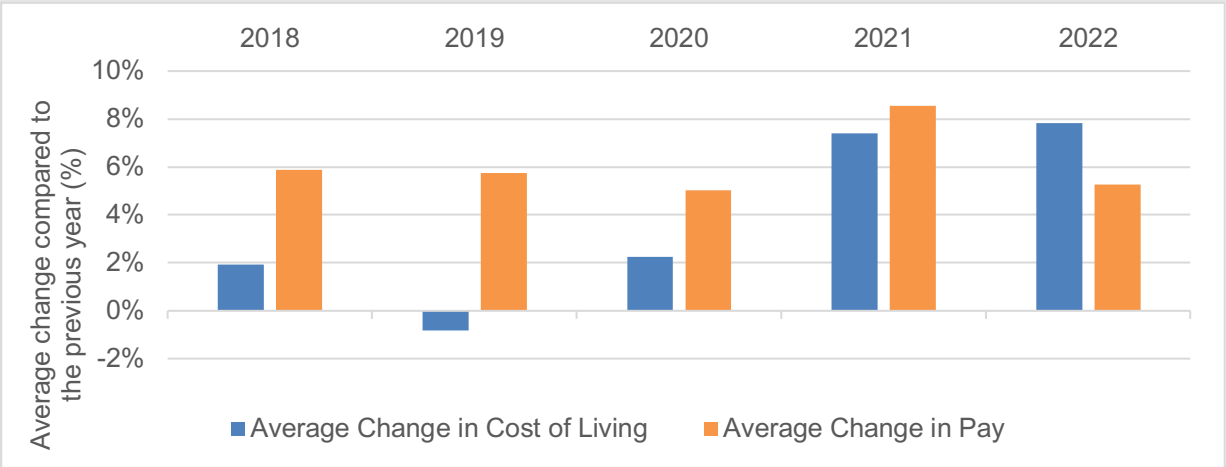
Panel B. Difference in the Change in Army Total Pay and the Composite COLI Using COLA Data, by Grade (Total Pay Growth − COLI Change)



SOURCES: Features DMDC data, COLA data, and BAH rates.
NOTE: Data restricted to people who were serving in the Army in September of each year from 2017 to 2022, were included in military strength, had an Army organization code, and had U.S. presence (based in CONUS or received BAH) with a valid residential mailing zip code and who did not move between any two consecutive observations and received full BAH. Some pay grades were dropped due to small sample sizes on the base.

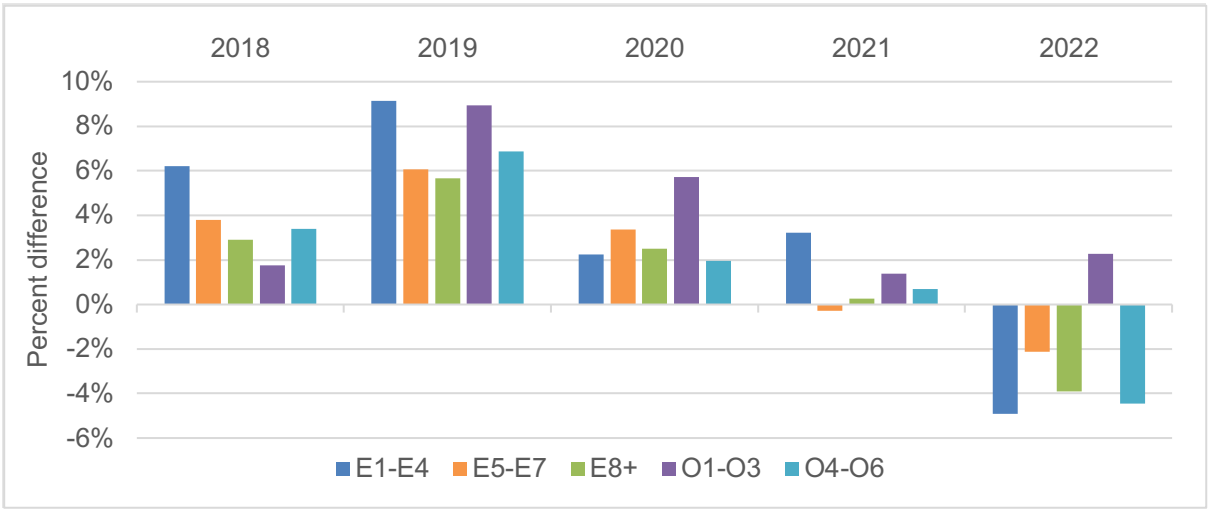
Figure B.9. Supplementary Results for Joint Base Myer–Henderson Hall

Panel A. Average Change in the Composite COLI Using COLA Data and Total Pay, by Year



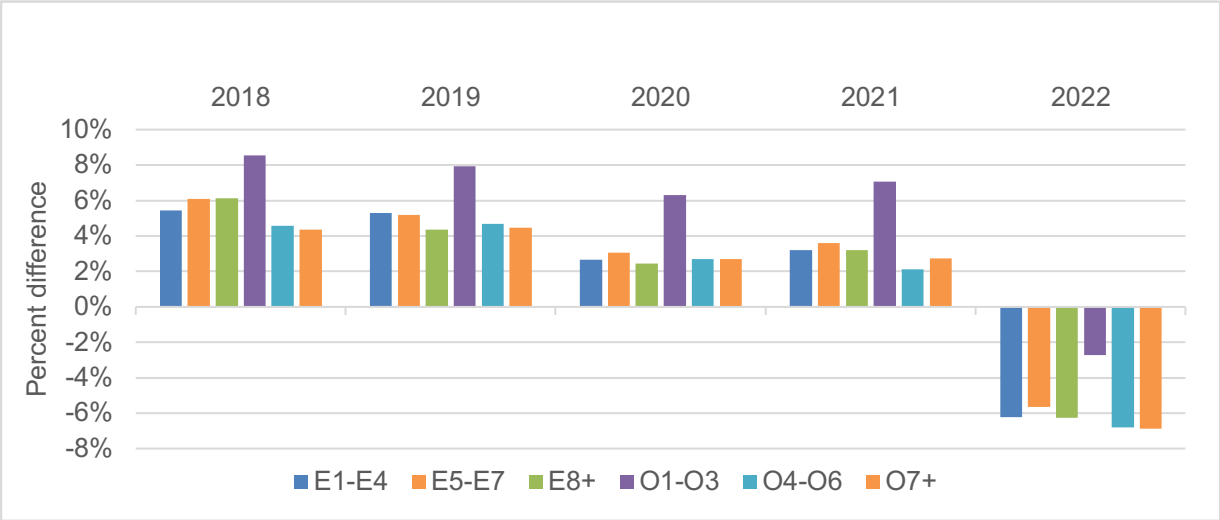
SOURCES: Features DMDC data, COLA data, and BAH rates.
NOTE: Data restricted to people who were serving in the Army in September of each year from 2017 to 2022, were included in military strength, had an Army organization code, and had U.S. presence (based in CONUS or received BAH) with a valid residential mailing zip code and who did not move between any two consecutive observations and received full BAH.

Panel B. Difference in the Change in Army Total Pay and the Composite COLI Using COLA Data, by Grade (Total Pay Growth − COLI Change)



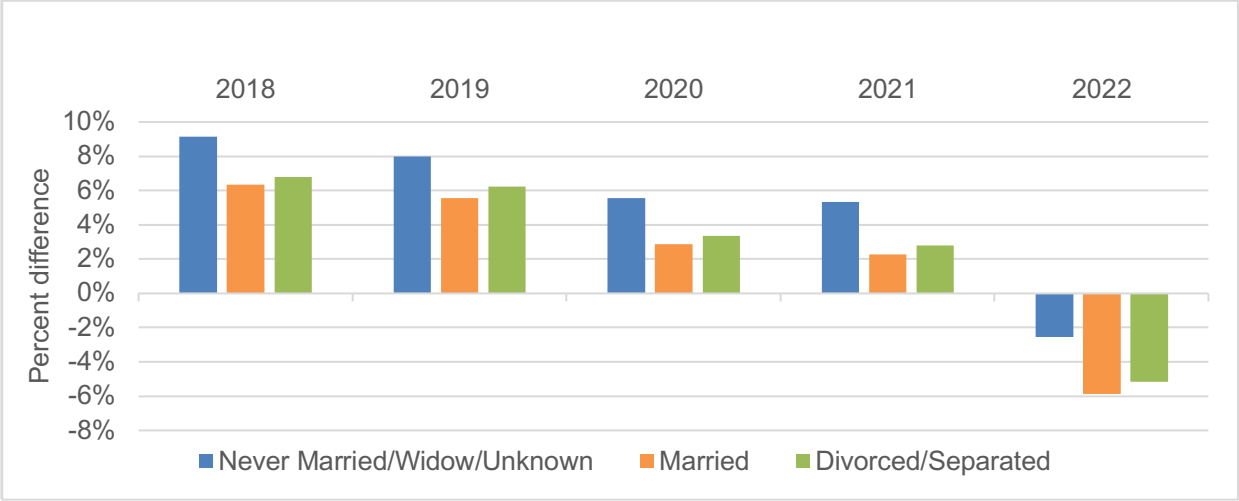
SOURCES: Features DMDC data, COLA data, and BAH rates.
NOTE: Data restricted to people who were serving in the Army in September of each year from 2017 to 2022, were included in military strength, had an Army organization code, and had U.S. presence (based in CONUS or received BAH) with a valid residential mailing zip code and who did not move between any two consecutive observations and received full BAH. Some pay grades were dropped due to small sample sizes on the base.

Figure B.10. Difference in the Change in Army Total Pay and the Composite COLI Using COLA Data, by Grade (Total Pay Growth − COLI Change)



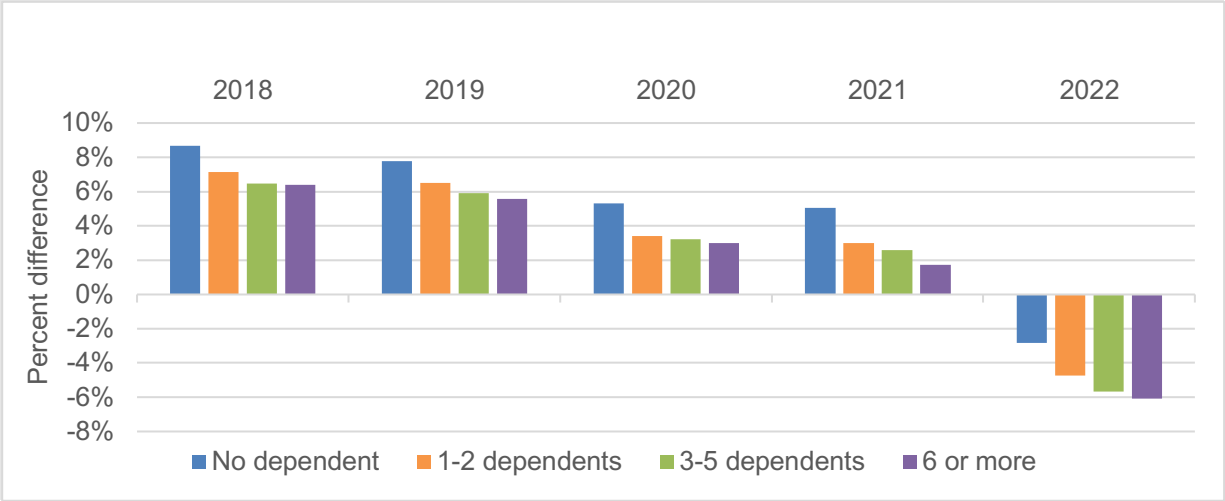
SOURCES: Features DMDC data, COLA data, and BAH rates.
NOTE: Data restricted to people who were serving in the Army in September of each year from 2017 to 2022, were included in military strength, had an Army organization code, and had U.S. presence (based in CONUS or received BAH) with a valid residential mailing zip code and who did not move between any two consecutive observations and received full BAH. Some pay grades were dropped due to small sample sizes on the base.

Figure B.11. Difference in the Change in Army Total Pay and the Composite COLI Using COLA Data, by Marital Status (Total Pay Growth − COLI Change)



SOURCES: Features DMDC data, COLA data, and BAH rates.
NOTE: Data restricted to people who were serving in the Army in September of each year from 2017 to 2022, were included in military strength, had an Army organization code, and had U.S. presence (based in CONUS or received BAH) with a valid residential mailing zip code and who did not move between any two consecutive observations and received full BAH.

Figure B.12. Difference in the Change in Total Pay and the Composite COLI Using COLA Data, by Number of Dependents (Total Pay Growth − COLI Change)



SOURCES: Features DMDC data, COLA data, and BAH rates.
NOTE: Data restricted to people who were serving in the Army in September of each year from 2017 to 2022, were included in military strength, had an Army organization code, and had U.S. presence (based in CONUS or received BAH) with a valid residential mailing zip code and who did not move between any two consecutive observations and received full BAH.

Abbreviations

BAH	basic allowance for housing
BAS	basic allowance for subsistence
BLS	U.S. Bureau of Labor Statistics
C2ER	Council for Community and Economic Research
CBSA	core-based statistical area
CCG	county cost group
COLA	Cost-of-Living Allowance
COLI	cost-of-living index
CONUS	continental United States
CPI	Consumer Price Index
DeCA	Defense Commissary Agency
DMDC	Defense Manpower Data Center
DoD	U.S. Department of Defense
GAO	U.S. Government Accountability Office
MHA	military housing area
OSD	Office of the Secretary of Defense

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GAO—*See* U.S. Government Accountability Office.

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ARROYO CENTER

Army personnel costs are a significant part of the Army's budget. Given force size, grade, and experience mix, the major driver of personnel costs is military compensation, which includes basic pay, allowances, special and incentives pays, retirement accrual, and an array of other benefits. Military compensation is used by the U.S. Department of Defense as a strategic human resources tool to attract, retain, and motivate high-quality personnel to stay, seek advancement, and eventually separate from service.

Between 2000 and 2020, military basic pay grew faster than inflation, by 70.7 percent versus a 51.9 percent increase in the Consumer Price Index. Since 2021, however, cost of living has been particularly salient in discussions about the adequacy and cost of military compensation, owing to historic rates of inflation nationally and to uneven rates of inflation across geographic areas.

In a step toward evaluating whether military compensation has been effective and efficient in addressing cost-of-living changes, the authors explore the extent to which military compensation growth has kept up with cost-of-living changes experienced by Army personnel from 2018 to 2022, across geographic areas and across subgroups of soldiers.

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RR-A2149-1