



Evaluation of Basic Allowance for Housing

Adam M. Clemens, Danielle N. Angers, Russell W. Beland, Shing L. Cheng, Daniel M. Leeds, Rikesh A. Nana, Robert W. Shuford, Susan Starcovic, and Sarah L. Wilson

with contributions by Glenn Ackerman, Peter Bernstein, Louise Collis, and Joshua Craig

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Abstract

This report for the 14th Quadrennial Review of Military Compensation (QRMC) responds to questions related to the Basic Allowance for Housing (BAH) posed by Congress in the 2023 National Defense Authorization Act (NDAA). BAH is a form of compensation designed to help members rent adequate housing near their duty station, and the amount depends upon their rank, their military housing area (MHA), and whether they have dependents. We found that BAH is, on average, higher than what civilians of comparable income spend on rent and utilities. The only exception is the BAH paid to members in the W1 paygrade without dependents. However, BAH is also volatile: in any given year, more than half of MHAs have a greater than 10 percentage point spread across the year-over-year BAH changes for different paygrades in that MHA. This may contribute to some members' dissatisfaction with BAH, as may comparison to on-base privatized housing standards, which are higher than BAH standards for some paygrades. We also found that over the long term, BAH responds to changes in housing markets very well, but its built-in lag of about 6 to 18 months means that it does not keep up with rapid housing cost inflation.

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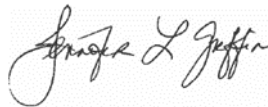
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Cover image: Air Force 1st Lt. Russell Bowman embraces his family at Joint Base Charleston, South Carolina, October 3, 2022, upon returning home from deployment. Photo by Airman 1st Class Christian Silvera.

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Approved by:

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Jennifer Griffin, Research Program Director
Marine Corps and Defense Workforce Program
Resources and Force Readiness Division

Executive Summary

This is a report for the 14th Quadrennial Review of Military Compensation (QRMC) on the Basic Allowance for Housing (BAH). Specifically, this report responds to BAH-related questions posed by Congress in the 2023 National Defense Authorization Act (NDAA).

The NDAA asks that DOD evaluate the following six issues:

1. The efficiency and accuracy of the current system used to calculate BAH
2. The appropriateness of using mean and median housing costs in such calculations
3. Existing military housing areas (MHAs) in relation to choices in, and the availability of, housing to servicemembers
4. The suitability of the six standard housing profiles in relation to the average family sizes of servicemembers, disaggregated by uniformed service, rank, and MHA
5. The flexibility of BAH to respond to changes in real estate markets
6. Residential real estate processes to determine rental rates

The NDAA also calls for the Department of Defense (DOD) to provide recommendations on the following five topics:

1. The feasibility of including information, furnished by federal entities, regarding school districts in calculating BAH
2. Whether to calculate BAH more frequently, including in response to a sudden change in the housing market
3. Whether to enter into an agreement with a covered entity to compile data and develop an enterprise-grade, objective, and data-driven algorithm to calculate BAH
4. Whether to publish the methods used by the Secretary of Defense to calculate BAH on a publicly accessible website of the DOD
5. Whether BAH calculations appropriately account for increased housing costs associated with Coast Guard facilities

Background about BAH

As explained in the BAH primer published by the Office of the Secretary of Defense (OSD), BAH is a form of compensation designed to help members rent adequate housing near their duty

stations when government housing is not available [1]. The BAH rate a member receives depends upon their rank, whether they have dependents, and the MHA of their duty station (with some exceptions if the dependents do not relocate). By law, the rate must be based on the cost of adequate housing for civilians of comparable incomes in the same area [2]. DOD interprets this as the local median rental cost for a given housing unit type, or “housing profile,” in a suitable neighborhood, plus the average cost of utilities in that area [1]. Rank and dependent status determine which housing profile is used.

BAH is calculated every year for 24 military paygrades in 300 MHAs in the US. The BAH rates are calculated from an annual BAH survey of available rental units in each MHA. Currently, BAH payments are set slightly below DOD’s estimate of total housing costs so that recipients notionally pay an average of 5 percent of their housing costs out of pocket.

Accuracy and efficiency of current BAH rates

To directly assess the accuracy of BAH rates, one would need to conduct more extensive BAH-like surveys in a sample of MHAs and compare the results to the existing BAH surveys, which is beyond the scope of this QRMC study. Instead, we used Census data from the American Community Survey (ACS)—the largest available survey that observes both household income and housing expenditures including utilities—to assess the sufficiency of BAH to match housing expenditures of civilians with comparable income. Because BAH is a key component of military income and varies significantly from one area to another, we defined *comparable civilians* as those with household income minus housing expenses similar to that of servicemembers’ regular military compensation minus BAH. BAH should then at least match what civilians with the same income-less-housing spend on rent and utilities.

At a national average level, we found that BAH is significantly higher than civilian housing expenditures, with or without taking into the account the notional 5 percent out-of-pocket that BAH recipients are currently expected to pay. For every rank and dependency status except one—W1 without dependents—average BAH is above average housing expenditures for comparable civilians. The degree to which BAH exceeds civilian expenditures varies from 60 percent for E2 with dependents to 13 percent for CWO4 without dependents. So, rather than paying 5 percent out of pocket on average, they can on average save a portion of their BAH and still rent housing comparable to their civilian peers.

Why, then, do some BAH recipients and their advocates perceive BAH as insufficient? One reason may be that BAH has a high degree of volatility (which reduces efficiency). The relative generosity of BAH varies from one MHA to another, one paygrade to another, and one year to another. It is not uncommon for rates of similar BAH standard units (such as one- and two-bedroom apartments or two- and three-bedroom townhouses) to increase or decrease by

substantially different amounts. We found that each year in over half of the MHAs, the year-on-year changes for different paygrades vary by more than 10 percentage points. If, for example, BAH increases by 10 percentage points for one paygrade, and in the same MHA in the same year it decreases by 5 percentage points for another paygrade, it is understandable that members in the latter paygrade could view their BAH as insufficient.¹ Although this volatility is somewhat smaller in MHAs with the largest (civilian) populations, it exists across all sizes of MHAs.

Another reason BAH may be perceived as insufficient is that on-base privatized housing standards are higher than BAH standards. With the exception of some older units that are now offered at a discount, all privatized housing units are now three-bedroom townhouses or bigger [3]. In contrast, E5s with dependents receive BAH tied to a two-bedroom townhouse, and E1s through E4s with dependents receive BAH tied to the midway point between a two-bedroom apartment and a two-bedroom townhouse, so they may perceive BAH as insufficient relative to what they expect on base.

Other findings

Mean versus median. BAH rates are currently based on the median (50th percentile) rents from the BAH surveys. Comparing the mean and median price in actual BAH surveys, we found that basing BAH on mean rates instead would increase BAH for some MHA-paygrade combinations and lower it for others. In some cases, the lowest paygrades would see the greatest reductions. If Congress is dissatisfied with the current BAH rates, it would be more straightforward to choose a higher or lower percentile for the BAH calculations rather than the mean. For example, setting BAH to the 60th percentile would increase it consistently.

Availability of suitable housing choices. We found that 92 percent of servicemembers reside in their assigned MHAs and 8 percent commute from neighboring MHAs. For those who choose to reside in neighboring MHAs, 60 percent choose MHAs with lower BAH rates, and presumably lower housing costs. The other 40 percent commute from MHAs with higher BAH rates.

Servicemembers choose their residences for many reasons, including spousal incomes and commutes, specific school districts, family preferences, and so on. It is difficult to ascertain their motivations without more direct information about these factors.

Not only are most members finding housing in their MHA, but they are also generally finding housing in higher quality neighborhoods relative to the civilian population. We compared the

¹ A member already stationed there and staying in that MHA would not see their BAH drop, but the reduction would take effect for members in that paygrade rotating into that MHA, at the same time that housing costs appear to be rising as evidenced by the increase in BAH for other grades.

ZIP codes that servicemembers choose within their MHAs to median gross rents reported in the ACS. In 74 percent of MHAs, servicemembers are choosing ZIP codes with higher median rents, which also correlates with higher quality housing and locations.

Suitability of the BAH housing profiles. Comparing the demographics of military families to the BAH housing profiles, we found that these standards should be sufficient, if each child were to have their own bedroom, in 69 to 90 percent of military families (69 for the E8, W2, and W3 paygrades, and 90 for the O2 paygrade). Applying on-base bedroom assignment policies, the BAH profiles are sufficient for 79 to virtually 100 percent of families depending on paygrade.

Flexibility to respond to markets. We found that over the long term, BAH responds to rising housing costs well: at a national average level, BAH has risen at least as much between 2006 and 2023 as other government-generated indices of housing cost. In the short run, BAH is not designed to adapt rapidly to volatile housing markets, and neither are other government-generated estimates of housing cost. BAH is more volatile than other government indices but not in a way that makes it more responsive to rapid changes in the market. Housing markets have been unusually volatile since the COVID-19 pandemic began, and both BAH and private-sector wages had difficulty keeping up with the rapid housing cost increases of 2021 and 2022.

Commercially generated indices have shorter lags than BAH or other government-produced measures. For example, by July of 2022, the Zillow index of rents in San Diego had risen 33 percent from January 2020, but BAH for an E5 with dependents there saw only a 0.7 percent increase during the same span. We note that commercial indices are not tied to the BAH profiles, nor do they exclude neighborhoods as unsuitable in the way that BAH surveys do, and they therefore cannot be used to simply set BAH levels as a replacement for the current BAH survey process.

Recommendations

Whether to incorporate school district information into BAH calculations. We recommend that DOD not involve itself in comparing the quality of civilian school districts, either within an MHA or across MHAs. Doing so would expose it to political risk, and the tasks of measuring school quality, quantifying its relationship with home prices, and determining the link between it and rental rates are all complex. A way to ensure that members have access to quality schools is to ensure that BAH is sufficient for them to live in higher cost neighborhoods, which is the case in most MHAs.

Whether to update BAH more frequently. Any change to BAH policy that allows it to update more frequently in response to the market would increase the total cost to the services, and they would learn the size of the increase only after the budget for the fiscal year has been built. As a result, if they have not budgeted enough to cover the increase, they would need to divert

funds from other budget line items already approved by Congress. However, if Congress expects the recent high volatility in housing markets to continue, then such a change may be necessary. Achieving this change would require either making a topline increase to DOD funding, offsetting savings in BAH (e.g., a larger notional out-of-pocket contribution), or offsetting cuts elsewhere in the DOD budget.

Whether to develop a BAH algorithm. Private-sector stakeholders in property markets use sophisticated algorithms to price homes and to forecast where the market is going. A commercially developed BAH algorithm may be useful for DOD as well, though we do not know how much actual predictive power these models have. It is critical that this tool estimate prices for the housing standards set by the government, rather than be allowed to generate its own standards. Also, even after such a tool passes an experimental phase and DOD chooses to implement it, OSD and the services should continue to closely monitor the results to ensure that it is performing as well on the new data being fed to it and is not trending in an unexplained direction.

Whether to fully publish BAH methods. The current BAH methodology uses proprietary data, is complex, and requires many “data smoothing” adjustments. Therefore, publishing it in its entirety would be difficult and would likely not improve perceptions of transparency. If DOD replaced it with a more streamlined process that relies heavily on publicly available data, that would enable more transparency and perhaps more trust. We caution, however, that it is unlikely DOD can ever fully commit to a methodology up front and fully document it. Any process is sure to generate irregularities, and if DOD is unable to deviate from the published process to correct these irregularities, it could lead to many complaints.

Whether BAH is appropriate to Coast Guard installations. To enable the Coast Guard to compensate its members for adequate housing that they sometimes must find farther from their duty stations, we recommend granting more clearly defined authority for the secretary concerned to pay the higher BAH rate for a neighboring MHA when members and their dependents live in that neighboring MHA. We also recommend expanding the differential lease payments law (which currently applies only to DOD) to include the Coast Guard to improve the housing supply in areas with few year-round rentals.

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Introduction

QRMC background

In accordance with Section 1008 of Title 37, United States Code (USC), the President must direct an independent review of the principles and concepts of the military compensation system every 4 years [4].

The director of the 14th Quadrennial Review of Military Compensation (QRMC) asked CNA to review the statutory requirements and methodologies used to calculate the basic allowance for housing (BAH), basic allowance for subsistence (BAS), cost-of-living allowances (COLAs), and basic needs allowance (BNA) to ensure military members are food secure and can procure suitable housing. This report is one of two produced by a CNA study that addresses each of these allowances.

In addition, Section 662 of the 2023 National Defense Authorization Act (NDAA) calls for the Department of Defense (DOD) to provide a report to Congress on BAH [5]. The NDAA asks that DOD evaluate the following six specific issues:

1. The efficiency and accuracy of the current system used to calculate BAH
2. The appropriateness of using mean and median housing costs in such calculations
3. Existing military housing areas (MHAs) in relation to choices in, and the availability of, housing to servicemembers
4. The suitability of the six standard housing profiles in relation to the average family sizes of servicemembers, disaggregated by uniformed service, rank, and MHA
5. The flexibility of BAH to respond to changes in real estate markets
6. Residential real estate processes to determine rental rates

The NDAA also calls for DOD to provide recommendations on the following topics:

1. The feasibility of including information, furnished by federal entities, regarding school districts in calculating BAH
2. Whether to calculate BAH more frequently, including in response to a sudden change in the housing market
3. Whether to enter into an agreement with a covered entity to compile data and develop an enterprise-grade, objective, and data-driven algorithm to calculate BAH

4. Whether to publish the methods used by the secretary to calculate BAH on a publicly accessible website of the DOD
5. Whether BAH calculations appropriately account for increased housing costs associated with Coast Guard facilities

This report addresses all of the questions above. A companion CNA report for this QRMC explores possible reforms to the BAH process as well as analysis and recommendations about BAS and COLAs. A separate RAND report for the QRMC focuses on the food security concerns that motivated the BNA.

BAH definition and statutory requirement

As explained in the BAH primer published by the Office of the Secretary of Defense (OSD), BAH is a form of compensation designed to help members rent adequate housing near their duty stations when government housing is not available [1]. The BAH rate a member receives depends upon their rank, whether they have dependents, and the MHA of their duty station (with some exceptions if the dependents do not relocate). By law, the rate must be based on the cost of adequate housing for civilians of comparable incomes in the same area [2]. DOD interprets this as the local median rental cost for a given housing unit type, or “housing profile,” in a suitable neighborhood, plus the average cost of utilities in that area [1]. Rank and dependent status determine which housing profile is used.

The six housing profiles for which DOD collects data are listed below. Most paygrades are tied to one of these or to a percentage difference between one of these anchor points and the next, but members in the grades of E-1 through E-4 with dependents are tied to the average of the cost of a two-bedroom apartment and a two-bedroom townhouse (by law).

- One-bedroom apartment
- Two-bedroom apartment
- Two-bedroom townhouse/duplex
- Three-bedroom townhouse/duplex
- Three-bedroom single family dwelling
- Four-bedroom single family dwelling

To provide some stability in household budgets and reduce the probability that members need to move during a tour at a duty station, the BAH rate a member receives can adjust up mid-tour but can only adjust down when the member has a permanent change of station (PCS), a reduction in rank, or a change in dependency status [1].

Members may choose to buy a home and use their BAH to make mortgage payments, but DOD policy specifies that BAH is tied to the rental market and not to ownership costs. Servicemembers are free to spend more or less than their BAH rate on housing as they see fit.

BAH data collection and calculation

BAH rates are traditionally calculated by surveying vacant rental units in each MHA. The surveys are supplemented by other data sources, including commercial real estate data bases and inputs from Military Housing Offices and privatized housing partners. The surveys are conducted annually from March through July.

Servicemembers are expected to pay a specified amount out of pocket in order to afford the standard BAH unit for their paygrade and location. This amount is termed an “absorption” rate. It is calculated to be 5 percent of the national average BAH rate for each paygrade. The absorption rate is a specified dollar amount that does not vary from location to location.

Background considerations about BAH

Although BAH rates are calculated such that they should cover 95 percent of the cost of appropriate and adequate housing based on geographic area, pay grade, and dependent status, the reality for individual servicemembers can vary widely. Personal circumstances and preferences can cause wide variations in the choice of rental homes and their costs. Even among servicemembers of the same grade, family size, and housing preferences who are assigned to the same base at the same time, housing costs might vary because of diligence in searching or simple random luck.

As a result, it is natural, and even unavoidable, that some servicemembers will end up with sizable out-of-pocket costs while others pay far less than BAH; the average expected out-of-pocket contribution has varied over time but has always been understood to be an *average*. These differences can be quite stark. Suppose the primary housing consideration for a servicemember is a short commute to work. An informal search of rental properties in the Washington, DC, area showed that a servicemember assigned to Joint Base Andrews could probably find a nearby home for somewhat less than BAH, while an otherwise identical member assigned to Walter Reed would likely pay about twice as much rent and face significant out-of-pocket costs. A similar, but even larger, disparity applied to members assigned to the Marine Corps Air Station at Miramar and the Naval Air Station North Island. Fortunately, in both cases members are free to choose the neighborhood in which they live and, if necessary, can trade commute times for rental rates.

In addition to these sorts of complexities, the single set of rates, though designed for two-parent families in which one parent is a servicemember and the other is a civilian, is used for dual-military couples, geo-bachelors, activated guard and reserve personnel, parents with joint custody, and others in various anomalous situations. It would be unrealistic to expect a single set of rates to be just right, or even close to right, across such a wide range of applications.

When comparing different geographic areas, the comparisons become far more difficult, and the relative winners and losers even harder to judge. In part this is because higher costs of living are often associated with more desirable locations, but individual servicemembers have idiosyncratic preferences about where to live. Thus, even if the system could somehow make purchasing power identical across all duty locations, some members would still come out ahead of others. Therefore, although we can state whether we are confident that a BAH rate for a given paygrade and MHA is sufficient to meet the statutory requirement for members receiving it, we cannot recommend one perfect table of BAH rates that meets all intents of the program equitably for all stakeholders at the minimum cost.

Organization of this report

The next 11 chapters discuss our analyses to answer each of the evaluations and recommendations requested by Congress in order.

We provide seven appendices. Appendix A provides details about the BAH estimation process. Appendix B presents tables of how much civilians spend on housing (rent plus utilities) as a function of their remaining income, type of home, and the overall housing costs of the area in which they live. Appendix C presents statistics on how many MHA-paygrade combinations have BAH that we can demonstrate with high confidence is sufficient. Appendix D presents the distribution of family size for each paygrade and how this compares with its housing BAH profile. Appendix E discusses the methodology we used to estimate the costs of changing the BAH housing standards. Appendix F provides an overview of housing rental market indices. Finally, Appendix G discusses academic research on the relationship between school quality and home prices.

How Accurate and Efficient Is the Current System Used to Calculate BAH?

For the great majority of BAH recipients, BAH is higher than median spending on rent and utilities by comparable civilians. This is especially so for servicemembers with dependents, particularly junior enlisted personnel or junior officers with prior enlisted service. The reasons for this are that Congress has set a BAH floor for junior enlisted personnel (a common standard for paygrades E1 through E4) and that officers with prior enlisted service receive more BAH than their peers of the same rank.

We used an innovative methodology that allowed us to assess the sufficiency of BAH both at a national average level and at the MHA level in 83 percent of locations. If we could not confidently determine the sufficiency of some rates in a specific MHA, we could often bound the maximum potential shortfalls.

In addition, we determined that BAH is highly volatile from year to year when compared to an alternate measure of housing cost. This volatility reduces the efficiency of BAH and may contribute to dissatisfaction with BAH. The disparity between the BAH profiles and the on-base privatized housing standard, which is even higher, may also contribute to dissatisfaction.

Accuracy: nationwide average

To directly assess the accuracy of the BAH to fulfill its legal and policy requirements, one would need to select a sample of housing areas and conduct more extensive BAH-like surveys to establish a fully accurate measure.² These results could then be compared to the current BAH rates to examine how far they deviate from full accuracy. Unfortunately, such an approach is beyond the scope of this QRMC study.

An alternative, indirect approach would be to see how changes in year-to-year BAH rates affect servicemembers' housing choices. A 2018 study for the Navy found that changes in BAH rates

² These surveys would use similar rules to BAH by restricting inappropriate neighborhoods, but they would use larger sample sizes for more statistical power. The process could only apply to MHA-profile combinations with a large enough rental market for these more extensive sample sizes to be possible.

relative to other housing metrics affect servicemembers' choices [6]. When BAH fell relative to other metrics, more servicemembers chose to reside in privatized military housing. When BAH increased relative to other metrics, more servicemembers chose to reside in civilian housing. Therefore, servicemember choices can be used as a predictor of year-to-year accuracy.

Our initial plan was to expand the 2018 study to include the other military services and use changing housing choices as a measure of the accuracy and consistency in BAH. However, we were not able to obtain occupancy data for servicemembers in the Army or Air Force's privatized housing projects. Therefore, we will interpret Congress's request to refer to evaluating the sufficiency of BAH to meet servicemember housing needs based on the standards set out by statute and DOD policies.

To evaluate the sufficiency of current BAH rates, we compared them to rental data from the American Community Survey (ACS). Conducted by the US Census Bureau, the ACS is the largest ongoing community survey in the US and is sent to about 3.5 million households each year [7]. The Census Bureau provides access to a large subset of ACS survey data, aggregated by public use microdata areas (PUMAs). ACS estimates are provided in 5-year increments, the latest being from 2017 through 2021. Unlike indices of housing cost, which can provide useful information about rates of change but not the appropriate levels for BAH, the ACS allows us to evaluate levels because it has information about both housing expenditures and income. Servicemembers earn more than civilian renters on average and therefore have higher housing standards. To evaluate the sufficiency of BAH, we used ACS data on household rents, incomes, housing type, bedrooms, household size, and age for the most recent 5-year estimates.

Comparing BAH to civilian housing expenditures

Our analysis of the ACS included innovative techniques for (1) identifying civilian income groups comparable to military servicemembers and (2) aggregating PUMAs to estimate the sufficiency of BAH rates.

Identifying comparable income groups

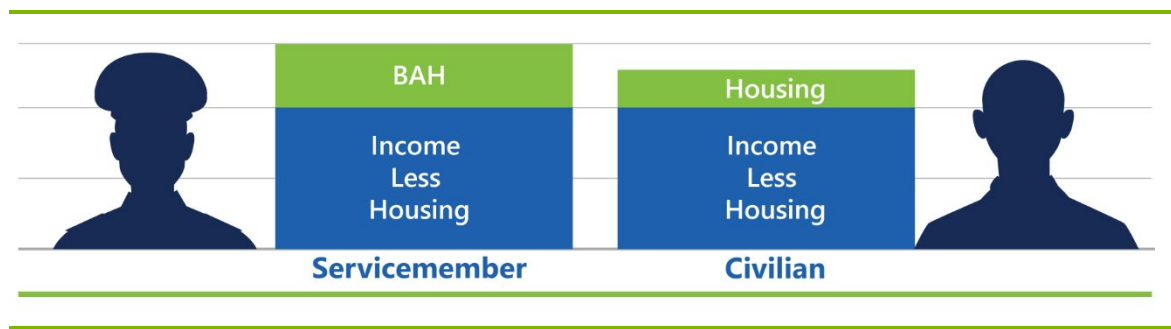
BAH, with its associated absorption rates, is intended to equalize the non-housing income of servicemembers across the country. Servicemembers who rent the standard BAH unit for their paygrades are supposed to have equal amounts of remaining income regardless of where they are stationed in the US. Because we are interested in the sufficiency of BAH, we want to compare servicemembers to civilians with similar non-housing income; the member's regular military compensation (RMC) minus their BAH should match the civilian's household income

minus their expenditures on rent and utilities.³ To this end, we divided the ACS data into ventiles,⁴ each containing about 5 percent of the sample used. Instead of grouping these ventiles by income, we grouped them by income less housing and utility expenses. We excluded civilians who live in mobile or group homes, and we used the Consumer Price Index (CPI)⁵ to inflate the median values to January 2023 so they could be appropriately compared to the 2023 BAH rates that took effect at that time.

Finally, BAH is supposed to estimate the cost of vacant rental units, while the ACS estimates the costs of vacant and occupied units. We compared the rents paid by new movers—defined as tenants who have moved in within the last 12 months—and found they were on average 7.9 percent higher, so we adjusted all the median rents accordingly for this new renter premium.

The income-less-housing approach facilitates assessing the sufficiency of BAH rates across the country. BAH is a major component of military compensation. For an E-5 with dependents and 10 years of service, BAH can vary from 26 percent to 121 percent of basic pay, with the average being 55 percent [8-9]. Such a large variation makes comparisons with pure income ventiles difficult because the appropriate income comparison varies so greatly from location to location. However, comparing the servicemember to civilians with similar non-housing incomes (measured as income less rent or RMC less BAH) provides a much more stable comparison, which we illustrate in Figure 1.

Figure 1. Comparing BAH to housing expenditure of comparable civilian



Source: CNA.

³ Although we compare members’ RMC to civilians’ total household income, we realize that members may have additional sources of income such as bonuses and special pays, spouses’ wages and salaries, and investment income. A member whose total household income is significantly higher than their RMC may accordingly choose to spend more on housing than a civilian with household income equal to the member’s RMC.

⁴ Ventiles are 5 percentile increments. The full sample, therefore, is composed of 20 ventiles.

⁵ The ACS uses the general CPI to adjust the results between its annual surveys. We tried to be consistent.

Nationwide average results

Table 1 shows how average BAH for each paygrade in 2023 compares with what comparable civilians spend on rent and utilities, if their incomes and housing expenditures are inflated to January 2023 dollars and if we assume they have just moved into a new home in the last year (as BAH recipients are likely to have done). For example, reading from left to right across the row for the W1 paygrade, we find that the average BAH paid to W1s with dependents in 2023 is 25 percent higher than what civilian households with the same income-less-housing would spend on rent and utilities, and that it would be 32 percent higher if BAH did not notionally require an out-of-pocket contribution. Continuing along the row, we find that the average BAH paid to W1s without dependents is 15 percent lower than expenditures of comparable civilians and would still be 11 percent lower without the notional out-of-pocket. For all other paygrades, and particularly for members with dependents, BAH is on average more than sufficient despite the notional “5 percent out of pocket” contribution.⁶

Table 1. Sufficiency of BAH at the national average level, by paygrade

Grade	% difference from civilian, with dependents	“5% out of pocket” added back in	% difference from civilian, without dependents	“5% out of pocket” added back in
E2	60%	68%	23%	29%
E3	57%	65%	26%	32%
E4	41%	49%	15%	21%
E5	45%	53%	27%	34%
E6	53%	61%	27%	34%
E7	38%	46%	17%	23%
E8	46%	53%	19%	25%
E9	26%	32%	10%	16%
W1	25%	32%	-15%	-11%
W2	39%	46%	18%	24%
W3	37%	44%	24%	30%
W4	26%	32%	13%	19%
W5	17%	23%	17%	23%
O1E	57%	65%	37%	44%

⁶ Average compensation (including tax advantage) for servicemembers varies with family size, so to determine the comparable civilian for members with dependents, we used the average regular military compensation of members with the median number of dependents (among members with dependents) for their paygrade.

Grade	% difference from civilian, with dependents	“5% out of pocket” added back in	% difference from civilian, without dependents	“5% out of pocket” added back in
O2E	47%	55%	30%	36%
O3E	46%	54%	31%	38%
O1	27%	33%	15%	21%
O2	39%	46%	23%	29%
O3	35%	42%	23%	30%
O4	38%	46%	23%	30%
O5	51%	59%	28%	35%

Source: CNA.

^a E2s, E3s, and E4s have different results even though their BAH standards are the same. This is because they have different RMCs, and BAH is intended to provide housing quality comparable to civilians with similar incomes. The DOD RMC calculator does not always provide estimates for E1s, so we were not able to include the E1 BAH amounts in our assessments.

Accuracy: across MHAs

We cannot use the ACS data to determine what comparable civilians spend on a particular housing type in a particular MHA, and therefore to directly measure how it compares to BAH for each paygrade-MHA combination. If one filters the ACS data by several attributes for specific areas, it can quickly devolve into small sample sizes, creating concerns about statistical validity. Instead, we developed a set of upper bounds against which we can compare BAH in 87 percent of MHAs. If a BAH rate exceeds this upper bound, we are confident that it is more than sufficient. Members in the most expensive 13 percent of households that we cannot develop an upper bound for are likely among the most highly compensated relative to their civilian peers because BAH applies the same set of housing standards even in the most expensive markets, whereas civilians adjust their housing choices based on local market conditions.

Grouping ACS survey samples to assess the MHA-specific sufficiency of BAH

To create these upper bounds, we grouped the PUMAs into low, medium, and high housing cost areas.⁷ We also sorted MHAs by BAH and split them into sixths (halves of thirds) as shown in Figure 2. If the average housing costs in an MHA are at the *lower* end of a cost third, and yet BAH for a given paygrade is *higher* than the average housing expenditures of comparable civilians in that cost third, we are confident that BAH is sufficient for that paygrade and MHA. If average housing costs in an MHA are at the higher end of a cost third, and BAH for a given paygrade is higher than the average housing expenditure of comparable civilians in the *next* (higher) cost third, we are confident that BAH is sufficient for that paygrade and MHA.⁸

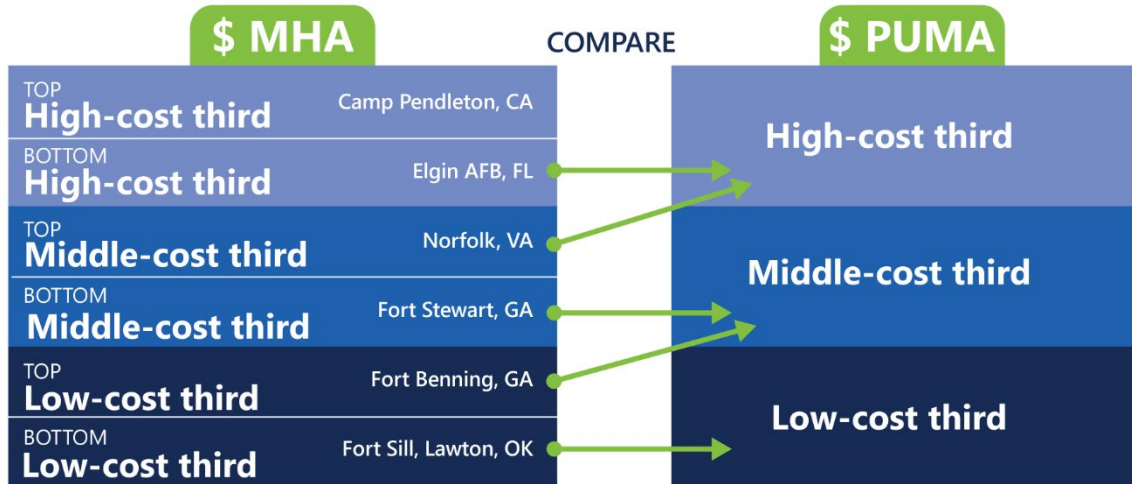
For example, suppose a member is stationed in the Norfolk, Virginia MHA, and BAH for their grade in that MHA is in the top half of the middle third of MHAs. If their BAH is higher than what comparable civilians spend on housing in the highest-cost third of PUMAs, then we are confident that their BAH is sufficient. This approach does not allow us to account for the 50 MHAs with the highest BAH (such as San Diego or Hawaii) because we do not have an upper bound against which to compare them. However, members in those high-cost MHAs are receiving BAH tied to a nationwide housing standard despite the fact that civilians tend to consume less housing in more expensive areas, so they are likely to be receiving more BAH than comparable civilians spend on housing.

⁷ The available ACS data consisted of 2,351 PUMAs. We chose the half of these PUMAs (1,175) in which the percentages of active-duty military populations exceeded the ACS median in order to exclude locations that have essentially no servicemembers and are not relevant for comparison to BAH recipients.

⁸ We were concerned about whether matching MHA BAH rates to ACS PUMAs by low-, medium-, and high-cost areas would be statistically valid. It implicitly assumes that MHAs with higher BAH rates map to PUMAs with higher average civilian rental expenditures and vice versa. We tested this correlation by identifying the 25 PUMAs with the highest military densities, which range in cost from Honolulu County-Koolauapoko to Pennyrile Area Development District (South) in Kentucky and map to 21 MHAs. The relative ordering of these MHAs by E5 with-dependents BAH has an 85 percent correlation with the relative ordering of the average housing costs in their respective PUMAs, and the correlation is even slightly higher if we use O3 with-dependents BAH.

In addition, we examined the ratios of the E1 to E4 with-dependents BAH rates in the MHA ordering to their corresponding mean rental costs in the PUMA ordering. The ratios stayed in a very tight range, suggesting that these are indeed comparable orderings. Both of these tests convinced us that the methodology comparing MHA BAH rates to PUMA rents using their relative rankings is indeed sound.

Figure 2. Comparing BAH within an MHA to housing expenditures in comparable-cost areas



Source: CNA.

The MHA listed in each cost tier is an example, but the exact set of MHAs assigned to each cost sixth will vary depending on the paygrade. Each BAH anchor point is estimated separately for each MHA and therefore the relative ordering of MHAs by BAH rate differs by grade.

Creating these upper bounds also involved using high estimates of servicemember incomes. Military pay is based on rank and years of service (YOS). For each paygrade, we used the maximum YOS for that paygrade, so it matches the highest ventile possible. For example, basic pay (BP) for an E5 maximizes out at 12 years of service. This is higher than the BP for the average E5. We compared the E5 BAH rates to civilian rental costs in ventiles comparable to this higher income level. We used the DOD RMC calculator to estimate the RMC for each paygrade⁹ and MHA; doing so enabled us to include the tax advantage from allowances to create a high estimate to compare to the civilian ventiles. If the BAH rates exceeded these high-estimate medians, we concluded that BAH is at least sufficient.

Results across MHAs

Table 2 and Table 3 display the percentages of MHAs in which we confidently assess that BAH is sufficient for each paygrade. For example, of the 250 MHAs that we can compare against an

⁹ The RMC calculator does not always provide income levels for E1 servicemembers, so we needed to exclude that paygrade from our analysis.

upper bound, the E5 row shows that BAH for an E5 with dependents meets or exceeds this upper bound in 244 MHAs, or 98 percent of them. Just as members with dependents receive higher BAH at the national average level, we also can confirm the sufficiency of their BAH in a higher percentage of MHAs.

Appendix B displays civilian spending on housing. For a given housing profile, civilians of different income levels spend very different amounts because number of bedrooms and housing type are just two of many factors that influence cost. Appendix C shows the maximum amount by which BAH could be insufficient across MHAs (the shortfall relative to our deliberate upper bound) when compared to civilian spending. These possible shortfalls relative to comparable civilians tend to be larger for members without dependents.

Table 2. BAH sufficiency statistics for servicemembers with dependents

Paygrade	Number of MHAs for which BAH is sufficient	Number of MHAs for which BAH may not be sufficient	Percent of assessed MHAs with sufficient BAH	Number of MHAs we cannot assess
E2 ^a	247	3	99%	50
E3 ^a	244	6	98%	50
E4 ^a	239	11	96%	50
E5	244	6	98%	50
E6	218	32	87%	50
E7	223	27	89%	50
E8	250	0	100%	50
E9	250	0	100%	50
W1	203	47	81%	50
W2	240	10	96%	50
W3	250	0	100%	50
W4	250	0	100%	50
W5	226	24	90%	50
O1E	246	4	98%	50
O2E	250	0	100%	50
O3E	250	0	100%	50
O1	242	8	97%	50
O2	201	49	80%	50
O3	249	1	100%	50
O4	229	21	92%	50
O5	243	7	97%	50

Source: CNA.

^a E2s, E3s, and E4s have different numbers of MHAs with sufficient BAH amounts even though their BAH standards are the same. This is because they have different RMCs, and BAH is intended to provide housing quality comparable to civilians with similar incomes. The DOD RMC calculator does not always provide estimates for E1s, so we were not able to include the E1 BAH amounts in our assessments.

Table 3. BAH sufficiency statistics for servicemembers without dependents

Paygrade	Number of MHAs for which BAH is sufficient	Number of MHAs for which BAH may not be sufficient	Percent of assessed MHAs with sufficient BAH	Number of MHAs we cannot assess
E2 ^a	189	61	76%	50
E3 ^a	165	85	66%	50
E4 ^a	148	102	59%	50
E5	125	125	50%	50
E6	169	81	68%	50
E7	145	105	58%	50
E8	153	97	61%	50
E9	137	113	55%	50
W1	124	126	50%	50
W2	208	42	83%	50
W3	135	115	54%	50
W4	95	155	38%	50
W5	145	105	58%	50
O1E	210	40	84%	50
O2E	172	78	69%	50
O3E	148	102	59%	50
O1	130	120	52%	50
O2	188	62	75%	50
O3	138	112	55%	50
O4	147	103	59%	50
O5	175	75	70%	50

Source: CNA.

^a E2s, E3s, and E4s have different numbers of MHAs with sufficient BAH amounts even though their BAH standards are the same. This is because they have different RMCs, and BAH is intended to provide housing quality comparable to civilians with similar incomes. The DOD RMC calculator does not always provide estimates for E1s, so we were not able to include the E1 BAH amounts in our assessments.

Efficiency

We also looked at the efficiency of BAH. *Efficiency* can be interpreted as cost effectiveness—are there cheaper and easier ways of calculating equally accurate BAH rates apart from the current survey process? As mentioned above, determining accuracy can be a difficult process. Efficiency can also be interpreted in a technical sense. An efficient estimator is characterized as having the smallest possible variance, indicating that a small deviance exists between the estimated value and the “true” value [10]. We will interpret efficiency in this more technical

definition—that Congress is concerned about the “volatility” of BAH regarding changes in its annual rates compared to the housing market.

One of the striking things about the year-to-year changes in BAH rates is their volatility. Even within a single MHA, large differences in the increases between different anchor points and paygrades are common. This contrasts with other metrics about changing housing prices. The CPI provides one number for an entire area, implicitly assuming that all rents in that area increase or decrease at similar rates. The same is true for some commercial rent indices, such as the Zillow Observed Rent Index (ZORI) and the Penn State/ACY Marginal Rent Index (MRI). It is important to note that none of these indices can be used to set BAH rates as a replacement for the current BAH process because they do not align with MHAs and do not exclude neighborhoods based on DOD standards or link expenditures to civilians of comparable income. Appendix F contains descriptions of different rental market price indices.

One housing market index that does show different categories of housing within a specific area is the US Department of Housing and Urban Development (HUD) 50th percentile housing costs. However, the HUD data are much less volatile than the BAH. This is partly by design (HUD tries to maintain consistent cost ratios across different numbers of bedrooms in a given area), but it would likely be less volatile anyway for three other reasons. HUD uses Census data, it uses a set of four profiles instead of six (it only divides the data by number of bedrooms), and it expands the geographic footprint as needed to get statistical validity rather than being restricted to MHAs. In other words, it is not a substitute for the BAH process.

To measure this BAH volatility, we looked at the percentage increases in the different BAH rates and anchor point¹⁰ rates for each MHA from 2007 through 2023. We considered the MHA rates to be volatile in a specified year if year-on-year changes for different BAH rates or anchor

¹⁰ To estimate the BAH anchor point cost increases, we made several adjustments to the published BAH rates. First, we adjusted all the rates for the published absorption rate that servicemembers are expected to pay out of pocket for their BAH standard unit. Then we adjusted for renters' insurance that had been included as part of the BAH until 2015. As far as we know, OSD never published specific amounts for renters' insurance, other than estimating it to be 1 percent of BAH. The absorption rate for 2015 was also 1 percent of BAH, so we used that amount as an estimate for renters' insurance and deflated it for previous years using the general CPI. Finally, we derived the anchor point estimates from these specific adjusted BAH rates. We estimated the one-bedroom apartment for each MHA to be this adjusted BAH rate (after adding the absorption amount and subtracting the estimated renters' insurance amount for the applicable years) for an E4 without dependents. We estimated the two-bedroom apartment anchor amount using the E1 to E4 with-dependents adjusted BAH rate and the E5 with-dependents BAH adjusted rate. The two-bedroom townhouse was the E5 with-dependents adjusted BAH rate. The three-bedroom townhouse was the E6 with-dependents adjusted BAH rate. The three-bedroom single family detached (SFD) rate was the W3 with-dependents adjusted BAH rate. The four-bedroom SFD rate was the O5 with-dependents adjusted BAH rate.

point rates differed by more than 10 percentage points.¹¹ For example, if the BAH rate for a with-dependents paygrade increased by 8 percent from the previous year, but the BAH rate for another paygrade in that same MHA decreased by 3 percent that same year, we considered that MHA-year combination to have a volatile change in BAH.¹²

Efficiency results

If we define a volatile MHA year as one with a greater than 10 percentage point spread in year-on-year changes, more than half of the MHAs had volatile BAH rates in any specific year since 2008.¹³ Even similar categories of housing often showed great volatility within the same MHA and year. For example, the difference in the annual rate changes between one- and two-bedroom apartments varied by up to 55 percentage points.¹⁴ The maximum difference in the rate changes between two- and three-bedroom townhouses was 27.4 percentage points.¹⁵ The maximum difference in the rate changes for three- and four-bedroom single family detached (SFD) homes was 34.5 percentage points.¹⁶

To put the BAH volatility into context, we compared it to the volatility of HUD's 50th percentile housing costs. HUD produces these costs each year for approximately 2,600 metropolitan statistical areas and counties. Using the same volatility metric, we found that the HUD estimates are generally much less volatile than BAH. In the average year between 2007 and 2023, approximately 16 percent of the HUD areas had volatile changes in their rates. In contrast, for the BAH anchor points, over 65 percent of the MHAs had volatile rate changes in an average year. Figure 3 shows the percentage of volatile areas for each year.

¹¹ The 10-percentage point difference is an arbitrarily chosen cut off, but by any measure, BAH has more variance in year-on-year changes within the same area and year than the HUD estimates.

¹² Using the calculation: 8 percent - (- 3 percent) >= 10 percentage points.

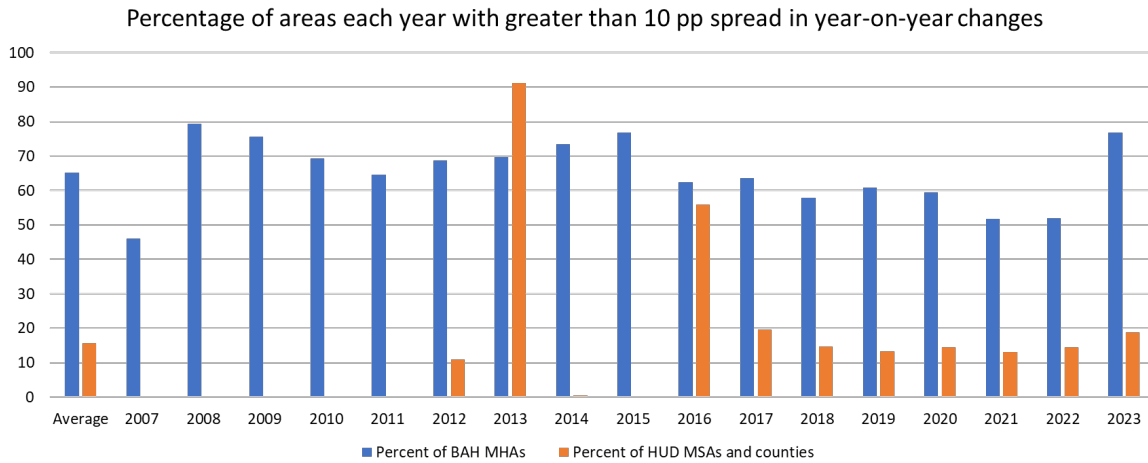
¹³ In 2007, a little less than half of the MHAs had volatile BAH rates using this definition.

¹⁴ This was in 2008 in Kodiak, Alaska, where the estimated cost of a one-bedroom apartment increased by almost 40 percent, but the two-bedroom apartment decreased by more than 15 percent.

¹⁵ This was in 2012 in Minot, North Dakota, where the estimated cost of a two-bedroom townhouse increased by 66.3 percent, but the cost of a three-bedroom townhouse increased by 39.9 percent. All housing had large increases in that market that year, but the differences between units in the other categories were much smaller.

¹⁶ This was in 2008 in Jackson, Tennessee, where the price of a three-bedroom SFD rose by 0.7 while the price of a four-bedroom SFD rose by 35 percent. Other housing categories rose in the 10 to 20 percent range.

Figure 3. Volatility comparison between BAH MHAs and HUD housing areas

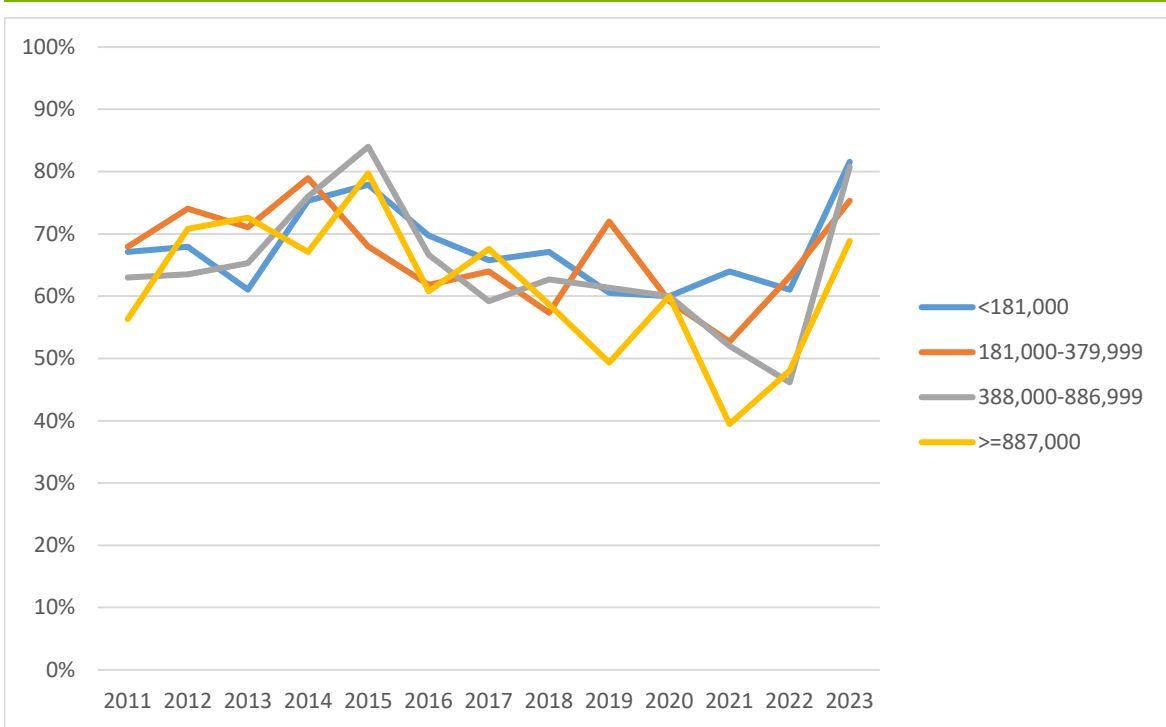


Source: CNA generated from historical BAH rates published at [Basic Housing Allowance | BAH Rate Lookup | Defense Travel Management Office \(dod.mil\)](#) and historical HUD estimates at [50th Percentile Rent Estimates | HUD USER](#).

Note: The HUD data had high volatility in two outlier years: 2013 and 2016. We enquired about those years; it was suggested that they may have been the result of a recalibration of the HUD rates. We are still investigating for a more definitive answer.

As noted above, BAH is estimated for each MHA regardless of its size, and it is to be expected that MHAs with smaller civilian populations would have fewer rentals available to sample in the BAH survey. These smaller samples, particularly for BAH profiles that are less common in that MHA (e.g., townhouses in some rural areas), have less statistical power and can generate more variance. However, as shown in Figure 4 and Figure 5, even the MHAs with the largest civilian populations (more than 887,000) have surprisingly high volatility.

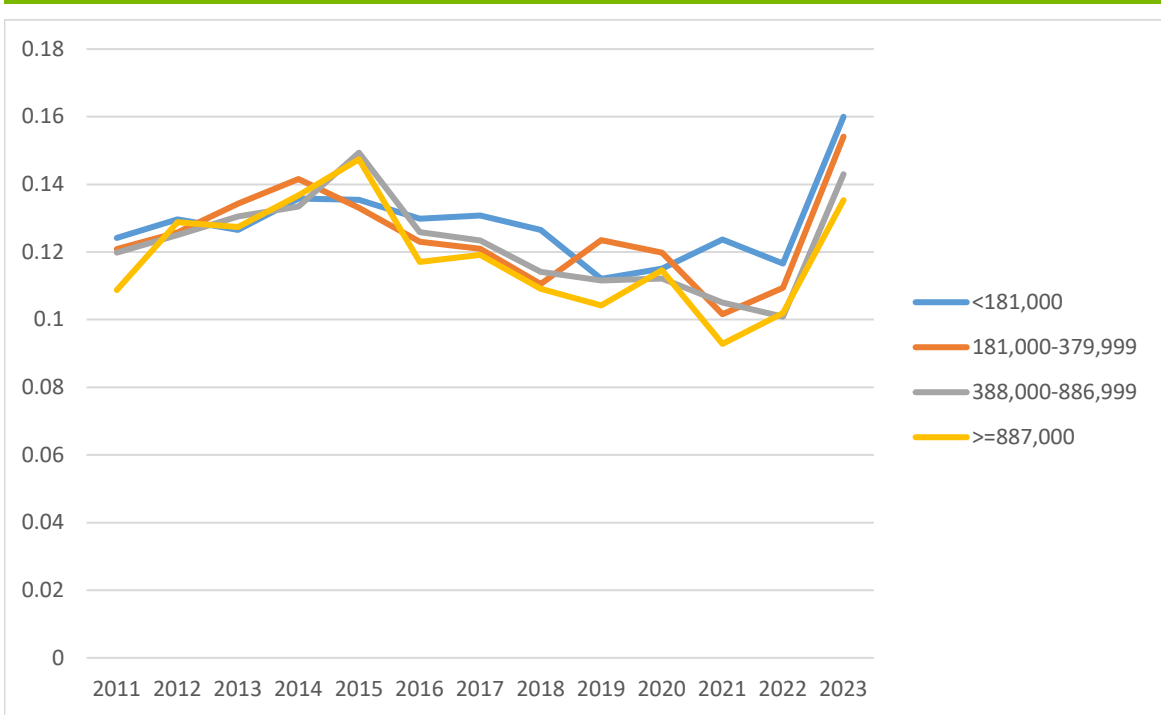
Figure 4. Percentage of MHAs in which year-on-year change in BAH differs by more than 10 percentage points across anchor points, by MHA population and year



Source: CNA generated from historical BAH rates published at [Basic Housing Allowance | BAH Rate Lookup | Defense Travel Management Office \(dod.mil\)](https://www.defense.gov/Portals/0/Documents/Basic_Housing_Allowance_BAH_Rate_Lookup.pdf).

Note: MHAs are sorted by population into four equal sets of 75 each.

Figure 5. Mean percentage points difference between highest and lowest year-on-year change across anchor points, by MHA population and year



Source: CNA generated from historical BAH rates published at [Basic Housing Allowance | BAH Rate Lookup | Defense Travel Management Office \(dod.mil\)](#).

Note: MHAs are sorted by population into four equal sets of 75 each.

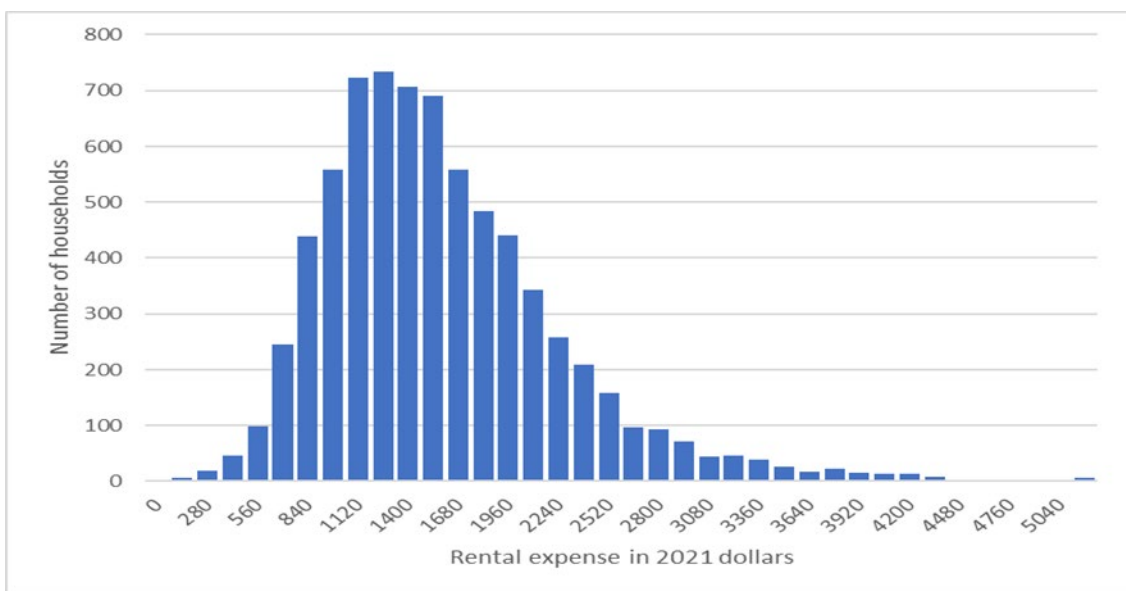
Discussion

Although BAH is high relative to civilian housing expenditures, it may be less so compared to servicemembers' expectations. This issue is related to the statistical problem of accurately setting the rate for each MHA, which can lead to BAH being far more generous for some MHAs than others, and to the significant differences in BAH changes across paygrades. BAH recipients may find that BAH relative to local civilian spending is lower in their current MHA than in their previous one or may learn it is lower than the MHA and paygrade combination of someone else they know. As a result, they may conclude that theirs is insufficient. We also note that some members are stationed in high-cost urban areas where they can trade a longer commute for lower rent or a larger home (e.g., stationed at the Pentagon and commuting from Stafford), and they may be dissatisfied if they are next stationed somewhere without that trade-off option.

Is the Mean, Median, or Another Percentile of the Housing Cost Distribution Appropriate?

In the general population, housing costs tend to have a longer tail to the right of the median than to the left, resulting in the mean being higher than the median.¹⁷ For example, Figure 6 shows the distribution of housing expenditures for three-person civilian households with income-less-expenditures in the same range as an E8 with 18 years of service or an O3 with six years of service (the 80th to 85th percentile of the civilian distribution). The mean is \$1,519 per month, higher than the median of \$1,405 per month. In this example, the mean corresponds to the 58th percentile.

Figure 6. Distribution of monthly housing expenses for three-person households in the 80th to 85th percentile of income minus housing expenses



Source: RCF Economic and Financial Consulting, LLC., generated from ACS 2017–2021 data.

¹⁷ This is common for many types of distributions that are limited to positive numbers because there is a limit to how low the numbers can go but not how high.

As part of the BAH sufficiency analysis, we compared the rental cost mean to its equivalent percentile for 352 different combinations of housing types and income-minus-rental-cost ventiles. The equivalent percentiles for those mean rents varied from the 48th percentile to the 63rd percentile, with the average being the 57th percentile.

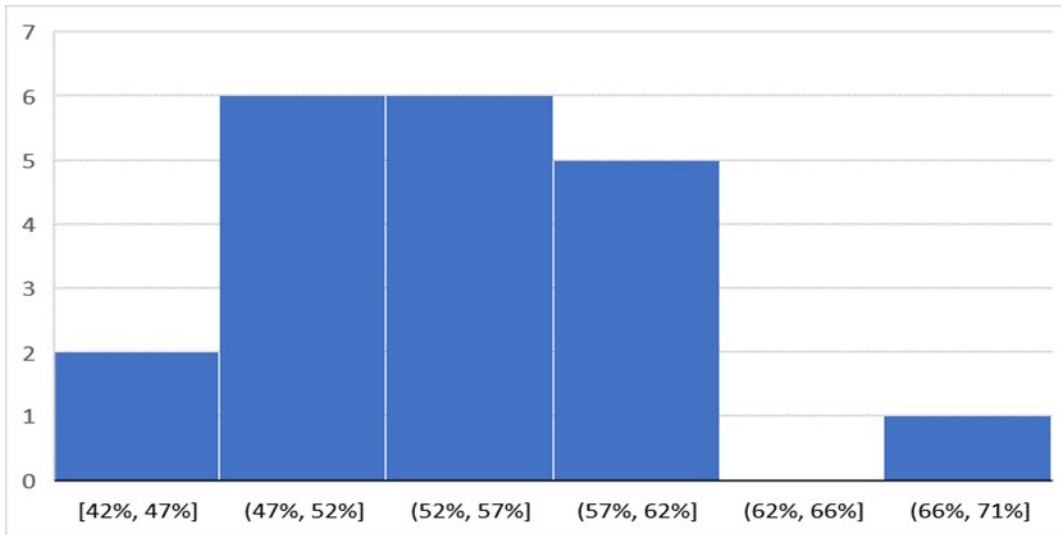
As an additional consideration, the BAH surveys exclude certain neighborhoods and typically have relatively small sample sizes. This can produce cost distributions with various and unexpected shapes. Although we do not have access to the raw data from BAH surveys conducted by Robert D. Niehaus, Inc., OSD Compensation determined the percentile that corresponds to the mean in 20 randomly chosen surveys (MHA-anchor point combinations). These 20 examples represent all six anchor points, all four Census regions, and communities ranging in size from Los Angeles, California, to Port Angeles, Washington. As shown in Figure 7, the means of these surveys correspond to anywhere from the 42nd to the 71st percentile of the survey. This is even more variable than the BAH sufficiency statistics based on the ACS survey.

Therefore, setting BAH rates according to means rather than medians would make members in some MHAs and paygrades worse off, and those who benefited would do so to an uneven degree. The survey in which the mean corresponded to the 42nd percentile was a survey of anchor point 1 (one-bedroom apartments) in Topeka, Kansas, indicating that in some cases the most junior and lowest paid members would be those adversely affected by this change.

If decision-makers are dissatisfied with the BAH rates provided by survey medians,¹⁸ it would be better to choose another specific percentile for setting rates. Doing so would raise or lower BAH in a consistent manner, whereas basing the rates on sample means would not.

¹⁸ Median values are equivalent to the 50th percentile of a sample population.

Figure 7. Percentiles corresponding to the average means for 20 BAH survey areas



Source: OSD Compensation analysis of BAH survey data gathered by Robert D. Niehaus, Inc.

Do Existing MHAs Contain Suitable Choices of Available Housing for Servicemembers?

Servicemembers have many reasons for choosing where they want to reside. Some want to minimize commutes to their assigned duty stations. Some want to minimize commutes for their spouses. Some desire their children to attend specific schools. Some choose to have long commutes in order to afford a larger home or to be close to family. Without specifically asking servicemembers for their reasons, we can only hypothesize.

Using data from the Defense Manpower Data Center (DMDC), we estimated that 92 percent of servicemembers reside in the MHAs of their assigned duty stations. Comparing DMDC and ACS data, we found that most servicemembers are residing in ZIP codes that have appropriate rental cost demographics.

Approach

We used two methods to determine whether the current MHAs contain suitable housing for servicemembers. First, we used DMDC data from October 2022¹⁹ to determine the percentages of servicemembers residing in their assigned MHA or commuting from a neighboring MHA. Second, we compared the ZIP codes where servicemembers reside to income and rental cost demographic data from the ACS to determine the relative quality of the neighborhoods servicemembers are choosing.

¹⁹ These data are from the DMDC BAH file and the Active Duty Personnel Master File. We chose the October 2022 data because that is the latest period that DMDC has data from all of the military services..

Findings

What we know about housing availability within existing MHAs

We estimated that about 92 percent of servicemember families reside within their assigned MHAs and 8 percent commute from neighboring MHAs.²⁰ This figure excludes BAH recipients whose residential ZIP code is neither in their BAH ZIP code nor an adjacent one because we could not distinguish between out-of-date residential address and true geo-bachelors.²¹

Of those servicemembers with dependents who choose to reside in neighboring MHAs, about 40 percent commute from MHAs with higher BAH rates (and presumably higher housing costs) than their duty station's MHA. Approximately 60 percent of servicemembers residing in neighboring MHAs choose MHAs with lower BAH rates (and presumably lower housing costs). Where MHAs are directly contiguous and non-trivial numbers of BAH recipients commute from a home in one to a duty station in the other, OSD implements data-sharing agreements so that rents in some ZIP codes are factored into calculating BAH for both MHAs.

We found a few MHAs with high shares of BAH recipients commuting from outside. Out of 300 MHAs, there are 28 with fewer than 70 percent of recipients living within the MHA, and 5 have fewer than half living within the MHA. These 28 MHAs are named for cities or counties rather than installations and tend not to be near any major military installation.

Quality of servicemember housing

Distribution of member ZIP codes relative to civilian peers

We can also indirectly assess some quality aspects of the locations chosen by servicemembers using data from the ACS from 2011 to 2021. We compared demographic data for the ZIP codes where servicemembers choose to reside within their MHA to data in the corresponding ACS ZIP Code Tabulation Areas (ZCTAs).²²

²⁰ This analysis excludes geo-bachelors whose residential ZIP code and BAH ZIP code are not in neighboring MHAs, suggesting their families reside in more distant locations.

²¹ Roughly a quarter of address ZIP codes for servicemembers with and without dependents were located more than 100 miles from their duty stations. We believe that some are geo-bachelors and that some records are not current; therefore, we exclude them from our statistics. Also, only one percent of personnel assigned to county cost groups (duty stations without MHAs) have residential ZIP codes that match the county to which they are assigned, which suggests sparse housing in those counties but also suggests many out-of-date addresses.

²² In most cases, the ZCTA is identical to the ZIP code for an area—but this is not always true. Therefore, we used a crosswalk linking ZCTAs to ZIP codes from the Uniform Data System (UDS) Mapper website.

For their BAH surveys, OSD Compensation tracks the subset of ZIP codes within MHAs where servicemembers reside. This subset of ZIP codes is commonly referred to in DOD as “Effective Market Areas” (EMAs). We matched the EMAs to their corresponding ZCTAs and ranked them among all the ZIP codes within specific MHAs. We ranked the ZIP codes by median gross rents and median incomes from the ACS.²³

The EMA ZIP codes typically had higher gross rents than the rest of the ZIP codes within the MHAs. This was true for 74 percent of the MHAs. Because rent is an indicator of housing quality and location desirability, this suggests that servicemembers are finding available housing in better areas within the MHAs.

Table 4 shows the range of differences between MHA ZIP codes within and outside of the EMAs. The largest differences came out to be +/- \$474, with the average across all MHAs being \$80.

Table 4. Range of average gross rent differences for MHA ZIP codes inside and outside the EMAs

	BAH MHA	BAH MHA name	Average gross monthly rent (in \$2022)		Difference (EMA minus non-EMA)
			ZIP codes inside EMA	ZIP codes outside EMA ^a	
Highest difference	RI256	Newport, RI	\$1,610	\$1,136	\$474
Median difference	IL335	Springfield/Decatur, IL	\$875	\$789	\$86
Lowest difference	CT051	New Haven/Fairfield, CT	\$1,478	\$1,952	-\$474
National average			\$1,163	\$1,084	\$80

Source: CNA generated using the Census Bureau’s Data Explorer tool.

^a Excludes MHAs that have no ZIP codes outside the EMA.

From these data, we found that servicemembers are usually finding housing in the more expensive ZIP codes within their MHAs. However, in some MHAs, they are choosing less expensive ZIP codes. In the 74 percent of MHAs where servicemembers choose more expensive ZIP codes, it is by an average rent difference of +\$139. In the 26 percent of MHAs where they choose less expensive ZIP codes, it is by a difference of -\$88. Altogether, these numbers provide

²³ The specific methodology used was to download selected pre-generated tables from the Census Bureau’s Data Explorer tool to obtain data on median gross rents (includes contract rent plus additional costs for utilities (i.e., water, electricity, and gas) and fuels) and median incomes. These data are available at the ZIP code tabulation area (ZCTA) level and derived from the ACS 5-Year Estimates Subject Tables.

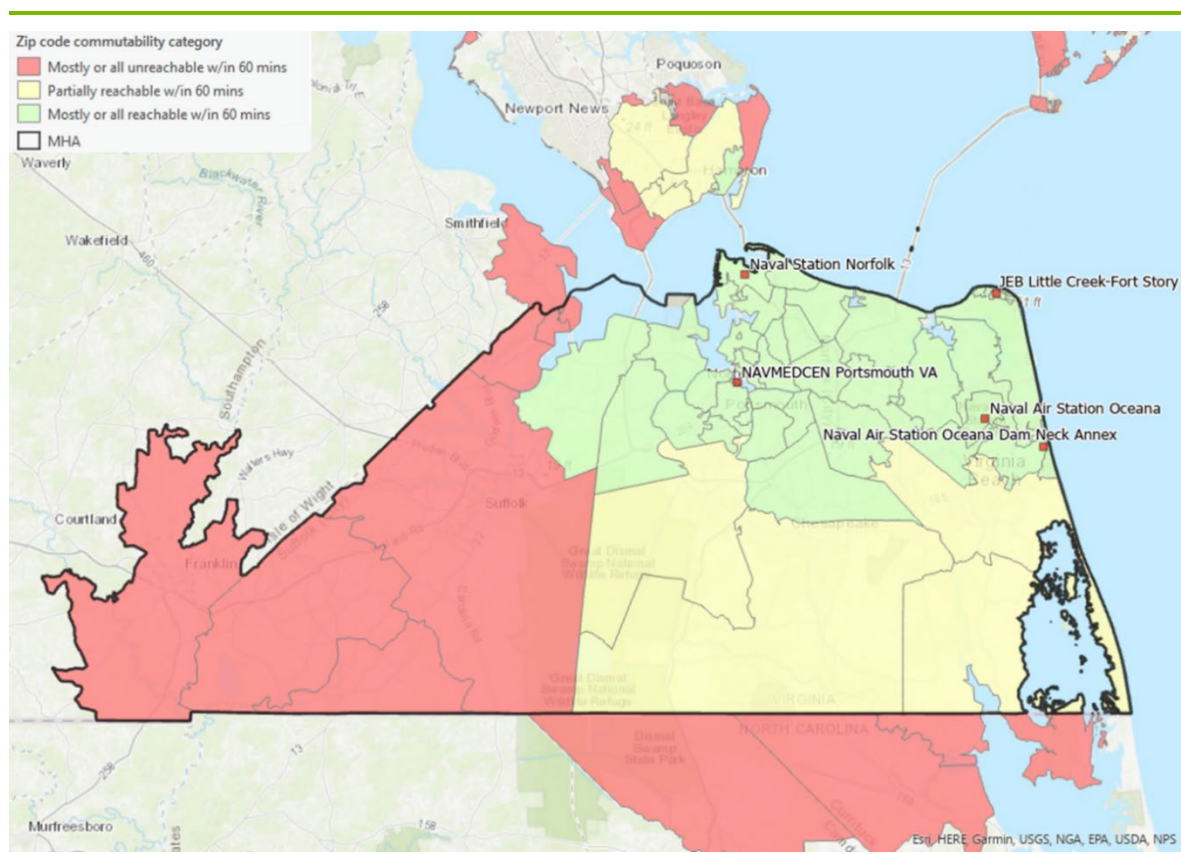
a national average of servicemembers residing in EMA ZIP codes with rents that are \$80 more than the other MHA ZIP codes.

Commuting times

MHAs are intended to provide suitable housing areas with reasonable commutes for servicemembers. Reasonable commuting times are not precisely defined, but we interpret them to be within a 60-minute drive during typical rush hours.

Estimating commute times to duty stations using MHA boundaries is complicated by their size and the distances between installations in some MHAs. We provide an example in Figure 8 as a demonstration of the geospatial analysis that is possible for MHAs. ZIP codes shaded red are mostly outside a 1-hour commute radius for at least one primary installation.

Figure 8. Commute times for Norfolk/Portsmouth, Virginia, MHA (VA 298)



Source: CNA generated from overlapping 60-minute driving isochrones of primary military installations within the MHA.

Installations near MHA boundaries

We do not know the reasons for the choices BAH recipients make regarding where to live. Servicemembers who choose more expensive MHAs may have working spouses who add to the family's income, or they may not be able to find suitable housing in their assigned MHA. Servicemembers who commute from MHAs with lower housing costs may do so in order to afford a larger home than the BAH standard. Without a specific survey, focus group, or other data collection process, it is not possible to know for certain.

Sometimes, a base installation may not be in the center of the MHA, but closer to the boundaries. As a result, servicemembers may have reasonable commutes from neighboring MHAs. If that neighboring MHA has lower housing costs, then a member commuting from there should have sufficient BAH. However, this proximity to the boundary could be problematic if the neighboring MHA has higher housing costs.

How Suitable Are the Six Standard Housing Profiles to the Average Family Sizes of Servicemembers?

We compared the BAH housing profiles to the demographics of military families. For the great majority of families, the number of bedrooms provided by BAH should be sufficient. For a married couple who would like each of their children to have a separate bedroom, the BAH housing standards should be sufficient for 69 to 90 percent of military families depending upon paygrade.²⁴

We estimated the costs of changing the BAH profiles to different standards, some depending upon family size. Depending on the standard chosen, the rough estimate of the additional cost ranges from a high of \$2 billion to a potential savings of \$1 billion per year.

The problem of BAH not providing enough bedrooms for larger military families has been lessening over time. Similar to civilians, servicemembers are choosing to delay marriage and have fewer children. If these trends continue, it will have important ramifications for BAH and the demand for other family-related benefits.

The original NDAA request was to evaluate the suitability of the housing profiles in relation to average family sizes disaggregated by uniformed service, rank, and MHA. However, we could evaluate this only in relation to DOD-wide family sizes disaggregated by rank. Data were not available to disaggregate the results by uniformed service and MHA.

Background and approach

BAH was designed so that servicemember families could afford to rent similar quality homes regardless of where in the US the servicemember was assigned. Therefore, BAH standards need to be specified for each paygrade with corresponding rents estimated throughout the nation.

²⁴ In practice, the number of bedrooms that a given paygrade rates when calculating BAH does not determine the size of home that the member will rent or buy, even if the member spends exactly their BAH on housing each month, because the number of bedrooms is one of several factors (e.g., quality of neighborhood, proximity to amenities, and age of structure) that determine a unit's price. A member receiving BAH at a rate meant for more bedrooms who has fewer dependents may choose a more expensive location, and vice versa.

Servicemembers are not required to rent these types of homes, but if they choose to do so, the median price of their paygrade's housing standard should be covered by the servicemember's BAH and absorption amounts. This policy is in contrast to the assignment policy if the servicemember family chooses to reside in on-base privatized housing. There, the unit provided for that servicemember's BAH rate (without any absorption amount) depends upon family size.

We compared the current BAH housing standards for members with dependents to the 2023 family-size statistics reported by the OSD (Personnel and Readiness), Directorate for Compensation [8].²⁵ We considered the implications of these family sizes if each child had their own bedroom, or if the number of bedrooms followed on-base housing standards, which allow children under 10 years old to share with a sibling of the same gender and children under 6 to share with a sibling of either gender [11-12].

We also examined the economic literature and ACS data to examine whether housing expenses increase with household size. We used cost and demographic averages from OSD Compensation to estimate rough costs for increasing BAH to match on-base housing standards. The detailed rules for adjusting each member's profile based on family size are found in Appendix E.

Finally, we looked at longer term demographic trends to assess whether potential problems between family sizes and BAH standards have been growing or diminishing over time.

Findings

Adequacy of the BAH housing profiles

Appendix D shows the current distribution of family sizes by paygrade for BAH recipients with dependents to the 2023 family size statistics reported by OSD (Personnel and Readiness).

If we assume that the first dependent is the servicemember's spouse and that it is desirable for children (assumed to be any subsequent dependents) to have separate bedrooms, then these BAH standards have bedroom numbers that are sufficient for between 69 percent and 90 percent of servicemember families for their respective paygrades (94 percent for O7s, though officers of flag rank typically live on base). There is no simple pattern in the relationship between paygrade and this adequacy metric because as members become more senior, their families tend to grow and their housing profiles do as well.

²⁵ We used the annually published Selected Military Compensation Tables, or "Green Book."

The military's on-base housing standards, however, do permit children to share bedrooms depending on age and gender. Appendix D also shows the different percentages of each paygrade for which the BAH standards provide sufficient numbers of bedrooms based on whether children can share bedrooms. (It varies by paygrade based on the assumptions made regarding the age of the family's children.) We estimate that between 82 percent and virtually 100 percent of servicemember families have sufficient bedrooms for their family size based on bedroom sharing rules.

Servicemembers without dependents

For servicemembers without dependents, the BAH housing standards are usually higher than on-base standards. The BAH standards for enlisted servicemembers range from a one-bedroom apartment for E1s to E4s up to about halfway between a two- and three-bedroom townhouse for E9s. These are better than barracks standards, where servicemembers typically must share a bedroom until E5 and do not get their own bathroom until E7. The lowest BAH housing standard includes a bathroom, a full kitchen, and more than one room.

Comparison with civilian housing choices

From academic literature, we found that within a specific income level, civilian households with more children tend to increase their housing expenses by very little or not at all [13-14]. In examining ACS data, we found a small increase in housing expenses within income levels as household size increases. The average amount was \$36 per additional person after the first two people. This increase appears small enough that it may only be due to increased utility costs. Based on these findings, the with-dependents BAH policy of providing one rate regardless of family size appears to be consistent with the civilian population.

Cost estimate of aligning BAH with on-base standards

We estimated the costs of aligning BAH with on-base housing standards for servicemembers with dependents. These cost estimates are rough and include all military paygrades through O6.

To adjust BAH recipients' housing profiles as a function of family size so that BAH provides one bedroom for each child (up to a four-bedroom single family detached home, as that is the largest BAH profile) for all military paygrades, the cost would be approximately \$1.1 billion per year. To increase BAH so that it corresponds to the on-base standard that younger children can share a bedroom, the cost would be roughly \$340 million per year.

Current on-base and privatized housing mostly consists of three- and four-bedroom units [3]. Some two-bedroom units are available, but servicemembers who accept these smaller units

tend to be given discounts from their BAH rates. This suggests that a three-bedroom unit has become the de facto minimum standard for privatized family housing. The cost to increase BAH rates to match this de facto standard of three bedrooms for most and four bedrooms for larger families would be roughly \$1.8 billion per year.

Finally, many smaller military families receive extra bedrooms by residing on base and through the BAH standards. For example, a married couple with one child would be entitled to only a two-bedroom home if based solely on family size. If DOD changed BAH rates to precisely match family sizes (both for larger and smaller families, but with a two-bedroom minimum for members with dependents), we estimate that it would result in a net annual *savings* of \$1 billion because more BAH recipients would experience a reduction than an increase.²⁶ Table 5 summarizes the estimated costs for these hypothetical BAH alternatives. It applies only to members with dependents; we assume DOD would not reduce BAH for members without dependents to match their on-base housing standards.

Table 5. Estimated costs for alternative BAH standards

Alternative BAH standards	Estimated Changes to DOD’s annual BAH costs
Current BAH costs (2023 estimated)	\$26.8 billion ^a
Increase BAH to cover 1 bedroom per child up to 4-bedroom home	\$27.9 billion (\$1.1 billion higher)
Increase BAH to correspond with on-base bedrooms per child with sharing permitted for younger children	\$27.1 billion (\$0.34 billion higher)
3-bedroom de facto on-base standard with 4 bedrooms for larger families	\$28.6 billion (\$1.8 billion higher)
Strict family-size BAH standard with shared bedrooms for younger children	\$25.8 billion (\$1.0 billion savings)

Source: CNA analysis base on Selected Military Compensation Tables, Jan. 1, 2023 [8].

Does not include members without dependents.

^a Source: DOD Press Release, “DOD Releases 2023 Basic Allowance for Housing Rates,” Dec. 14, 2022 [15].

These rough estimates are all based on average BAH costs per paygrade listed in the Selected Military Compensation Tables [15]. They do not adjust for the distribution of family sizes

²⁶ This assumes that children can share bedrooms consistent with the rules for on-base privatized housing. If instead a one-bedroom-per-child rule is used in combination with smaller family sizes, the savings would be less at an estimated \$234 million per year.

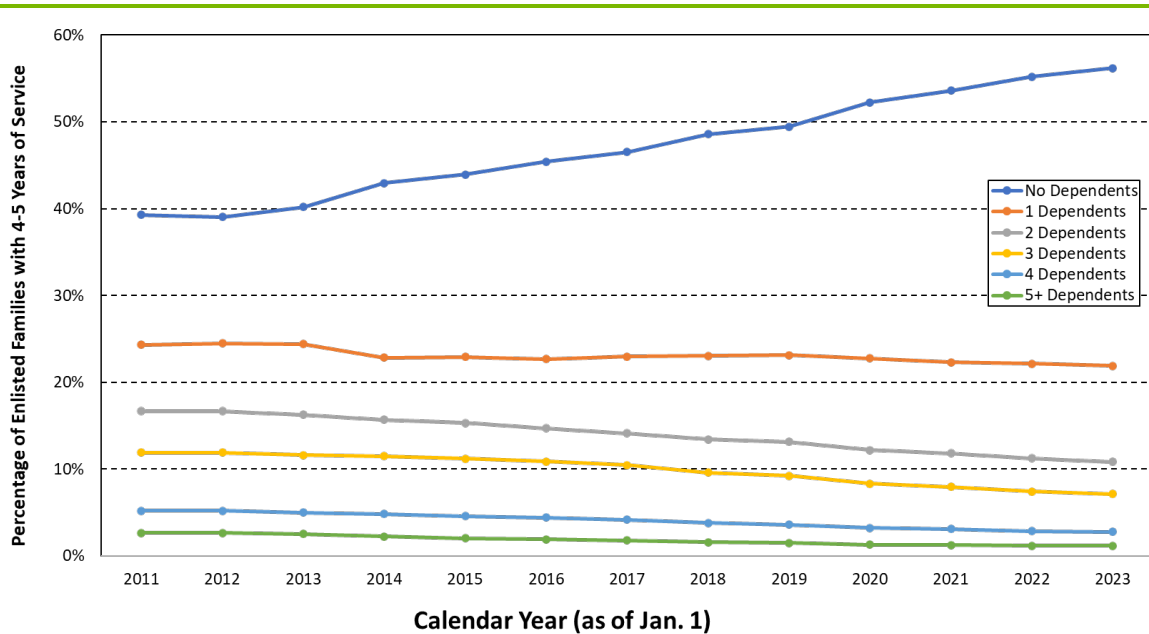
across different MHAs. They also do not adjust for any changes to servicemember family-size choices due to receiving additional BAH payments for larger families.

Has this problem been increasing or decreasing over time?

Congress is concerned about families being inadequately housed based on the number of bedrooms in their BAH profiles, but this issue is becoming less of a problem over time. Using the Selected Military Compensation Tables, we examined family-size trends in the military from 2011 through 2023. Military servicemembers reflect the trends seen in the rest of the US population—they are deciding to marry later and have fewer children.

Figure 9 shows the trends in the number of dependents for enlisted servicemembers with 4 to 5 years of service. The number of single servicemembers increases consistently and dramatically from 39 percent to 56 percent between 2011 and 2023. Those servicemembers with two or more dependents decrease from 36 percent to 22 percent over the same period.

Figure 9. Number of dependents for enlisted members with 4 to 5 years of service, by calendar year



Source: CNA generated from Selected Military Compensation Tables [8].

Although Figure 9 shows data for only enlisted servicemembers with 4 to 5 years of service, we found similar trends for other years of service and within paygrades.

However, in all age ranges from 21 through 60, military heads of household tend to have more dependents than civilian heads of household the same age according to the ACS. Therefore, although they are following civilian trends, military servicemembers still marry younger and have more children than civilians.

We have not seen other analyses that identify these trends in marital and family-size choices. If these trends continue, they will have important ramifications not just for the adequacy of the BAH standards but also for BAH budget estimates, the demand for on-base and privatized housing, and the demand for other base services, such as childcare centers and medical facilities.

How Flexible Is BAH to Respond to Changes in Real Estate Markets?

BAH simply was not designed for rapid surges in the housing market, such as the surge that occurred in 2021 and 2022. Its responsiveness over longer time horizons is much better: at a national average level, BAH has risen at least as much between 2006 and 2023 as other government-generated indices of housing costs.²⁷ The exception is four-bedroom homes, for which average BAH growth between 2006 and 2023 was slightly lower. However, BAH comes with a built-in time lag of about 6 months at the beginning of the year and about 18 months by the end of the year because it is based on rents surveyed between March and July of the previous year. Therefore, during 2021 and 2022, this lag resulted in its relative changes falling far behind in some markets in the short run. We note that private-sector wages also failed to keep up with rising housing costs during those years, so military families were far from the only Americans struggling with inflation.

Approach

First, we examined whether BAH growth over time has exceeded, matched, or failed to keep up with other government-generated measures of housing cost on average. These include the HUD estimate and the rent of primary residence component of the CPI calculated by the Bureau of Labor Statistics (BLS). We did this by normalizing all cost measures to 100 in 2006 and tracking their value as a percentage of this initial amount. The CPI measure of rent of primary residence does not break out prices for different types of homes and includes utilities only if they are included in the monthly rent payment. However, the HUD estimates median rents separately for different numbers of bedrooms (studio through four-bedroom) and includes all utility payments associated with the home, as does BAH.²⁸

Then, we considered how BAH changes in the last three years have kept up with recent price surges (as measured by commercial indices), and we looked at San Diego as an example (discussed in the next subsection).

²⁷ These include HUD estimates of the 50th percentile rent and the CPI rent of a primary residence.

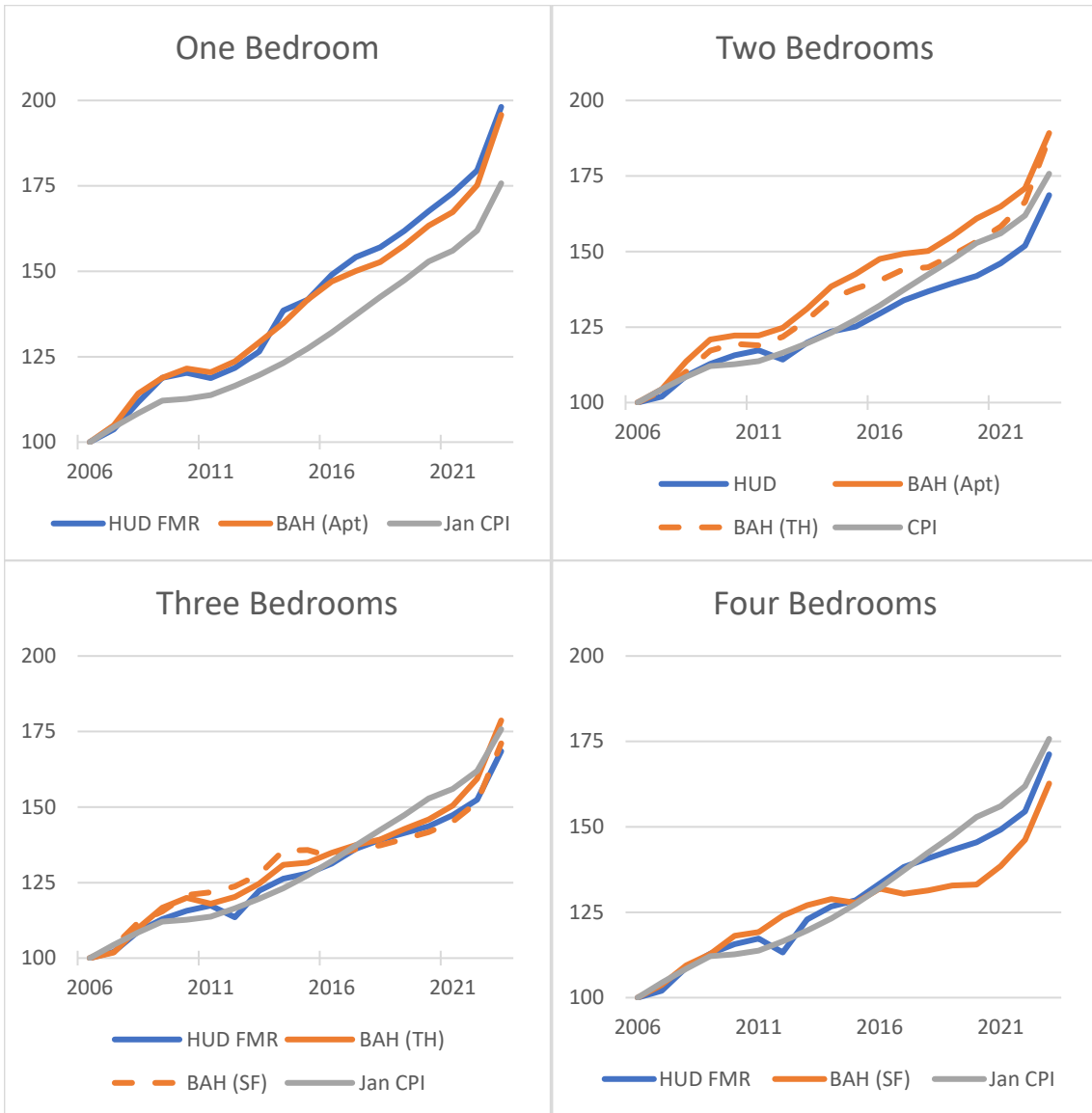
²⁸ BAH and the HUD measure include water and energy consumption by the home but not entertainment, such as internet and cable TV.

Findings

We see from Figure 10 that BAH costs grew by the greatest amount in this period for the smallest rental units (and vice versa).²⁹ However, BAH did not consistently outpace or lag HUD 50th percentile growth. The two measures tracked closely for one-bedroom and three-bedroom dwellings, BAH grew more quickly for two-bedroom dwellings, and HUD Fair Market Rent (FMR) grew more quickly for four-bedroom dwellings starting in 2015 (during a period from 2015 to 2020 in which BAH barely increased at all).

²⁹ BAH measures were created by averaging the costs at each anchor point corresponding to a given dwelling type and bedroom number, and by weighting by the number of servicemembers corresponding to that anchor point in each MHA as of FY 2022. Since anchor points depend on the presence of dependents, servicemembers whose dependent status was unknown were omitted from these calculations. Duty MHA was used for all servicemembers except those both listed as receiving BAH at their residence and with a known MHA of residence who were assigned to their duty MHA. When a given dwelling type and number of bedrooms had separate anchor points for servicemembers with dependents and without dependents, BAH values and servicemember counts with dependents were used.

Figure 10. Comparison of cost indices, normed to 2006



Source: CNA analysis of data from the US Department of Housing and Urban Development and the US Bureau of Labor Statistics.

Abbreviations: HUD = US Department of Housing and Urban Development; FMR = Fair Market Rent; Apt = Apartment; TH = Townhouse; SF = Single Family House; CPI = Consumer Price Index

However, these are long-term trends, and BAH’s short-term flexibility is another issue. By statute, BAH rates update when basic pay updates, which occurs once per year in January [2]. As a result, from January through December of a calendar year, BAH payments are based on the prices sampled between March and July of the previous calendar year. As a result, BAH rates have a lag of at least 5 months the day they take effect, and of at least 17 months by the end of the year.

Ordinarily, the effect of this lag is small relative to the volatility in BAH and to the other factors that drive how much members pay for housing. Between 2006 and 2020, the CPI index of rent on primary residence rose 53 percent, equivalent to an average compounded rate of about 3 percent per year. However, between 2020 and 2023, this measure grew at an average of 4.8 percent per year, and the increase was much higher in some markets. We will demonstrate this by showing percentage changes from January 2020 for a BAH anchor point (the E5 with dependents BAH that is supposed to cover a two-bedroom townhouse) and a more responsive commercial index of rents.

Let us take San Diego as an example. As shown in Table 6, by July of 2023, a commercially generated index of rental prices in the San Diego metropolitan area had risen 39 percent since January of 2020. BAH for an E5 in 2023 had not quite grown at the same rate but was still 33 percent higher than in 2020. By 2022, observed rents had risen 22 percent by January of that year and 33 percent by July of that year (from a 2020 baseline), but BAH was less than a percent higher than 2020 and actually *lower* than it had been in 2021. BAH simply was not designed for rapid surges in the market such as this. Members rotating into this MHA in 2022 and still receiving essentially the same BAH that their predecessors there received two years earlier would not be able to find the same quality of housing as those predecessors because BAH had not kept up with local rents.

Table 6. E5 with dependents BAH change from 2020, San Diego MHA, and commercial rent index for same market

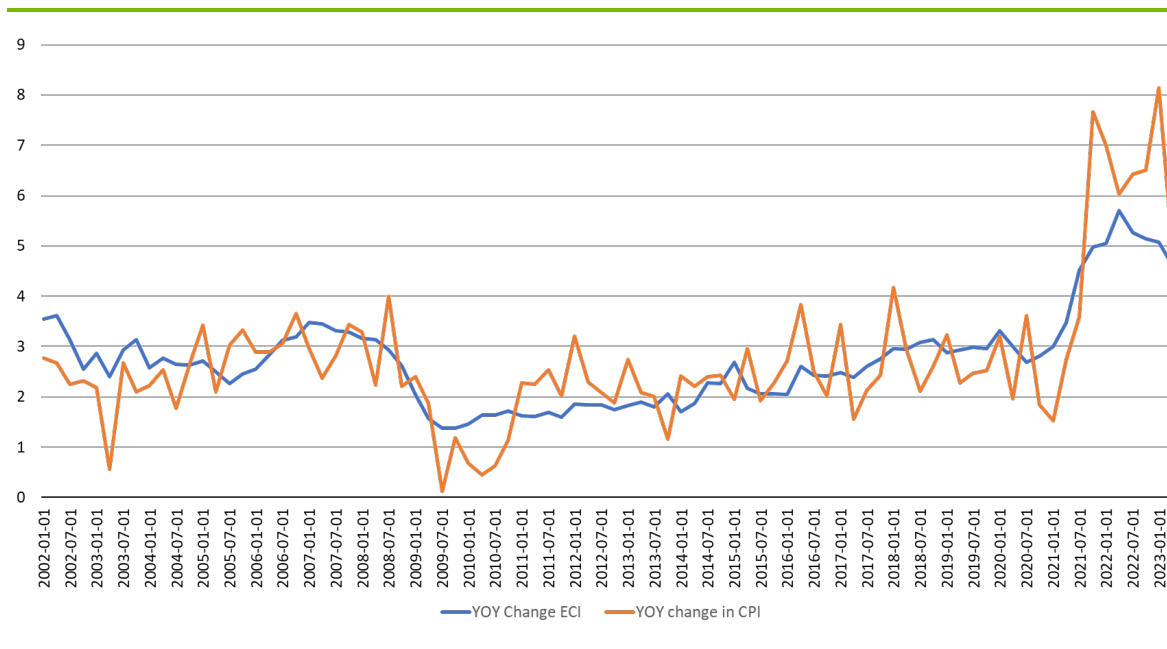
	Jul 2020	Jan 2021	Jul 2021	Jan 2022	Jul 2022	Jan 2023	Jul 2023
E5 BAH year-on-year (YOY) change	N/A	3.5%	N/A	-2.6%	N/A	32.1%	N/A
E5 BAH change from 2020	N/A	3.5%	N/A	0.7%	N/A	33.1%	N/A
Zillow Observed Rent Index (ZORI) YOY change	1.1%	3.5%	12.5%	17.9%	18.1%	8.6%	4.6%
ZORI change from Jan 2020	0.1%	3.5%	12.6%	22.0%	33.0%	32.5%	39.2%

Source: CNA generated from OSD Compensation-provided BAH rates and the Zillow-generated ZORI index.

Private-sector wages and inflation

During the rapid market fluctuations of 2021 and 2022, private-sector wages did not keep pace with inflation either, so if this is a failing of BAH, it is not unique to BAH or to the public sector. Figure 11 shows that although wages and consumer prices mostly moved together between 2002 and 2020 (though inflation dropped in 2009 and 2010 and caught up in 2011 through 2013), the surge in consumer prices (inflation) from 2021 through 2023 was well above wage growth [16]. We also note that this measure of income is before taxes and transfers and that both civilians and military personnel received large non-wage transfers from the government.

Figure 11. Yearly wage increases versus median CPI (inflation) for US private-sector workers



Source: CNA generated from Federal Reserve Economic Data [16].

Note: ECI is employment cost index: wages and salaries: private industry workers.

In fact, there has been a long-term trend of housing becoming increasingly unaffordable for civilians, as measured by its growing share of their total household expenditures. Shelter made up 28.1 percent of an average consumer basket of goods and services in 1994, and it had risen to 33.5 percent by 2019, *before* the COVID-19 surge [17]. We will discuss some drivers of this surge in the next chapter.

Responsiveness to utilities costs

Finally, utilities are a component of BAH and require their own estimation methodology. Currently, this estimate is based on the ACS, which asks households how much they spend on electricity, gas, water, and fuel. The 5-year moving average in the ACS means that these data have a lag of 2 to 7 years, so the contractor that prepares the estimates compensates for this lag using the fuels and utilities component of the CPI [18]. Using inflators to approximately compensate for the lags in the BAH process is a reasonable approach and one used by other indices as well. However, in the case of utilities, we note that public utility companies publish their current rates, so a more direct approach to estimate changes in utilities costs for an MHA could involve the military housing office (MHO) looking up the rate adjustments of the local utility providers, with some OSD oversight of this process.

How Do Residential Real Estate Processes Determine Rental Rates?

Residential rental rates are estimated based on a combination of factors that can vary by location and over time based on the real estate market. Supply and demand dynamics depend on economic conditions such as inflation, population growth, housing supply, federal interest rates, and other factors. Some of the key factors that landlords or property managers consider when estimating rental rates include the following: location (e.g., safety of the neighborhood, proximity to public services such as public transportation, school districts, employment), the property type, the size and layout of the property (e.g., number of bedrooms, bathrooms), the condition and quality (e.g., age, recent remodel or renovations, amenities), operating costs (e.g., taxes, mortgage payments, utilities, maintenance costs, homeowners association fees, property management costs), historical demand and rent from comparable properties in the neighborhood, and seasonal variation [19].

Local regulations and rent control ordinances can limit how much landlords can increase rents. For example, landlords in California cannot raise rents by more than 5 percent plus the percentage change in the CPI, with a maximum allowable increase of 10 percent every 12 months [20]. When calculating rental increases, landlords have flexibility (within local regulations) in calculating the percent of rent increase, but typically landlords increase rent by around 3 percent each year [21]. Landlords need to find a balance between increasing rent to cover increasing operating expenses (e.g., increasing home insurance premiums) and keeping good renters in place.

We found that government indices, including those produced by HUD and the BLS, have lags relative to commercial indices, and that large housing providers and their investors now use tools with forecasting capability that have the potential to help DOD set BAH rates, as we will discuss in a later chapter. We also found that because of the importance of a property's location to its market value, the implied assumption in BAH policy that a house is more expensive than a townhouse is not accurate on average.

Approach

We learned of alternate measures of housing cost used by the market through discussions with HUD and with the American Apartment Owners Association (AAOA) and through internet searches. For qualitative information about how lessors set prices, we spoke to an AAOA

representative. We compared changes in government and commercial indices over time, both at the national average level and in specific local markets, to examine both the volatility and responsiveness of the government estimates. We also examined recent academic and professional writings about drivers of the recent volatility in the housing market. Finally, we used ACS data to compare the observed average prices of different housing profiles and determine whether their relative prices are in the same order that BAH implicitly assumes they should be.

Findings

State of the market and available tools

Many in the real estate industry, including the AAOA, expect that the current trend of delayed home ownership will continue and that the housing shortage will mostly be addressed through the increased supply of rental units, especially since numerous city- and state-level tax, financial, and regulatory incentives are encouraging the construction of multifamily buildings [22-24]. Given the high demand and low inventory of existing homes, the rising mortgage rates, the tendency of real estate investors and corporations to outbid first-time home buyers, and the supply chain issues making it more expensive to construct new homes, prospective homeowners are continuing to rent for longer, and investors are betting on a “renter nation.” In many real estate markets, rental unit supply is catching up with the demand, and rental prices are starting to level off.

When we asked about how suppliers know what to charge for new construction that has not been priced before, the AAOA said the priority is to fill the property, so they err to the low side. Then they can raise rates incrementally on existing tenants and experiment one at a time with higher rents as units become available for new tenants. Currently, suppliers have more freedom to raise rents for new tenants, which is one reason for the recent mover premium in our methodology for comparing BAH to expenditures for comparable civilians.

To estimate rental rates, property owners and real estate professionals typically conduct local real estate market research and consider the various factors described above. Many property managers also use online rental estimate tools such as Zillow’s Rental Manager, Rentometer, TruVest, and RentCast to estimate what they can charge for their rental property. Some companies utilize proprietary algorithms based on public property data and rental property listings, or they may use other tools to gather average or median rental statistics by ZIP code and rental comparables by entering a specific address. Real estate professionals, developers, and investors often use subscription-based real estate management services offered by RealPage, Yardi, CoStar Group, Moody’s Analytics REIS, and CoreLogic Inc., which provide

analytic products, consulting services, property management software, and market insights and trends based on forecasts.

Comparison of government and commercial indices

Rent is a major contributor to inflation, which accounts for the biggest proportion of the CPI—34 percent consists of spending for shelter [25].³⁰ Based on the latest data from the BLS from August, the July shelter component was the largest contributing factor for both the overall inflation increase and the core inflation increase.³¹ CPI shelter was up 7.7 percent over the 12-month period ending in July 2023 [26].

However, the CPI has a lag in how rental data are reflected due to the annual cycle of lease renewals. Since most leases last for a year, a renter's cost stays the same over the course of the year, and it will take a year to have a clearer picture of the changes in the rental market.

Housing rental market indices can be used to track and analyze trends in the rental market, though not to directly set BAH rates because they do not align with MHAs and do not exclude neighborhoods inappropriate for servicemembers or identify spending of comparable civilians. Many prominent indices often give different measurements of rental inflation. We provide a summary of available US rental growth indices and their methodologies in Appendix F.

The BLS conducted a study comparing new indices they created using a repeat rent index methodology using BLS rent microdata and found that the discrepancy between the CPI and many notable alternative indices such as ZORI, the MRI, and the Single Family Rent Index (SFRI) is almost entirely explained by differences in rent growth for new tenants relative to the average rent growth for all tenants. The authors found that indices calculating rent inflation for new tenants lead the BLS rent inflation by 1 year [27].

Exploring differences in rental indices: year-over-year changes and trends over time

In this next section, we explore how these rental indices differ, comparing the ZORI, Apartment List Index, HUD 50th percentile rents, CPI rent of primary residence, and BAH Anchor Point data. We compare year-over-year changes in growth and normalized indices showing cumulative change from the baseline in January 2017 (the first year Apartment List data were

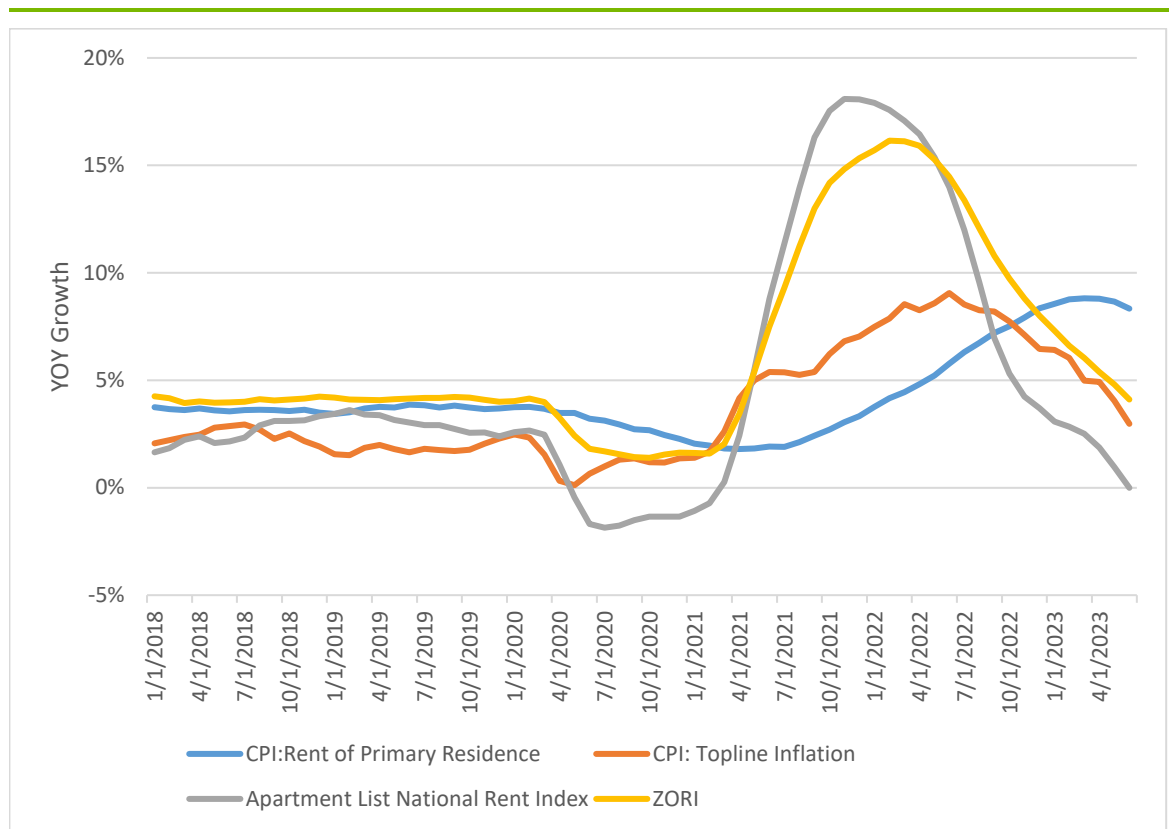
³⁰ The shelter component of CPI includes both rent of primary residence and owner's equivalent rent of primary residence, in addition to insurance and temporary shelter while traveling.

³¹ Core inflation excludes food and energy from the market basket.

reported). We present national-level comparisons and provide examples from select MHAs for which we had CPI rent data for a matching CBSA.

Figure 12 compares CPI data with Apartment List national rent index and ZORI year-over-year increases by month from January 2018 to June 2023. ZORI and Apartment List peaked between November 2021 and March 2022 with up to 18 percent year-on-year (YOY) growth. Topline CPI inflation peaked in June of 2022, and the CPI for rent peaked in April of 2023 at 8.8 percent YOY growth and is just starting to recede.

Figure 12. Year-over-year growth in Apartment List rent index versus ZORI versus CPI (rent) versus CPI (overall)

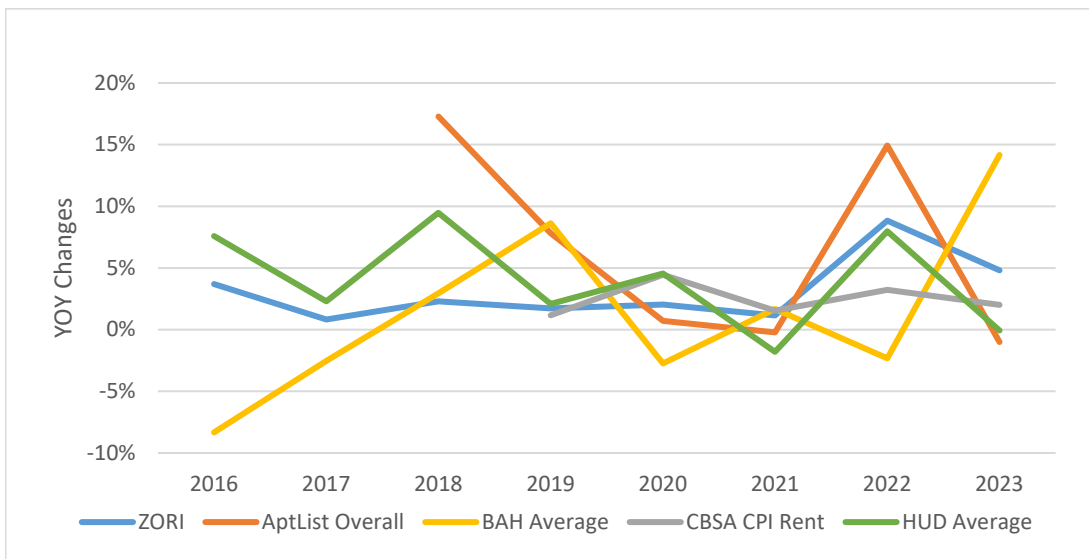


Source: CNA generated from Zillow, Apartment List, and Bureau of Labor Statistics indices.

We observed that there is more volatility in the BAH YOY changes compared to the ZORI, Apartment List, and CPI rent indices. We observed pre-pandemic volatility with greater than 10 percentage point differences in BAH YOY changes in a number of metropolitan areas, including Atlanta, Boston, Chicago, Honolulu, New York, and St. Louis. Some MHAs also have

fluctuating YOY trends with positive growth one year and negative growth the following year, including Anchorage, Boston, Chicago, Dallas, Detroit, Honolulu, New York, and Philadelphia. The CPI rent, ZORI, and Apartment List indices have tended to consistently have positive rental growth, except in 2021. Figure 13 shows the example of the Honolulu market, where average BAH fell in 2022 at the same time that commercial indices were spiking.

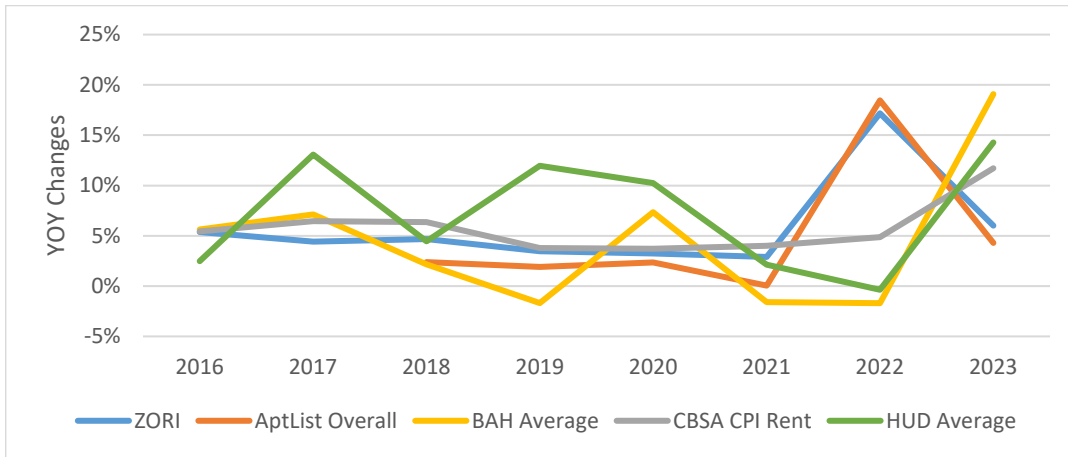
Figure 13. Year-over-year growth for MHA HI408: Honolulu County, Hawai'i



Source: Zillow, Apartment List, DOD, BLS, HUD.

We also observed pre-pandemic HUD volatility (greater than 10 percentage point swings in YOY changes), which was greatest in Boston, Dallas, Denver, San Francisco, and Seattle. The HUD estimates were typically more volatile from year to year than the ZORI or Apartment List indices, as shown in the example of Dallas in Figure 14. This volatility is likely due to the way DOD and HUD calculate their rental estimates each year and make adjustments, rather than being reflective of what was actually occurring in the rental market.

Figure 14. Year-over-year growth for MHA TX277: Dallas, Texas



Source: Zillow, Apartment List, DOD, BLS, HUD.

Due to the COVID-19 pandemic, rising home prices, rental property shortages, and subsequent inflation, rental costs have significantly shifted over the past few years. Across all the MHAs, we observed that ZORI and Apartment List indices sharply increased in YOY growth in 2022, with up to 20 percent YOY increases (e.g., Atlanta, New York, and Seattle); these increases were higher than BAH, CPI, or HUD YOY growth. However, in 2023, when the ZORI and Apartment List YOY increases slowed, we observed that BAH, CPI, and HUD had larger increases in YOY growth. This finding is consistent with what we found in literature, due to the inherent lag in how CPI, HUD FMR, and BAH are calculated.

Recent pandemic-related effects on home prices

A number of economic factors have changed during and since 2020, including households' cash on hand and their spending on such things as experiences and non-perishable goods. Two things that have affected housing markets in particular are remote work and interest rates. The ability to relocate and work remotely reduced demand for housing in some places and increased it in others, but overall appears to have increased house prices [28-29]. Also, higher interest rates increase the cost of purchasing a home and reduce incentive to sell one, which raises the demand for rentals and therefore puts upward pressure on rents [30].

Does BAH drive rental costs?

Some suspect that the BAH rates themselves determine rents in certain locales. It has been claimed that landlords raise rents in response to BAH rates. Although it is true that landlords will provide a quality of housing that is appropriate to their customer base, it is unlikely they have enough power to set rents in specific markets. Servicemembers also have an incentive to choose housing appropriate to their compensation and to bargain with landlords whenever possible because the amount of BAH they receive is independent of what they spend on rent.

We are aware of only one study that examined the effect of BAH changes on changes in observed market rents. That CNA study was published in 2002 and examined the housing markets in Oahu, Hawai'i, and in Clarksville, Tennessee, near Fort Campbell [31]. It considered the degree of competition among landlords in the local area, the flexibility of supply (housing supply near Fort Campbell had grown significantly in the previous decade), and past estimations of the income elasticity of housing demand (i.e., how much households increase their expenditure on rent for each dollar of additional income). It also directly estimated the effect of BAH increases on rents in these markets by comparing areas with higher and lower military densities within the MHA, and it found little effect. The study also noted that the Overseas Housing Allowance, which depends on how much the recipient actually spends on rent, is much more likely to affect rents.

The six BAH profiles versus the reality of the market

Finally, we note that the supply and demand conditions that drive the residential real estate market do not necessarily align with the assumptions underlying the six housing profiles. The BAH policy that ties profiles to paygrades implicitly assumes that a four-bedroom single family dwelling is more expensive than a three-bedroom single family dwelling, which is in turn more expensive than a three-bedroom townhouse or duplex, and so forth.

In practice, BAH surveys sometimes produce cost estimates for the different anchor points that do not line up in this order for a given MHA. If left uncorrected, these “inversions” would result in some members receiving less BAH than members in a lower paygrade in the same MHA. BAH policy places all paygrades in an order such that an E6 with dependents receives more BAH than an O2 with dependents and less than a W1 with dependents, and so on.³² So, if the estimated cost of a three-bedroom townhouse is higher than that of a three-bedroom single family dwelling in an MHA, OSD must adjust these estimates to ensure not only that a W3 with

³² The ordering is different for members without dependents than members with dependents, and E1 through E4 all receive equal BAH.

dependents receives more BAH than an E6 with dependents, but also that there is enough separation between them for the seven intervening grades (W1, E7, O1E, W2, E8, O2E, and O3) to each receive more BAH than the grade below.

Analysis of ACS data reveals that these “inversions” are not deviations from the norm but, in fact, the norm for the private market. Average monthly rent nationwide for a three-bedroom townhouse or duplex (\$1,456) is greater than for a three-bedroom detached house (\$1,183).³³ In fact, in an area covered by North Dakota, South Dakota, Montana, and Wyoming, it is much more expensive even than a four-bedroom detached house (\$1,141 versus \$774). This is nearly the case in Arkansas, Mississippi, Oklahoma, and Alabama as well. The reason is that townhouses tend to be in more expensive locations that are closer to amenities and more employment opportunities.

Some indices of housing costs apply only to apartments or only to single family dwellings, but the HUD 50th percentile estimate applies to all housing types and breaks them out by number of bedrooms only. Given the differences across markets in the relative cost of a detached home and an attached home, an approach using four anchor points instead of six may be more suitable to define BAH profiles and calculate BAH rates.

³³ These are 2021 prices.

Feasibility of Including School District Information in Calculating BAH

There are two ways to interpret how and why school quality could affect the calculation of a suitable BAH rate. One is a comparison of school quality within an MHA to ensure that BAH covers the cost of housing in the areas with better schools, which in most cases would tend to be in higher cost areas. We have determined that BAH recipients tend to live in higher cost ZIP codes than the civilians in their MHA. The other is a comparison of school quality across MHAs to compensate members who have been assigned to an installation with poorer public education and may want to make additional investments supporting their dependents' education.

Economic literature has tried to explicitly tie school quality to housing prices since 1969, building on a broader literature on how neighborhoods form based on tastes for (and ability to afford) different local amenities and measures of neighborhood quality [32-33]. There is a broad consensus that school quality affects housing prices, but settling on a specific number has proven challenging.

Challenges in three areas explain why it is difficult to produce a single estimate for the effect of school quality on housing prices: research methodology, terminology, and local context.

Challenges related to research methodology reflect that many measures of neighborhood quality are correlated with the strength of local public schools. For example, people who value high-quality public schools are also likely to value public safety, short commute times, public parks, access to local businesses, and other factors that affect housing prices, so determining the effect of just one is extremely hard. Several strategies attempt to isolate the impact of schooling from that of other amenities, with varying degrees of success. All strategies employed have limitations that make them difficult to apply across MHAs to calculate BAH. We discuss this academic research further in Appendix G. Even if methodology were not a concern, defining school quality is not straightforward. For example, a school's value-added—not the level of its students' scores, but the degree to which it improves scores relative to how the same student would perform elsewhere—may be more valuable to a new homebuyer than its overall achievement level; however, value-added measures may reflect measurement error or vary substantially across years, particularly in areas with few students, and are available for relatively few grades [34]. The scope at which quality is computed or aggregated will also be relevant to policy-makers. For example, if a family is zoned to a high-achieving school in a low-

achieving district (or vice versa), which should BAH take into account?³⁴ And to what extent should BAH take shifts in individual school catchment or district boundaries into account?

The research literature and BAH also reflect different assumptions—research on school quality centers on purchase prices, while BAH is defined to reflect rental rates.³⁵ Although the two are highly correlated, school quality could be reflected differently in purchase prices than in rents. For example, since buying a house requires a longer term commitment to a specific area, school quality might correlate more closely with purchase prices than with rents. For this reason, the impact of school quality on the purchase price of housing might not be directly translatable to the same increase in BAH.

Finally, even if an accurate measure of the impact of school quality on housing prices could be defined and computed, it would likely vary from place to place and require a great deal of ongoing research to incorporate properly [38]. A DOD-endorsed comparison of the quality of public school districts across different areas of the country would also expose it to political risk, as locally elected politicians may question the ranking of their constituents' schools or use these relative rankings to advocate for a different laydown of installations.

We note that local and state governments and some private entities do publish data about schools' test scores, teacher workforce, student demographics, and so on. The services may consider such data when choosing where to locate installations. However, such consideration is based on subjective judgement calls and is not the same thing as including this information in the formal process to calculate BAH. If inclusion of school quality in BAH is to be considered in some capacity, it makes the most sense to do so through an experimental algorithm for possible later use, as discussed in a subsequent chapter.

³⁴ There is some evidence, for example, that the demographics of individual schools—but not overall school districts—are reflected in house prices, indicating that families may be less likely to consider school district characteristics than those of their specific schools [35]. However, a study of simultaneous shifts in school catchment and district boundaries in Shelby County, Tennessee, found that district rezoning had between 1.5 and 2 times the effect of a 1 standard deviation increase in a school's test scores [36].

³⁵ Studies also use different measures of purchase value; for example, those that do not have access to sale data can use aggregate housing indices (which do not fully reflect new construction or updates), owner valuations (which are systematically overstated), or advertised house prices (which vary from actual sales, but not necessarily in a known, systematic fashion) [37].

Frequency of Calculating BAH

By law, barring extraordinary circumstances, BAH rate adjustments can take effect only at the same time as basic pay table adjustments [2]. This requirement has effectively caused BAH rate adjustments to be annual events. Combined with the lag time required to incorporate surveys of housing costs, this requirement means that BAH rates for individual members are frequently based on housing costs well over a year out of date.

In times of modest inflation, and in areas with relatively stable housing prices, the time between the collection of cost data and the subsequent adjustments to the BAH rates is of little concern. Cost differences in other factors tied to housing, such as commuting distance, amenities, and quality of the neighborhood, are likely to swamp any differences caused by the time lag. Conversely, during periods of high inflation, or in areas where housing costs are increasing rapidly for other reasons, the time lag could result in BAH rates too low for the allowance to serve its intended purpose. This would be particularly true among servicemembers moving into a new housing area, as those with existing leases or mortgages are unlikely to experience the full effects of unexpected rental rate increases.³⁶

Again, the lag time between the collection of survey data and the actual adjustment of BAH rates is of serious concern only when inflation is high, or housing costs are unstable for other reasons. If, for example, housing costs went up a steady 2 percent per year, then in the summer months, when servicemembers are most likely to move, the BAH rates for their new locations would be about 2 percent lower than they theoretically should be. But that 2 percent difference is likely dwarfed by countless other factors and, at worst, it simply means the notional out-of-pocket cost is bit higher than it might otherwise have been. In contrast, if housing costs jumped 10 percent or 12 percent, either across the country or in a particular area, servicemembers who did not have fixed leases or mortgages in place would likely face either significant additional out-of-pocket costs or settle for housing that is below standards.

Increases in out-of-pocket expenses caused by cost increases that occur between BAH rate adjustments could be mitigated in a number of ways, but any mitigation would entail either a significant increase in the cost of BAH to the military departments or some sort of offsetting reduction in overall BAH levels. If the former, it could be funded either by an increase in DOD's

³⁶ Recall that when rental prices are falling in an area, members already stationed there are shielded from a decline in BAH because they may be locked into a longer term lease or mortgage. Other members may be able to profit from this rate protection by moving or negotiating a new lease at a lower price.

topline or by cuts to other DOD programs. Several types of adjustments are considered in detail below.

Options for how to allow BAH to adjust more flexibly

More frequent updates: BAH rates are currently adjusted at the beginning of each year along with the basic pay tables. Although it would require legislative relief, there is no insurmountable reason BAH rates could not be adjusted more frequently. In particular, BAH rates could be adjusted twice a year, cutting on average 6 months of lag from each adjustment.³⁷ Such a change would cause survey costs to increase, perhaps even double, but those costs are trivial compared to the overall cost of BAH.³⁸ A much larger cost would result from the reality that, given that average rates typically increase with each adjustment, the military departments would end up paying additional BAH for the second half of each year. There would be some offsetting savings from areas in which the BAH rates declined, but those tend to be few. In addition, because of rate protection for those already assigned to such areas, savings would be seen only from those members newly moving into such areas.

Increased flexibility to adjust rates: Following Hurricane Katrina, Congress authorized the secretary concerned to increase BAH rates in real time for areas subject to a major disaster declaration [39]. Authority to make ad hoc BAH rate changes for various reasons could be expanded, though this would require additional legislation. Such a proposal could have minimal administrative cost, but to the extent the authority was exercised, it would be unambiguously costly. Additionally, DOD would need to determine how such adjustments would be made and create a system for evaluating the merits of proposed adjustments.

Include expected inflation in BAH rates: Because of the lag time to calculate new rates, the BAH tables are about 6 months out of date at the start of the year and about 18 months out of date at the end of the year, creating an average lag of roughly one year. If DOD expected housing prices to increase at, say, a 2 percent annual rate, it could effectively eliminate the expected cost of that lag to the servicemembers by adding 2 percent to the annual BAH increase.³⁹ For this change to be effective, DOD would have to be able to predict rental price increases with at

³⁷ Because it takes considerable time to conduct and implement surveys, this would not cut the lag time in half.

³⁸ OSD reports that the average annual cost of the BAH contract is \$1.7 million, compared to the estimated \$26.8 billion paid to BAH recipients.

³⁹ If compounding is considered, the actual increase would be slightly smaller than 2 percent.

least modest accuracy. Even at that, such a change would only partially address unanticipated jumps in rental prices in particular markets.

Basing BAH rates, in whole or in part, on more responsive indices: Currently, BAH rates are determined through a process dependent on customized housing surveys commissioned by DOD. Given the nature and methodology of the surveys, the considerable lag between the sampling of housing costs and implementation of the resulting BAH rates is largely unavoidable. As explained above, if inflation is high or some local housing markets are particularly hot, the lag will cause the calculated BAH to be significantly too low for its intended purpose. There are, however, other readily available sources of data on inflation in general, or on housing rental costs in particular. DOD could consider incorporating one or more such measures into its BAH calculations to help calculate interim adjustments, though we emphasize that these measures do not align with MHAs or with DOD standards and cannot be used as replacements for the current process. At a minimum, such a move could introduce more recent data into each calculation, and BAH rates might even be adjustable within a year as cost indices are updated, though still protecting members already there from reductions just as the current system does.

Funding additional rate adjustments

Each of the proposals above would result in servicemembers, on average, receiving higher BAH when they reside, or move into, areas with housing costs significantly higher than projected by the survey results. The additional cost to DOD depends on which housing areas would see rate adjustments and how large those adjustments might be. Compensating for minor increases in individual housing markets might not prove prohibitively costly, but even modest across-the-board adjustments could result in profound increases in outlays. An overall 5 percent increase in BAH to compensate for increased inflation, for example, would cost nearly \$1.5 billion in FY 2024.

Each of the proposals above would likely involve significant additional cost to the military departments. In addition, the first two would complicate budgeting and execution. Any additional BAH funding needed for mid-year, or ad hoc, rate changes would be difficult to estimate in time for the regular budgeting process and would not be known with any precision until well into the execution year. With annual BAH expenditures approaching \$30 billion, even the funding to accommodate a percentage point or two of unbudgeted price increases would represent a significant sum and require accommodation in the execution year.

Barring significant increases in the services' budgets for BAH, there is little room to accommodate rate adjustments in markets with unexpectedly high housing costs and

essentially no potential to accommodate inflationary spikes that affect most, or all, of the country.

Despite the financial difficulties, the rationale for rate adjustments in the face of unexpected price hikes is largely twofold. First, without some sort of adjustment, members living off base would see a decline in their purchasing power while those living on base would not. Second, military members are subject to frequent moves as a part of their employment, which limits the feasibility of home ownership and may preclude their taking advantage of benefits other renters enjoy, such as rent control or long-term relationships with landlords.

Conversely, it could be argued that other adults in this country are expected to cope with inflation largely on their own. They may lose out because their rent goes up sooner than their wages, but they may come out ahead on things like existing student loans and car loans that effectively decline in cost with higher inflation. Civilian employees of DOD are expected to wait until the start of the year for their locality pay to adjust to changes in local conditions and to pay their rent based on a pay table that changes only once a year.

If, however, adjusting BAH rates for those facing high out-of-pocket costs is a priority, and if Congress does not directly address the higher cost through top-line increases or offsetting cuts elsewhere in the DOD budget, there are potential offsets within BAH that could provide some funding.

Some servicemembers decline government quarters or space in privatized on-base housing. And though they are free to do so, one might reasonably argue that they could face some BAH reduction if they are inclined to make that choice.

Another group that might be potential candidates for a more modest BAH is dual-military couples residing in the same housing area. Currently, both members receive their full BAH even though it is generally reasonable to assume that they share a common home and a common bedroom. We note that reducing BAH for a member married to another BAH recipient could create a disincentive for dual-military couples to marry.

Additionally, one might argue that members who are already living in a given area are less likely to see housing cost increases as large as those newly moving to the area. Those already residing in the area may have leases or mortgages that limit their cost increases. At a minimum, they are likely to know the area better than new arrivals and thus be more likely to find a better deal on housing. Accepting that logic, special rate increases might apply only to those newly entering an area, just as rate reductions generally do not apply to those already living in an area.

Finally, there is nothing magical about the current standard of 5 percent out of pocket. In the relatively recent past, the target out-of-pocket rate has been as high as 15 percent and as low

as zero [39]. Changing the notional out-of-pocket rate from 5 percent to 8 percent (that is, intending BAH to cover 92 percent of housing costs on average) would save DOD 3.16 percent of its total BAH cost. Even if privatized housing was excluded from the reduction, the potential savings available to be targeted toward areas with costs that rose exceptionally fast would be considerable.

Advisability of a Covered Entity to Develop a BAH Algorithm

Section 662 of the 2023 NDAA calls for an evaluation by the Secretary of Defense of “residential real estate processes to determine rental rates” and a recommendation by the Secretary of Defense regarding “whether to enter into an agreement with a covered entity, to compile data and develop an enterprise grade, objective, data-driven algorithm to calculate BAH” [5].

Following up on this, Section 625 of an unsigned version of the 2024 NDAA directs the Secretary of Defense to “enter into an agreement with a covered entity pursuant to...calculate, using industry-standard machine learning and artificial intelligence algorithms, the monthly rates of BAH for not fewer than 15 MHAs.”

Well-known commercial entities including Zillow and Redfin use algorithms to process large amounts of market data and boast that their forecasts of homes’ values have a median error rate of only about 2 percent for homes that are on the market [40-41]. We do not know how much such tools would contribute to DOD’s ability to forecast changes in local rental markets over a span of a year or more. However, it is reasonable to ask how all these data and also the commercial algorithms that predict values using the data may help improve the accuracy and effectiveness of BAH.

To address this question, we first revisited the statutory mandate for BAH:

The Secretary of Defense shall determine the costs of adequate housing in a military housing area in the United States for all members of the uniformed services entitled to a basic allowance for housing in that area. The Secretary shall base the determination upon the costs of adequate housing for civilians with comparable income levels in the same area [2].

Thus, setting BAH requires not only estimating the current market value of a home, but also determining which homes are adequate for civilians of comparable income. Broadly speaking, there are two possible approaches to this: either directly observe what civilians with the same income-less-housing cost spend on housing in the servicemember’s area and set BAH equal to that, or make a judgment call about what is “adequate” and then estimate its cost in that area. Currently, DOD uses the latter approach, and judgment calls are not an appropriate responsibility for machine learning and artificial intelligence (AI). As noted in the *Economist*, AIs may be recruited by their designers or trainers to serve objectives that are not transparent, and even if not, “would you trust a ten-year-old whose entire sense of reality had been formed by surfing the internet?” [42].

However, a key insight from existing commercial algorithms *is* highly relevant to BAH: there are now more efficient ways to sample housing rental market data than the current BAH surveys. In fact, HUD reports that it now uses six commercially generated rental indices to calculate its Fair Market Rents: Zillow, Apartment List, CoreLogic, Real Page, REIS (produced by Moody's Analytics), and CoStar, in addition to government-generated data from the Census Bureau. Therefore, if the government sets standards of what constitutes adequate housing for servicemembers, commercial indices may be an efficient and flexible way to update estimates of the cost of that housing.

Moreover, machine learning may be able to go beyond indices of the local housing market to estimating the price of a particular set of housing attributes that DOD has deemed adequate. This is known as a hedonic pricing model: a model that predicts the price of a good as a function of observable characteristics of that good. For example, suppose that a cost index in a given market may experience fluctuations driven by demand for vacation and retirement homes near water, but the algorithm does not require proximity to water and produces a more stable estimate. In this case, a machine learning algorithm trained on the correct variables would produce more accurate estimates of the cost of adequate housing than would a commercial index. As attempts to measure value-added by schools become available, such as those calculated by the not-for-profit organization GreatSchools, experiments with a machine learning algorithm could include a school value-added requirement determined by DOD officials.

We note that DOD would need to monitor the performance of these machine learning algorithms, and particularly how they perform when the set of variables from which they generate their estimates differs from the set of estimates on which they were trained. A logical robustness check to run before using these algorithms would be to feed them data with missing values for some variables that are likely to frequently have missing values in the markets where they will be employed.

Finally, it is worth considering that machine learning may be useful to forecast future changes in rental costs, solving the lag problem in BAH rates. HUD reports that it has begun forecasting changes in rent levels, but it does not yet have confidence in its ability to do so. Private firms and the Federal Reserve also attempt to forecast changes in the CPI and could generate forecasts specifically of the housing component of the CPI [43-44]. Therefore, the primary value of the AI experiment called for by the unsigned 2024 NDAA may be to test the accuracy of AI-generated forecasts of changes in average rent levels within an area, using observable data about local supply and demand changes.

Advisability of Publishing BAH Methodology on a Public Website

Setting actual BAH rates is a complicated process. MHAs need to be drawn around each base or geographic grouping of bases. Individual neighborhoods then need to be evaluated for, and potentially eliminated from, use in the calculations for any of a variety of reasons. Next, rental and utility rates need to be surveyed or otherwise estimated, after which anomalies and outliers need to be identified and examined. Only then can DOD begin to set the actual rates for each area and category of servicemember. At each stage in the process, there is a certain unavoidable amount of subjectivity. Additional accuracy, complexity, or consistency would certainly be possible, but would likely come with additional costs and increased time needed to complete the process.

Currently, OSD publishes a primer on BAH that explains much of the methodology but not in enough detail to replicate the process of setting actual rates. Given the inherent subjectivity in deciding issues such as where to draw boundaries between MHAs, which neighborhoods to exclude from consideration, and how to deal with extreme outliers, the current rate setting system does not lend itself to any straightforward description of the overall methodology used. At best, DOD might be able to publish the detailed methodology used for each MHA, but this would likely be a significant burden, be of little intrinsic value, and could invite second guessing.

Publishing its methodology might be practical if DOD relied on a more standardized rate setting process. However, the more standardized the process is, the more likely it is that unreasonable or anomalous results could sneak into the rates. Additionally, any requirement for full disclosure of the methodology would effectively prohibit the use of any proprietary data in the rate setting process. That limitation could have the potential to limit contractor support in data collection or evaluation.

Publishing the BAH methodology in more detail may contribute to greater trust in the process *if* it is accompanied by a change to a more streamlined process using publicly available indices that is easier to document and if it comes with a published caveat that OSD in consultation with the services may deviate from this methodology in unusual circumstances. Even in this case, members may come to regret the change if their complaints about the suitability of the BAH rate for their MHA are more difficult to address given the need for OSD to then document a deviation from the published methodology.

Appropriateness of BAH to Coast Guard Facilities

Each year, the Coast Guard publishes a list of Critical Housing Areas (CHAs), some of which are MHAs and others of which are identified by ZIP code only. The 2023 list includes 31 CHAs, 14 of which are associated with an MHA. These are locations where the service expects members may not wish to house their families, and members with dependents who receive orders to a CHA may request a housing allowance based on a different location.

Most of the CHAs are in remote locations such as Garibaldi, Oregon, and Demopolis, Alabama. However, the list also includes the Camp Lejeune, North Carolina, MHA. From internet searches for units available to rent, we found that CHAs typically have fewer available rentals listed than other Coast Guard duty stations. We also identified a total of 21 neighboring MHAs (less than 60 miles away) for these CHAs, and we found that 12 of these 21 neighboring MHAs had higher BAH rates across most or all paygrades than the BAH available for the CHA. We also found very few rental listings in most of these neighboring MHAs. For example, the St. Mary and Terrebonne, Louisiana, MHA (listed as a CHA) had five Zillow listings and a RentCast average monthly listings of 19, while its neighboring MHA of Lafayette, 25 miles away, had even fewer listings.

Therefore, members' requests to receive BAH for a different location may be due to an inability to find available housing close to their duty stations, or due to housing that they consider more suitable being in a higher cost neighboring MHA.

We note that the Coast Guard operates in some locations where it has already determined that BAH cannot provide servicemembers with housing because there is no market for year-round rentals. In these locations, government-owned housing is provided instead. One example is the Island of Nantucket, a popular seasonal haven for wealthy families.

Two changes to law may benefit the provision of suitable housing for Coast Guard families. First, Section 2877 of Title 10 USC allows services to provide differential lease payments to lessors whom the servicemembers are also paying rent to. If the member pays approximately their BAH rate for rent, but this is not enough to incentivize lessors to make year-round rentals available, the service can provide an additional incentive. However, this law applies only to services in the DOD, and it could be changed to include the Coast Guard, which falls under the Department of Homeland Security [45].

Also, Section 403 of Title 37 allows the secretary concerned to pay BAH for the location where the family resides or for the previous duty station if “the member’s assignment to duty in that area, or the circumstances of that assignment, require the member’s dependents to reside in a different area” [2]. This language does not cover members without dependents or members living with their dependents but outside their assigned MHA or county cost group (CCG).⁴⁰ Because many Coast Guard members find suitable housing in a higher cost nearby county (such as those assigned to Port O’Connor, Texas, who find housing in higher cost Victoria, Texas), we recommend clarification of the law to allow the secretary concerned to pay BAH for a more expensive neighboring MHA in which the member resides, with or without dependents.

This concludes the recommendations requested by Congress for this report. Our companion report builds on several analyses summarized here and offers recommendations for alternate methodologies to determine BAH. In this report, we provide appendixes reviewing the current BAH methodology, displaying some of our results in further detail, reviewing details on housing market indices that may be useful elements in the construction of alternate approaches to BAH, and reviewing research on the relationship between school quality and housing markets.

⁴⁰ Members, such as recruiters, who live in an area with too few BAH recipients to justify an MHA have their BAH set by using BAH rates in MHAs that have similar cost profiles according to the Housing and Urban Development estimates of Fair Market Rent.

Appendix A: BAH Process

The BAH program is designed to compensate servicemembers for off-base housing comparable to their civilian counterparts. Data are collected in approximately 300 MHAs across the United States (including Alaska and Hawai'i) to determine local median rent and average utility costs for different types of rental units.⁴¹ The different types of rental units, called housing profiles, are linked to paygrades representing the average housing choice by civilians with comparable incomes.

Rental cost data collection

A BAH rate is calculated for each housing profile by MHA [1]. Data collection occurs every March through July during peak PCS season. Rental cost data are collected through three sources:

1. Nationwide commercial rental subscription database: provides verified property costs for over 100,000 multifamily rental units
2. Local installation MHO representatives: provide local knowledge on real estate contacts, neighborhood quality unique market factors, and servicemember living patterns
3. BAH data collection contractor: independent market research specialists

The three sources provide a series of checks and balances to ensure accuracy. The nationwide database is updated monthly over the collection period. For each given unit, the median of the monthly prices is used as the final BAH sample price. The BAH contractor also collects and verifies residential vacancy listings information from trusted sources such as Multiple Listing Service (MLS), Zillow, and Trulia. The MHO representatives review the database- and contractor-collected data to confirm the included properties meet BAH standards. BAH standards exclude data from certain types of properties such as mobile homes, efficiency apartments, furnished units, income-subsidized complexes, age-restricted facilities, and seasonal units. The remaining properties are screened to ensure each unit included in the data:

Meets building safety codes and is in good repair

⁴¹ Although servicemembers are not prohibited on using BAH for a mortgage payment, BAH is designed to reflect the rental market only.

Is not in a high-crime neighborhood (i.e., an area with a crime rate over twice the national average)

Is within a set of ZIP codes in which 90 percent of servicemembers assigned to the MHA live

Is in an area where typical civilian incomes are comparable to regular military compensation (basic pay plus BAH plus BAS plus the tax advantage resulting from tax-free allowances)

The data collection contractor then validates the data submitted from the three sources by:

Establishing the availability and location of each unit in the survey sample

Verifying the current rental rates

Identifying any utility inclusions in the rental rates

Determining price differences for different lease terms (BAH uses a standard 12-month lease price for its data collection)

The DOD aims to gather about 30 to 75 units per housing profile for each MHA. This allows them to estimate with 95 percent statistical confidence a median rent that is within 10 percent of the true median rent. If the number of available units does not reach this quorum, the DOD will use overall housing cost trends to estimate a specific housing profile or use other methods to estimate rates (such as asking landlords to price their seasonal units as if they were annual).

Calculating BAH for locations outside of an MHA

DOD determines BAH rates for every location in the US, even those outside of MHAs. To determine the BAH in these areas, DOD uses FMR data from the Department of Housing and Urban Development to order counties from lowest to highest housing cost. The counties are then organized into 39 groups of comparable housing costs called CCGs. The CCGs serve as a crosswalk for counties within an MHA to counties outside of an MHA, as each CCG includes both types. The BAH rate of counties within an MHA is used to calculate the BAH rate for their CCGs. This CCG BAH rate is applied to all counties within that CCG that is outside of an MHA. CCG BAH rates apply to less than 2 percent of BAH-eligible servicemembers.

Utility cost data collection

DOD uses data from the US Census Bureau's ACS and the BLS Regional CPI to calculate utility cost data. The ACS provides electricity, heating fuel, and water and sewer costs for approximately 1 percent of the entire US population each year. DOD uses the latest 5 years of data to identify costs specific to each housing profile in each MHA [18]. Since there is a 2- to 7-year lag in ACS data, CPI data are used to scale the data to current-year utility costs. The utility cost estimates are baseline rates. If electricity, water, and gas/fuel are included in the monthly

rental of a unit, the utility costs added to the rent to obtain a total housing cost (THC) will exclude the included utility.

BAH rate calculations

DOD uses six housing profiles “anchored” to nine paygrades to calculate BAH for all remaining paygrades. The six housing profiles, with the paygrades used as anchor points, are shown in Table 7. The E4 anchor points for servicemembers with and without dependents represent the minimum housing standards and apply to all lower ranks (the standard for E1 to E4 with dependents is halfway between the two-bedroom apartment anchor point and the two-bedroom townhouse anchor point). OSD Compensation has noted that some of these profiles are rare in some MHAs, such as single family dwellings in dense urban areas or apartments in coastal areas with vacation homes. This can lead to small sample sizes and estimation irregularities.

Table 7. BAH housing profiles

Housing profile	Grade with dependents	Grade without dependents
1-bedroom apartment		E4
2-bedroom apartment		O1
2-bedroom townhouse/duplex	E5	O1E
3-bedroom townhouse/duplex	E6	O3E
3-bedroom single family dwelling	W3	O6
4-bedroom single family dwelling	O5	

Source: BAH primer [1].

After all of the data are collected, DOD reviews the local median housing costs for each MHA and applies data smoothing quality control procedures to mitigate sampling errors or data anomalies. OSD Compensation reports that the data smoothing process is used for three main reasons: to increase confidence for low sample sizes, to ensure BAH rates progress as paygrades progress, and to limit volatility from year-to-year market changes. The BAH rates for each of the anchor points are equal to the THC (median rent costs plus average utility costs) for that housing profile in each MHA. For all non-anchor point paygrades, the BAH rate is calculated by interpolating between anchor points. First, DOD calculates the difference between the upper and lower anchor points. Second, a specified percentage is applied to that difference to obtain a dollar amount. Then, that dollar amount is added to the lower anchor point to obtain the BAH rate for the paygrade in question. Table 8 demonstrates these calculations for an E7 with dependents using the lower and upper anchor points of E6 and W-3, respectively.

Table 8. BAH calculation example

Description	Formula	Example
E6 with dependents local housing cost (3-BR TH)	A	\$1,000
W3 with dependents local housing cost (3-BR SFD)	B	\$1,200
Difference	C: B-A	\$1,200 - \$1,000 = \$200
36% of that difference	D: C x %	\$200 x 0.36 = \$72
E7 with dependents interpolation	A+D	\$1,000 + \$72 = \$1,072

Source: BAH primer [1].

Even with the help of the data smoothing process, BAH rates may fluctuate from one year to the next because the process is designed to accurately reflect changes in market conditions. To prevent servicemembers from being penalized for signing long-term leases or contracts, they are entitled to keep their existing rate if the new rate (published January 1) decreases. Servicemembers are eligible for rate protection unless their status changes due to PCS, reduction in paygrade, or change in dependency status.

Appendix B: Civilian Housing Expenditures

In these tables, for a given percentile range of civilian household income minus housing expenses, we list example military paygrades that tend to fall in that range (which can vary slightly from one area to another and by dependent status because of differences in the tax advantage). We then display what the median civilian in that range spends on various types of housing. These figures include both rent and utilities. Table 9 shows results across all PUMAs nationwide, and the subsequent tables show results for the top, middle, and bottom third of PUMAs in terms of housing cost. So, for example, civilians with the same amount of income left over to spend on things other than housing as an E5 will spend \$1,784 on a two-bedroom townhouse in a high-cost area, \$1,313 on a two-bedroom townhouse in a medium-cost area, and \$1,053 on a two-bedroom townhouse in a low-cost area.

Table 9. Median civilian monthly housing expenditures by income range: nationwide

Income range	Example paygrades	All	1 BR APT ^a	2 BR APT	2 BR TH ^b	3 BR TH	3 BR SFD ^c	4 BR SFD
90–95%	E9, O4	\$1,954	\$1,894	\$1,897	\$2,047	\$2,248	\$1,896	\$2,269
85–90%	W3, O3	\$1,733	\$1,668	\$1,720	\$1,745	\$2,015	\$1,699	\$2,031
80–85%	E7, W2	\$1,607	\$1,557	\$1,601	\$1,590	\$1,900	\$1,592	\$1,934
75–80%	W1, O2	\$1,498	\$1,429	\$1,502	\$1,509	\$1,790	\$1,503	\$1,858
70–75%	E6, O1	\$1,416	\$1,370	\$1,416	\$1,442	\$1,755	\$1,436	\$1,745
65–70%	E5	\$1,349	\$1,281	\$1,345	\$1,401	\$1,670	\$1,391	\$1,724
60–65%	N/A	\$1,281	\$1,221	\$1,281	\$1,351	\$1,681	\$1,344	\$1,640
55–60%	E4	\$1,251	\$1,184	\$1,264	\$1,306	\$1,560	\$1,320	\$1,601
50–55%	E3	\$1,194	\$1,110	\$1,214	\$1,292	\$1,608	\$1,285	\$1,535
45–50%	E2	\$1,166	\$1,080	\$1,181	\$1,240	\$1,478	\$1,264	\$1,498

Source: American Community Survey (ACS) 2017–2021 data from the half of public use microdata areas (PUMAs) that have above the median share of military personnel. Tabulated by RCF Economic and Financial Consulting, LLC., and adjusted from 2021 to 2023 dollars by CNA using the CPI. Which ventile (5 percentage point range) of civilian income-less-housing a paygrade aligns with varies slightly by MHA and by dependency status.

^a APT = apartment

^b TH = townhouse or duplex

^c SFD = single family dwelling (detached house)

Table 10. Median civilian monthly housing expenditures by income range: high-cost areas

Income range	Example paygrades	All	1 BR APT ^a	2 BR APT	2 BR TH ^b	3 BR TH	3 BR SFD ^c	4 BR SFD
90–95%	E9, O4	\$2,320	\$2,141	\$2,211	\$2,374	\$2,550	\$2,428	\$2,731
85–90%	W3, O3	\$2,113	\$1,910	\$2,062	\$2,094	\$2,376	\$2,214	\$2,516
80–85%	E7, W2	\$1,999	\$1,825	\$1,943	\$1,965	\$2,306	\$2,133	\$2,482
75–80%	W1, O2	\$1,901	\$1,708	\$1,872	\$1,952	\$2,251	\$2,068	\$2,408
70–75%	E6, O1	\$1,830	\$1,651	\$1,807	\$1,859	\$2,174	\$2,062	\$2,385
65–70%	E5	\$1,787	\$1,601	\$1,775	\$1,784	\$2,079	\$2,021	\$2,331
60–65%	N/A	\$1,727	\$1,560	\$1,737	\$1,755	\$2,140	\$1,977	\$2,279
55–60%	E4	\$1,668	\$1,489	\$1,691	\$1,684	\$2,062	\$1,949	\$2,295
50–55%	E3	\$1,644	\$1,476	\$1,673	\$1,685	\$1,987	\$1,901	\$2,276
45–50%	E2	\$1,598	\$1,415	\$1,647	\$1,676	\$2,013	\$1,923	\$2,215

Source: ACS 2017–2021 data from PUMAs that have above the median share of military personnel and have housing costs in the highest third. Tabulated by RCF Economic and Financial Consulting, LLC., and adjusted from 2021 to 2023 dollars by CNA using the CPI. Which ventile (5 percentage point range) of civilian income-less-housing a paygrade aligns with varies slightly by MHA and by dependency status.

^a APT = apartment

^b TH = townhouse or duplex

^c SFD = single family dwelling (detached house)

Table 11. Median civilian monthly housing expenditures by income range: medium-cost areas

Income range	Example paygrades	All	1 BR APT ^a	2 BR APT	2 BR TH ^b	3 BR TH	3 BR SFD ^c	4 BR SFD
90–95%	E9, O4	\$1,683	\$1,375	\$1,575	\$1,692	\$1,905	\$1,771	\$2,049
85–90%	W3, O3	\$1,566	\$1,316	\$1,490	\$1,523	\$1,777	\$1,689	\$1,902
80–85%	E7, W2	\$1,483	\$1,281	\$1,416	\$1,452	\$1,717	\$1,626	\$1,860
75–80%	W1, O2	\$1,413	\$1,230	\$1,361	\$1,394	\$1,618	\$1,560	\$1,871
70–75%	E6, O1	\$1,367	\$1,213	\$1,322	\$1,354	\$1,620	\$1,529	\$1,744
65–70%	E5	\$1,315	\$1,161	\$1,286	\$1,313	\$1,614	\$1,490	\$1,756
60–65%	N/A	\$1,275	\$1,141	\$1,257	\$1,321	\$1,635	\$1,481	\$1,706
55–60%	E4	\$1,252	\$1,121	\$1,245	\$1,275	\$1,500	\$1,432	\$1,634
50–55%	E3	\$1,213	\$1,071	\$1,214	\$1,283	\$1,548	\$1,421	\$1,639
45–50%	E2	\$1,184	\$1,060	\$1,192	\$1,218	\$1,477	\$1,391	\$1,586

Source: ACS 2017–2021 data from PUMAs that have above the median share of military personnel and have housing costs in the middle third. Tabulated by RCF Economic and Financial Consulting, LLC., and adjusted from 2021 to 2023 dollars by CNA using the CPI. Which ventile (5 percentage point range) of civilian income-less-housing a paygrade aligns with varies slightly by MHA and by dependency status.

^a APT = apartment

^b TH = townhouse or duplex

^c SFD = single family dwelling (detached house)

Table 12. Median civilian monthly housing expenditures by income range: low-cost areas

Income range	Example paygrades	All	1 BR APT ^a	2 BR APT	2 BR TH ^b	3 BR TH	3 BR SFD ^c	4 BR SFD
90–95%	E9, O4	\$1,229	\$1,052	\$1,151	\$1,286	\$1,448	\$1,298	\$1,514
85–90%	W3, O3	\$1,163	\$971	\$1,098	\$1,202	\$1,315	\$1,233	\$1,402
80–85%	E7, W2	\$1,116	\$938	\$1,071	\$1,159	\$1,360	\$1,188	\$1,318
75–80%	W1, O2	\$1,071	\$903	\$1,034	\$1,071	\$1,308	\$1,165	\$1,251
70–75%	E6, O1	\$1,032	\$888	\$994	\$1,102	\$1,254	\$1,126	\$1,237
65–70%	E5	\$1,016	\$889	\$983	\$1,053	\$1,267	\$1,116	\$1,197
60–65%	N/A	\$977	\$843	\$952	\$1,053	\$1,192	\$1,085	\$1,201
55–60%	E4	\$972	\$818	\$958	\$1,028	\$1,191	\$1,086	\$1,192
50–55%	E3	\$929	\$796	\$927	\$1,011	\$1,196	\$1,040	\$1,170
45–50%	E2	\$913	\$781	\$903	\$1,013	\$1,164	\$1,049	\$1,143

Source: ACS 2017–2021 data from PUMAs that have above the median share of military personnel and have housing costs in the bottom third. Tabulated by RCF Economic and Financial Consulting, LLC., and adjusted from 2021 to 2023 dollars by CNA using the CPI. Which ventile (5 percentage point range) of civilian income-less-housing a paygrade aligns with varies slightly by MHA and by dependency status.

^a APT = apartment

^b TH = townhouse or duplex

^c SFD = single family dwelling (detached house)

Appendix C: BAH Sufficiency Statistics

Here, we tabulate the largest possible shortfall for MHA-paygrade combinations in which BAH does not exceed our upper bound. Reading across the first row, we see that of three MHAs in which E2 BAH may be insufficient, the maximum shortfall is under \$10 in two of them and under \$50 in the remaining one. The same row in Table 14 shows that the possible shortfall is less than 1 percent in two of them and less than 5 percent in the third. Tables 15 and 16 repeat the results for BAH recipients without dependents. These figures were generated based on the assumption that BAH recipients can be expected to contribute an average of 5 percent of the cost of their housing out of pocket, though as we showed in Table 1, most members should in practice not need to do so in order to match the housing expenditures of comparable civilians.

Table 13. Maximum potential monthly dollar shortfalls for MHAs where BAH may be insufficient for servicemembers with dependents

Paygrade	Number of MHAs with maximum BAH shortfall (in dollars)					
	Less than \$10	\$10–\$25	\$25–\$50	\$50–\$100	\$100–\$200	Over \$200
E2	2	0	1	0	0	0
E3	3	2	1	0	0	0
E4	4	4	2	1	0	0
E5	3	2	1	0	0	0
E6	3	11	4	10	4	0
E7	3	7	3	10	4	0
E8	0	0	0	0	0	0
E9	0	0	0	0	0	0
W1	7	5	3	12	19	1
W2	2	2	3	3	0	0
W3	0	0	0	0	0	0
W4	0	0	0	0	0	0
W5	2	3	6	5	8	0
O1E	1	1	2	0	0	0
O2E	0	0	0	0	0	0
O3E	0	0	0	0	0	0
O1	4	1	3	0	0	0
O2	5	7	5	9	21	2
O3	1	0	0	0	0	0
O4	3	2	4	8	4	0
O5	2	4	1	0	0	0

Source: CNA.

Table 14. Maximum potential monthly shortfalls for MHAs where BAH may be insufficient for servicemembers with dependents (as a percentage of BAH)

Paygrade	Number of MHAs with maximum BAH shortfall (as a percentage of BAH)					
	1% or less	1%–3%	3%–5%	5%–10%	10%–20%	Over 20%
E2	2	0	1	0	0	0
E3	3	2	0	1	0	0
E4	5	3	2	1	0	0
E5	3	2	1	0	0	0
E6	13	9	7	3	0	0
E7	10	8	6	3	0	0
E8	0	0	0	0	0	0
E9	0	0	0	0	0	0
W1	10	8	11	17	1	0
W2	4	6	0	0	0	0
W3	0	0	0	0	0	0
W4	0	0	0	0	0	0
W5	5	8	10	1	0	0
O1E	2	2	0	0	0	0
O2E	0	0	0	0	0	0
O3E	0	0	0	0	0	0
O1	5	2	1	0	0	0
O2	11	8	12	17	1	0
O3	1	0	0	0	0	0
O4	5	8	8	0	0	0
O5	6	1	0	0	0	0

Source: CNA.

Table 15. Maximum potential monthly dollar shortfalls for MHAs where BAH may be insufficient for servicemembers without dependents

Paygrade	Number of MHAs with maximum BAH shortfall (in dollars)					
	Less than \$10	\$10–\$25	\$25–\$50	\$50–\$100	\$100–\$200	Over \$200
E2	7	7	17	30	0	0
E3	5	15	16	33	16	0
E4	5	4	26	24	43	0
E5	9	12	10	35	51	8
E6	6	9	14	29	23	0
E7	3	10	9	26	52	5
E8	1	12	15	23	26	20
E9	6	6	12	34	30	25
W1	7	7	13	27	41	31
W2	3	5	10	15	9	0
W3	7	7	12	33	30	26
W4	6	5	8	24	33	79
W5	5	7	10	18	32	33
O1E	5	6	11	14	4	0
O2E	7	9	12	22	28	0
O3E	3	7	10	17	38	27
O1	6	11	19	30	38	16
O2	6	14	14	16	12	0
O3	7	5	15	22	36	27
O4	2	4	7	15	38	37
O5	7	4	8	17	20	19

Source: CNA.

Table 16. Maximum potential monthly shortfalls for MHAs where BAH may be insufficient for servicemembers without dependents (as a percentage of BAH)

Paygrade	Number of MHAs with maximum BAH shortfall (as a percentage of BAH)					
	1% or less	1%–3%	3%–5%	5%–10%	10%–20%	Over 20%
E2	7	13	18	21	2	0
E3	5	22	13	37	8	0
E4	5	21	10	37	29	0
E5	10	17	13	45	38	2
E6	8	19	17	35	2	0
E7	5	16	15	49	20	0
E8	6	21	17	32	21	0
E9	8	20	19	37	29	0
W1	10	13	17	35	51	0
W2	3	12	8	16	3	0
W3	11	19	19	37	29	0
W4	9	12	18	38	68	10
W5	9	15	16	38	27	0
O1E	7	16	11	6	0	0
O2E	11	20	11	34	2	0
O3E	9	12	18	34	29	0
O1	8	19	19	42	32	0
O2	12	21	11	18	0	0
O3	10	18	21	31	32	0
O4	5	12	14	36	36	0
O5	8	15	17	21	14	0

Source: CNA.

Appendix D: Family Size and Suitability of Profiles

Table 17 shows the distribution of family size among BAH recipients with dependents by paygrade. For example, 61 percent of E1 to E4 personnel with dependents have only one dependent, in most cases a spouse. In addition, 23 percent have two dependents, 11 percent have three, 4 percent have four, and 1 percent have five or more. The percentage with only one dependent reaches its low point at E8 or O5 and then begins to climb again as children grow up and leave home.

Table 17. Distribution of family size by paygrade and BAH standard housing units

Paygrade	Num. of bedrooms	Formal BAH profile	Number of dependents				
			1	2	3	4	5+
E1 to E4	2	Halfway between 2-BR apt and townhouse	61%	23%	11%	4%	1%
E5	2	2-BR townhouse	45%	26%	19%	8%	3%
E6	3	3-BR townhouse	28%	24%	28%	14%	7%
E7	3	3-BR townhouse plus 36% toward 3-BR SFD ^a	18%	21%	32%	19%	10%
E8	3	3-BR townhouse plus 75% toward 3-BR SFD	15%	20%	35%	20%	11%
E9	3	3-BR SFD house plus 16% toward 4-BR SFD	18%	25%	33%	16%	7%
W1	3	3-BR townhouse plus 1% toward 3-BR SFD ^a	25%	20%	31%	16%	8%
W2	3	3-BR townhouse plus 52% toward 3-BR SFD ^a	18%	19%	32%	20%	11%
W3	3	3-BR SFD ^a	14%	20%	34%	20%	11%
W4	3	3-BR SFD house plus 22% toward 4-BR SFD	18%	22%	34%	18%	9%
W5	3	3-BR SFD house plus 48% toward 4-BR SFD	26%	27%	30%	11%	5%
O1E ^b	3	3-BR townhouse plus 44% toward 3-BR SFD ^a	59%	17%	15%	7%	3%
O2E	3	3-BR townhouse plus 93% toward 3-BR SFD ^a	57%	18%	15%	7%	3%

Paygrade	Num. of bedrooms	Formal BAH profile	Number of dependents				
			1	2	3	4	5+
O3E	3	3-BR SFD house plus 26% toward 4-BR SFD	41%	22%	22%	10%	5%
O1	2	2-BR townhouse plus 11% toward 3-BR townhouse	59%	17%	15%	7%	3%
O2	3*	2-BR townhouse plus 98% toward 3-BR townhouse	57%	18%	15%	7%	3%
O3	3	3-BR townhouse plus 98% toward 3-BR SFD ^a	41%	22%	22%	10%	5%
O4	3	3-BR SFD house plus 58% toward 4-BR SFD	20%	20%	32%	18%	10%
O5	4	4-BR SFD	14%	17%	36%	21%	12%
O6	4	4-BR SFD plus 1%	17%	20%	36%	19%	9%
O7	4	4-BR SFD plus 2%	22%	21%	35%	16%	6%

Source: BAH Primer and 2023 Green Book [1, 8].

^a BAH standards are either one of the six anchor points or an in-between proportional amount between anchor points.

^b Although the Green Book reports on officers with prior enlisted service separately, the distribution of family size it reports for them is proportionately the same as for other officers of the same paygrade, so it appears to have calculated percentages for each paygrade as a whole.

Based on these numbers and assumptions about the ages of the children, in

Table 18 we estimate the percentage of families in each paygrade for whom the associated housing profile provides enough bedrooms, under two sets of assumptions. For example, members below the grade of E5 who have dependents receive BAH tied to the prices of two-bedroom apartments and townhouses. For 84 percent, those two bedrooms would be enough for each child to have their own room (they have either zero or one child). For 95 percent, those two bedrooms would be enough for each child under age six to have their own room or share with one sibling, and we assume that all children of members in those paygrades are under age six.

Table 18. Percentages of families with sufficient bedrooms under the current BAH profiles

Paygrade	Number of bedrooms in BAH standard	Percentage of families with sufficient bedrooms in BAH standard units	
		With 1 child per bedroom	With sharing bedrooms ^a
E1 to E4	2	84%	95%
E5	2	70%	89%
E6	3	79%	94%
E7	3	71%	80%
E8	3	69%	79%
E9	3	76%	84%
W1	3	76%	84%
W2	3	69%	79%
W3	3	69%	79%
W4	3	73%	82%
W5	3	84%	89%
O1E ^b	3	90%	94%
O2E	3	90%	93%
O3E	3	85%	90%
O1	2	76%	91%
O2	3*	90%	100%
O3	3	85%	95%
O4	3	72%	81%
O5	4	88%	100%
O6	4	91%	100%
O7	4	94%	100%

Source: Reference: BAH Primer and 2023 Green Book [1, 8].

^a We assume E6s and O3s with multiple dependents have a child over 6; E7s, O4s, and warrant officers with multiple dependents have a child over 10; children under 10 may share a bedroom with a sibling of the same gender; and children under 6 may share a bedroom with one sibling of either gender. We also assume that two siblings have a 50 percent chance of being the same gender and that a six-year-old with three younger siblings has a 12.5 percent chance of being a different gender than all three of them.

^b Although the Green Book reports on officers with prior enlisted service separately, the distribution of family size it reports for them is proportionately the same as for other officers of the same paygrade, so it appears to have calculated percentages for each paygrade as a whole.

Appendix E: BAH Profile Adjustment Rules Based on Family Size

Here we explain our rules for estimating the cost of a policy change aligning BAH with family size. We assumed that the first dependent is a spouse sharing a bedroom with the member. We did not have data on the ages of members' children, so we made assumptions about them based on experience. We assumed that enlisted members in the grades E6 and above and officers in the grades O3 and above who have two or more dependents have a child over the age of 6. And we assumed that enlisted members in the grades of E7 and above, warrant officers, and commissioned officers in the grades of O4 and above who have two or more dependents have a child over the age of 10, and if there is a second child that child is over the age of 6.

Table 19 explains our adjustment rules. For example, paygrades E1 through E5 and O1 rate less than a three-bedroom townhouse (technically, so do O2s, but by only 2 percent of the difference from a two-bedroom). At those grades, we assumed that children are younger than 6 years old, so each child can share a room with one sibling. A family size of five or six implies more children than fit in one bedroom, so we upgraded them to the BAH for a three-bedroom townhouse (which we assumed is the average of that for an E6 with dependents and an O3E without dependents, or \$2,396 per month).

Table 19. Possible adjustment for family size

Current profile	Family size	Adjustment
Less than a 3-BR TH	5 or 6 (more than 2 children)	All assigned to 3-BR TH
3-BR TH or higher but less than a 4-BR SFD	6, with 1 child over 6YO	Assign one-eighth to 4-BR SFD (6YO is different gender from all younger siblings)
	5, with 1 child over 10YO and another over 6YO	Assign one-half to 4-BR SFD (6YO is different gender than younger sibling)
	6, with 1 child over 10YO and another over 6YO	All assigned to 4-BR SFD
Higher than 3-BR TH	4 (2 children)	Assign all to 3-BR TH
Higher than 2-BR TH	1, 2, or 3	Assign all to 2-BR TH

Source: CNA generated.

Appendix F: Overview of Housing Rental Market Indices and Methodologies

Zillow Observed Rent Index (ZORI) is a repeat rent index that is constructed by Zillow, a leading online real estate marketplace, with data starting from 2014. Zillow analyzes the rental prices from various sources, including their own rental listings and public data, to estimate changes in rental prices over time. The index takes into account the rental prices of various types of housing units such as apartments, townhouses, condos, and single family homes.

ZORI is designed to provide a timely and granular understanding of rental market trends accounting for changes in the types of rental properties available over time using a repeat rent or repeated transaction methodology. It calculates price differences for the same rental unit over time, and it then aggregates those differences across all properties repeatedly listed for rent on Zillow. It covers a wide range of geographic areas, including national, metropolitan, county, city, and ZIP levels for all regions where the available data are sufficient. It also uses weights for the index based on the latest data from the US Census Bureau ACS in which units that appear more frequently in the Zillow data are weighted less and those that appear less frequently are more heavily weighted. It uses the ACS to get the age of a building and the number of units it contains and breaks out three categories: single unit (detached and attached), two to four units, and five or more units in a building. Once the index is constructed, it is smoothed using a 3-month exponentially weighted moving average.

Consumer Price Index (CPI) is a widely recognized economic indicator published by the BLS in the United States. The CPI is a broad-based index that reflects changes in overall cost of living. It measures changes in the prices of a basket of goods and services, including housing or shelter. Shelter includes owner's equivalent rent and rent of primary residency. The rental component of CPI is based on housing surveys conducted by BLS through which they collect data on a sample of rental units and calculate changes in rent prices. The CPI survey uses stratified sampling methodology [25]. The CPI rent for primary residence data is available for select consolidated metropolitan statistical areas.

Penn State/ACY Marginal Rent Index (MRI) is constructed using data from Real Capital Analytics, which contains rental property transaction prices and capitalization rates for large professionally managed multifamily properties that have sold more than once since 2000 [46]. It is a product of two aggregate indices: a national repeat-sale index and the seller's forward-

looking estimates of average multifamily income yield (cap rate). The baseline rent index is then scaled to match the Repeat Rent Index developed by the same authors [47]. The MRI covers 20 states and 34 metropolitan areas [48].

ApartmentList Rent Estimates are estimates of the median rent across new leases signed in a given market and month. They start with the ACS of median rent for recent movers and extrapolate the data forward to the current month using a growth rate calculated using their listing data. They calculate growth rates using a same-unit analysis (similar to Case-Shiller's approach) that compares only units with transactions in multiple time periods to get an accurate picture of rent growth that controls for compositional changes in available inventory. It estimates median rent for city, county, core-based statistical area, or state.

Zumper calculates current median asking rents for one- and two-bedroom apartments for the top 100 cities and 300 additional cities within major metropolitan areas. The data are sourced through a combination of proprietary listings posted by landlords and brokers through Zumper's Landlord Platform and third-party listings from MLS providers.

RentCast is a real estate and property data application programming interface (API) that provides on-demand access to over 140 million property records, owner details, home value and rent estimates, comparable properties, and active sale and rental listings, as well as aggregate real estate market data. Users can query the rent estimate for a specific address or for latitude and longitude coordinates, and it will return the estimated rent expected from a long-term rental lease and provide comparable rental listings. They obtain their data from public county records, recorded deeds, tax assessor databases, and online real estate listing websites with historical aggregated rental market data by ZIP code starting in April 2020. The API is free for up to 50 calls per month, but long-term API contracts can be purchased.

Rentometer is a website that estimates rent prices for specific neighborhoods. Looking up rent estimates is free, but real estate professionals can purchase API contracts and tools. It collects and analyzes approximately 10 million rental records per year.

TruVest is a real estate investment, development, and technology company. It provides free rent estimates, mortgage estimates, property valuations, and property taxes on its website for any residential property in the US. The rental estimate model is based on a self-learning AI engine. For subscribers, it provides additional data analytics including rental and sales comparables, long-term investment projections, and estimates on capitalization rates and return on investment (ROI) for investment properties.

CoreLogic Single Family Rental Index (SFRI) is a private repeat rent index developed by CoreLogic, a global property information, analytics, and data solutions provider. SFRI includes higher tiered detached single family rental units, which realtors advertise in the MLS, and it

also tracks rental price changes nationally and across 20 metropolitan areas [27]. Since the SFRI is based on MLS data, it is not representative of the general rental market, in which the Census's Rental Housing Finance Survey estimated that only 11 percent of single-unit rental properties are listed using a real estate agent and listed on MLS. Although data are not available publicly online, CoreLogic publishes articles on housing market trends on their website: [Property Market Insights | CoreLogic®](#).

HUD Fair Market Rent (FMR) is calculated by HUD and is used as a reference point for determining rental assistance payments in various housing programs, including the Section 8 housing choice voucher program. HUD establishes a base rent for two-bedroom units using 40th percentile estimates of gross rent from the 5-year ACS. It then makes adjustments using a recent movers adjustment factor that is based on a ratio of the gross rents paid by recent movers from the 1-year ACS in order to gather the most accurate, comprehensive rental data at the local level. Gross rent includes the cost of shelter plus utilities (except telephone, cable or satellite television, or internet). It is then adjusted for inflation from the ACS year, which is calculated using the CPI, and a trend factor is applied using the expected future level of gross rent CPI to calculate the FMRs ahead of each fiscal year. The bedroom ratios are then applied to calculate rents for zero-bedroom (efficiency), one-bedroom, two-bedroom, three-bedroom, and four-bedroom units.

The FMR is adjusted annually to reflect changes in market conditions, with updated rates effective October 1 each year. It is not intended to represent the actual rental price for a specific unit or property, but rather a standard for determining rental subsidies based on market conditions. FMR may not always align with the actual rental prices in a particular area, especially in areas with rapidly changing rental markets. In FY 2023, the HUD methodology was modified because the Census Bureau could not release standard 1-year estimates from the 2020 ACS due to the COVID-19 pandemic. Instead, HUD utilized a multipronged approach that included six sources of rental data—four private and two public. The two public sources were Zillow's Observed Rent Index and Apartment List Rent Estimates. The four private sources were SFRI, RealPage (formerly Axiometrics) average effective rent per unit, Moody's Analytics REIS average gross revenue per unit, and the CoStar Group average effective rent. For these private sources, data and methodology were not available online but were available for purchase. To estimate an average gross rent inflation factor, HUD used private-sector rent data in which at least three sources cover the FMR area.

HUD 50th percentile rent: The methodology for determining the 50th percentile rents is the same as determining the FMR, but instead of using 40th percentile estimates of gross rent from the 5-year ACS, it uses the 50th percentile rent.

Table 20. Comparison of rental market indices

Characteristics	HUD 50th Pct	AptList	ZORI	CPI	MRI	SFRI	Zumper
Metric	Median Rent	Index	Index	Index	Index	Index	Median Rent
Start of data	2001	2017	2014	1953	Unknown	unknown	2018
Geographic coverage	Metropolitan areas and counties	500 cities, 50 states, and DC, National	National, metro, county, city, ZIP code	National, Census Regions, Division, Consolidated Metropolitan Statistical Areas	20 states and 34 metro areas	US, 20 major metro areas	Top 100 cities by pop and 300 cities within metro areas
Data sources	ACS, BLS	ACS and AptList Data	Zillow Data and ACS weights	BLS, FRED, St. Louis Federal Reserve	Real Capital Analytics	MLS	Zumper Landlord platform and MLS
Break out by unit sizes	Zero-BR (studio), 1-BR, 2-BR, 3-BR, and 4-BR units	1- and 2-BR	N/A	N/A	N/A	Single Family Homes	1- and 2-BR
Frequency of updates	Annual	Monthly	Monthly	Monthly	Monthly	Monthly	Monthly
Transparency and replicability	HUD has access to more data than publicly available	Rental data are proprietary, but methodology is published	Rental data are proprietary, but methodology is published	Data Available	Penn State researchers, published papers	Corelogic data are not publicly available	Rental data are proprietary
Method	ACS recent movers, adjusted	ACS recent movers, rent growth using repeat rents	Repeat rent	Stratified Sampling	Repeat sale	Repeat rent	Median asking rents
Data availability	Online	Online	Online	Online	Private	Private	Online

Source: CNA generated.

Appendix G: Research on School Quality and Housing Prices

Some studies of school quality and local housing costs use an instrumental variables strategy, relying on variation across neighborhoods in some factor strongly associated school quality that does not otherwise affect housing prices. For example, Downs and Zabel (2002) and Gibbons and Machin (2003) argue that the percent of the local population within a certain age range would be such a variable; however, the age distribution of a neighborhood likely affects its housing prices through mechanisms other than school quality, and similar arguments could likely be made for many other suggested variables [35, 49].

Another strategy is to examine houses very close to a school district or school catchment boundary, on the logic that nearby houses should have access to similar amenities and differ primarily based on assigned school quality. This approach is generally favored over instrumental variable approaches, but it still has its own challenges. Geographic proximity does not prevent housing prices or neighborhood quality from changing abruptly; for example, distance alone does not necessarily take boundaries such as highways or rivers into account [50]. Even if two areas are initially similar, positive feedback loops between school quality, neighborhood quality, and income levels can lead to diverging neighborhood quality and housing prices in nearby homes [51-52]. Similarly, living near a school district or catchment boundary could reflect some degree of risk tolerance in case the boundary shifts; however, some studies use alignment between district or catchment boundaries and (more stable) town boundaries to avoid this issue [53-56].

A third strategy is to look at houses that have been sold multiple times and evaluate how changes in sale price are associated with school quality [57-58]. This approach's strength is that comparing houses against their prior sale value implicitly accounts for all fixed characteristics of each house and its neighborhood; however, it cannot account for other changing measures of neighborhood quality that may be correlated with school quality. Furthermore, houses that are sold multiple times over a relatively short period of time may be systematically different from those that are not (e.g., if they are seen as particularly good or bad for young families) and therefore their sale values may have a different relationship with local school quality.

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Abbreviations

AAOA	American Apartment Owners Association
ACS	American Community Survey
AI	artificial intelligence
API	application programming interface
BAH	basic allowance for housing
BAS	basic allowance for subsistence
BLS	Bureau of Labor Statistics
BNA	basic needs allowance
BP	basic pay
CCG	county cost group
CHA	critical housing area
COLA	cost-of-living allowance
CPI	consumer price index
DMDC	Defense Manpower Data Center
DOD	Department of Defense
EMA	effective market area
FMR	fair market rent
HUD	Department of Housing and Urban Development
MHA	military housing area
MHO	military housing office
MLS	Multiple Listing Service
MRI	Marginal Rent Index
NDAA	National Defense Authorization Act
OSD	Office of the Secretary of Defense
PCS	permanent change of station
PUMA	public use microdata area
QRMC	Quadrennial Review of Military Compensation
RMC	regular military compensation
SFD	single family detached [home]
SFRI	Single Family Rent Index
THC	total housing cost
USC	United States Code
YOS	years of service
YOY	year-on-year
ZCTA	ZIP code tabulation area

ZORI

Zillow Observed Rent Index

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