Local LISEP Data TLC and TWE Methodology

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Introduction

In this iteration of the True Living Cost (TLC), we seek to produce estimates at the Metropolitan Statistical Area (MSA) level. As of March 2020, there were 384 MSAs in the U.S., but we focus on the 56 most populous ones. Out of these 56, there were geographical changes in 6 of them that made tracking of the same geography throughout time impossible given our data sources[1]. The included MSAs are listed in Appendix 1 alongside their most recent county-level delineations as defined by the U.S. Census Bureau. MSA boundaries changed over the years, which means we had to hold the most recent geographic boundaries constant to produce comparable TLC estimates over time.[2] LISEP's goal is to produce a TLC estimate for each of the 50 MSAs over the period 2005-2021.

A. MSA Population Counts and Geographic Delineations

1. Population Counts

To calculate the population of each MSA across years, we use the same U.S. Census intercensal county-level population estimates as in the main TLC Index. We match each MSA to the counties that fall within it and sum the population estimates of these counties in a given year. Then, LISEP calculates the proportion of the eight family types in each MSA using the American Community Survey (ACS).Those family types are the same as the ones listed in the main TLC index methodology.

2. Geographic Delineations

[1] These were the Birmingham-Hoover AL, Charlotte-Concord-Gastonia NC-SC, Grand Rapids-Kentwood MI, Indianapolis-Carmel-Anderson IN, Louisville-Jefferson County KY-IN, and Nashville-Davidson-Murfreesboro-Franklin TN MSAs.

[2] U.S. Census Bureau. "Delineation Files." Census.gov, 8 Oct. 2021, https://www.census.gov/geographies/reference-files/time-series/demo/metro-micro/delineation-files.html.

We run into several complications when attempting to keep the MSAs' geographic boundaries fixed over time. We list some of these issues and the approach we adopted to overcome them.[3]

a. MSAs that gain or lose counties over time

The first problem encountered in calculating the TLC at the MSA-level is that the MSAs' geographic definitions changed over time. We define the MSAs' boundaries to be those most recently published by the Census Bureau in 2020 (the most recent year). Because each MSA is defined as a group of counties, we use county-level data whenever possible. We then aggregate the county data back to the MSA level using county population counts as weights. Several MSAs gain and lose counties over the years as boundaries are constantly in flux. Thus, we add or subtract counties from MSAs based on the boundaries defined in 2020 to establish MSAs with fixed borders over time.

b. MSAs that split over time

Some MSAs were divided in two at some point in the period 2001-2021. A few examples:

- In 2003, the Baltimore-Washington DC MSA split into the Washington-Arlington-Alexandria, DC-VA-MD-WV MSA and the Baltimore-Towson, MD MSA.
- In 2003, the Los Angeles-Riverside-Orange County, CA MSA split into Los Angeles-Long Beach-Santa Ana, CA MSA and the Riverside-San Bernardino-Ontario, CA MSA.
- In 2003, the Raleigh-Durham-Chapel Hill, NC MSA split into the Raleigh-Cary, NC MSA and the Durham, NC MSA. These splits present further problems in data accuracy throughout time which we will discuss in later sections.

[3] Some MSAs only changed in name while their boundaries remained intact. No changes were needed for these MSAs.

When the data is presented only at the MSA level, it is impossible to discern the portion of the data that applies to the MSA's current geographic boundaries. For instance, rent prices are usually higher in DC than in Baltimore, but the data is combined for these two MSAs in years prior to 2004. Since we don't know the influence that DC has on this price versus Baltimore, we can't allocate a rent price to each current MSA using the past combined MSA's data. To overcome this problem, we started our TLC estimates in 2005, the year after which none of the MSAs of interest split.

c. MSAs that cross state lines

The last geographical problem concerns MSAs that stretch across state lines. If we had data at the county level, this would not be a problem. But for certain parts of the budget (childcare, car insurance premiums for transportation, and medical care premiums), the only data available was at the state level. For these categories, we used the county population estimates to calculate the ratio of the MSA population that lived in each state for each year. We then used these ratios as weights to produce cost estimates at the MSA level.[4]

[4] U.S. Census Bureau. "County Population Totals: 2020-2021." Census.gov, https://www.census.gov/data/tables/time-series/demo/popest/2020s-counties-total.html.

B. Wages

We calculate the wages for the localized True Weekly Earnings (TWE) in the exact same way that we calculate the national TWE except with the population being defined by the MSA instead of the nation. For reference, we track this process in depth in the TWE Methodology, found here: https://assets-global.website-files.com/63ba0d84fe573c7513595d6e/63c1b88e3742ca36ae193f70_TRU%20Methodology.pdf. Which you can find on the TWE section of the LISEP website.

C. Housing

To calculate the cost of minimally adequate housing for a given MSA, we use the same general approach as in the national TLC. We use the Housing and Urban Development Department's Fair Market Rent (FMR) county-level estimates.[5] For each year, we aggregate the FMR estimates for the counties that fall within the current boundaries of each MSA, using intercensal county population counts from the Census Bureau as weights to obtain an MSA-level housing cost.[6]

1. Complications

a. Fair Market Rents of the 50th Percentile

The first issue that we face in constructing consistent housing cost estimates throughout time is that several counties and MSAs used the 50th percentile FMR for some years in the sample and then switched to the traditional 40th percentile used in the national TLC Index.

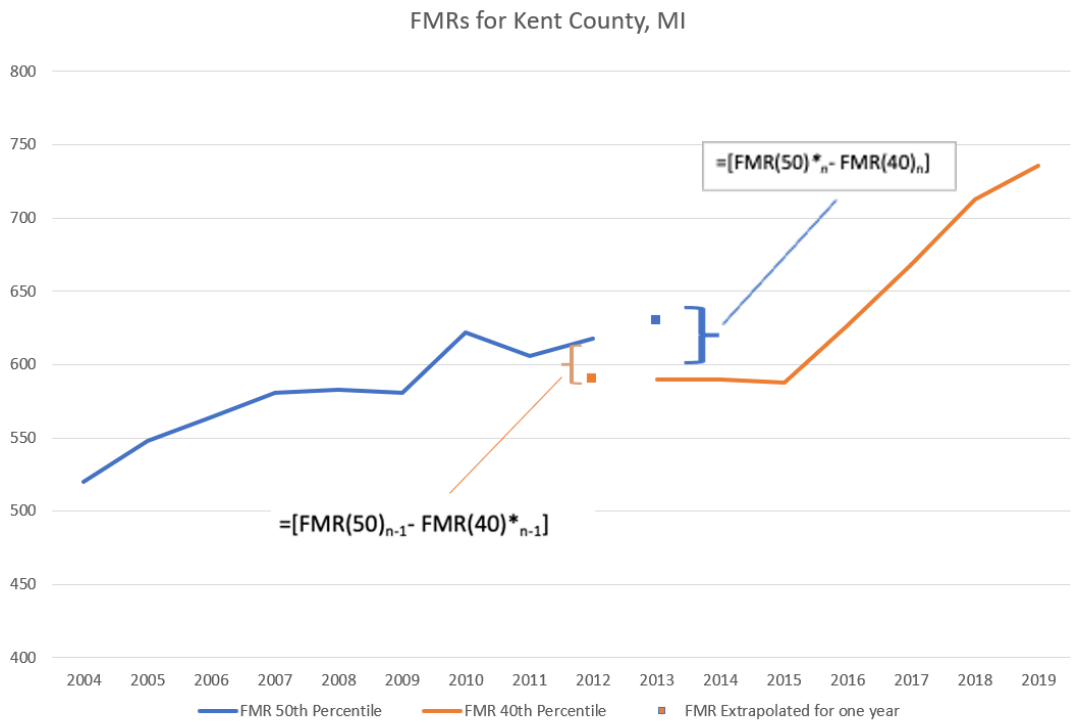
Step 1: To correct for this variation in these counties, we take the 40th percentile FMRs for all of the years in which there was data for the 40th percentile. For the years in which the 50th percentile FMR was recorded, we have the advantage of knowing the 50th percentile FMR in at least two consecutive years, which allows us to extrapolate linearly into the years in which data for the 40th percentile was recorded. We assume that during these years, the 40th and 50th percentile FMRs moved in parallel to each other. We apply this linear trend of the 50th percentile rents to the MSA for each year in which the 40th percentile was not available.

[5] "FY 2022 Fair Market Rent Documentation System." Fair Market Rents (40th PERCENTILE RENTS) | HUD USER, https://www.huduser.gov/portal/datasets/fmr.html#null.
[6] Bureau, US Census. "Population and Housing Unit Estimates Tables." Census.gov, 17 Dec. 2021, https://www.census.gov/programs-surveys/popest/data/tables.2019.List_58029271.html.

To illustrate this calculation, this is an example from Kent County Michigan which switched from 50th percentile FMRs to 40th percentile FMRs in 2013.

Table 1: Homogenization of FMR estimates for Kent County, MI

Year	FMR 50th Percentile (step 1)	FMR 40th Percentile (step 1)	FMR Extrapolated one year (step 2)
2004	520		
2005	548		
2006	564		
2007	581		
2008	583		
2009	581		
2010	622		
2011	606		
2012	618		590 (extrapolated from 40th trend)
2013		590	630 (extrapolated from 50th trend)
2014		590	
2015		588	
2016		627	
2017		668	
2018		713	
2019		736	



Step 2: Following the extrapolation, we still face the problem of not knowing the first point of our constructed time series. In other words, what is the difference between the 40th and 50th percentile FMR during the years in which we only have the 50th percentile? Mathematically, we have two options. For simplicity, we will call the first year in which 40th percentile rents were recorded year *n*. First, we could extrapolate the time trend of the 40th percentile FMRs created in year *n* and year *n+1* to year *n-1* and then adjust further back in time (*n-2, n-3,* etc.) using the time trend of the 50th percentile rents as discussed above. This could be problematic if there was a shift in the FMR trend at year *n-1* or at year n. For example, if there was a peak at *n-1*, and we chose to linearly interpolate onto the year *n-1* using *n* and *n+1*, the assumed 40th percentile rent could be higher than the observed 50th percentile rent. For example, suppose that the 50th percentile rent is $500 for year *n-2*, $600

for year *n-1*, \$500 for year n and \$300 for year *n+1*. This would cause the assumed rent at *n-1* to be \$700, higher than the observed 50th percentile FMR (\$600) which is illogical.

To avoid this, we considered a combination of the trends before and after the switch in percentiles of FMRs. To do this, we extrapolated the 50th percentile rent trend onto year *n* and took the difference between ($FMR(50)*_n$) and the observed 40th percentile FMR at year *n* [$FMR(40)_n$]. We also took the difference between the extrapolated 40th percentile trend at year *n-1* [$FMR(40)*_{n-1}$] and the observed 50th percentile recorded FMR at year *n-1* [$FMR(50)_{n-1}$]. We then calculated the average of this difference and subtracted it from the observed 50th percentile FMR for year *n-1*. We used this point as an anchor and then applied the linear trends of the 50th percentile FMRs to this anchoring point to obtain our theoretical 40th percentile FMRs so that we could have a consistent time series.[7] In the example, the anchor point would be 618 - [(630 - 590) + (618 - 590)] / 2 = 584.

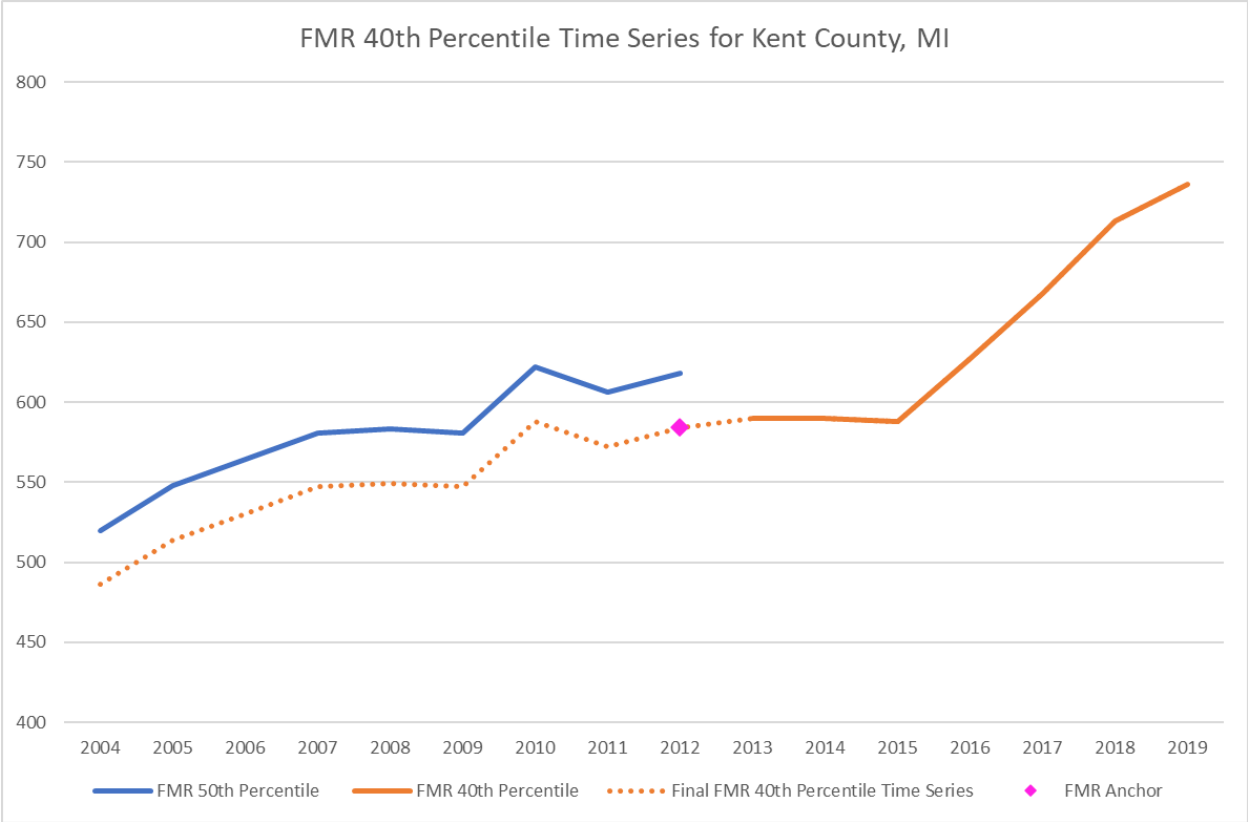
Mathematically, the anchor point is defined as:

$$FMR_{anchor} = FMR(50)_{n-1} - [\,[FMR(50)*_n - FMR(40)_n] + [FMR(50)_{n-1} - FMR(40)*_{n-1}]\,] / 2$$

and the first point in the linear interpolation is:

$$FMR_{(n-1)} = FMR_{anchor} - (FMR(50)_{n-1} - FMR(50)_{n-2})$$

[7] A full list of all of the counties surveyed and the respective percentiles of their Fair Market Rents for that year can be found at https://www.huduser.gov/portal/datasets/fmr.html#null in each year's Schedule B report.



Even after this adjustment procedure, LISEP could not estimate the cost of rent for some MSAs given the data from HUD. Counties within these MSAs were deleted from or added to that MSA, but the HUD never provided FMR data for these counties separately. In some instances, the HUD provided FMR estimates for the MSA as a whole, which was a different geographical region from the one we are tracking with the most recent boundaries. These MSA areas are Seattle, Raleigh-Cary, and Philadelphia-Wilmington. However, this situation took place before 2005, so it doesn't affect our TLC estimates which start in 2005, as stated previously.

C. Food

In the national TLC index, we use meal prices from the Map the Meal Gap dataset at the state level to produce a national food cost estimate. To produce MSA-level estimates, we use the Map the Meal Gap at the county level. We then combine counties into MSAs and use county intercensal population estimates as weights.[8] We use the MSA-level Consumer Price Index (CPI) for food at home (ELI code AF11) published by the Bureau of Labor Statistics (BLS) to adjust the local cost of food prior to 2009 and after 2019 when Map the Meal Gap data is unavailable. For the MSAs and years in which the CPI is not provided, we use the food at home CPI for the region in which the MSA falls (Northeast, South, Midwest, West). Table 2 details the years and MSAs for which CPI of food at home is available.

To generate the final cost of food, we set the allocation for each family to be the same allocation as detailed in the Food Section of the TLC Methodology. We allocate the national cost of the USDA low-cost food plan by family type for 2019 and e adjust this price throughout MSAs for each year using the changes in the Map the Meal Plan costs and the CPI for food at home. For Honolulu MSA, the Map the Meal Gap data is not available until 2010, and so we use the CPI values for 2009 as well.

Table 2: MSAs and Years in which CPI for Food at Home is available

MSA	First Year Available	Last Year Available	Years Allocated Regional CPI
Pittsburgh, PA	2001	2017	2020
Cleveland-Akron, OH	2001	2017	2020
Milwaukee-Racine, WI	2001	2017	2020

[8] Bureau, US Census. "Population and Housing Unit Estimates Tables." Census.gov, 17 Dec. 2021, https://www.census.gov/programs-surveys/popest/data/tables.2019.List_58029271.html.

Cincinnati-Hamilton, OH-KY-IN	2001	2017	2020
Kansas City, MO-KS	2001	2017	2020
Riverside-San Bernardino-Ontario, CA	2001	2017	Los Angeles-Riverside-Orange County, CA CPI recorded 2001-2017. switched to specific MSA for 2020 when data was available
Portland-Salem, OR-WA	2001	2017	2020
Boston-Cambridge-Newton, MA-NH	2001	2022	
New York-Newark-Jersey City, NY-NJ-PA	2001	2022	
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	2001	2022	
Chicago-Naperville-Elgin, IL-IN-WI	2001	2022	
Detroit-Warren-Dearborn, MI,	2001	2022	
Minneapolis-St.Paul-Bloomington, MN-WI	2018	2022	2001-2008
St. Louis, MO-IL	2018	2022	2001-2008
Washington-Arlington-Alexandria, DC-VA-MD-WV	2001	2022	
Miami-Fort Lauderdale-West Palm Beach, FL	2001	2022	
Atlanta-Sandy Springs-Roswell, GA	2001	2022	
Tampa-St. Petersburg-Clearwater, FL	2018	2022	2001-2008
Baltimore-Columbia-Towson, MD	2001	2022	

Dallas-Fort Worth-Arlington, TX,	2001	2022	
Houston-The Woodlands-Sugar Land, TX	2001	2022	
Phoenix-Mesa-Scottsdale, AZ	2018	2022	2001-2008
Denver-Aurora-Lakewood, CO	2018	2022	2001-2008
Los Angeles-Long Beach-Anaheim, CA	2001	2022	
San Francisco-Oakland-Hayward, CA	2001	2022	
Seattle-Tacoma-Bellevue, WA	2001	2022	
San Diego-Carlsbad, CA	2018	2022	2001-2008
Urban Hawaii (Applied to Honolulu MSA)	2018	2022	2001-2009
All other MSAs in list	N/A	N/A	2001-2008, 2020

D. Medical Care

1. Medical Premiums

We use the same methodology for medical costs as in the national TLC. Our approach involves two different datasets, both available from the Medical Expenditure Panel Survey (MEPS) conducted by the Agency for Healthcare Research and Quality (AHRQ). The medical premium cost is available at the state level. For MSAs that exist entirely within one state, we allocate the premiums based on the number of individuals in each family type (detailed calculation in Section 1 of main TLC methodology). We allocate the family plan, the single plan, and the employee plus one plan to each of the family types in the same way as the national TLC index: single plan for family type 1, employee plus one for family types 2 and 5 and Family plan for the remaining family types.

For the MSAs that cross state lines, we adjust the state premiums by the proportion of the MSA population in each state. The critical assumption that we make in this step is that the MSA family proportions are level across state lines within the MSA. Because the data from the ACS that we use to calculate family proportions is only available at the state level and the MSA level, LISEP cannot determine family proportions at the county level within each MSA. Alternatively, we could assume that the family proportions are level throughout the state rather than the MSA. This would be a more radical and less probable assumption since the distribution of family sizes is more likely to change in a larger state that encompasses rural and urban areas than, for example, smaller states that are fully metropolitan.

2. Out-Of-Pocket Expenses

To calculate the cost of medical out-of-pocket expenses, we use the same MEPS microdata as in the national TLC. We are able to compute MSA-level out-of-pocket cost estimates thanks to the restricted state-level geographic identifiers we obtained from the AHRQ.

In the national index, the most granular geographic variable that we used was the census region (Northeast, Midwest, South, and West).

Similarly to the national TLC index, we calculated the out-of-pocket expenditures for families that were covered by employer insurance and earned an income in the 25th to 75th percentile of the wage distribution. Because of this restriction to employer-sponsored coverage and our use of state-level rather than regional data, some states had relatively small sample sizes for adult out-of-pocket and child out-of-pocket spending. In these situations, to make sure that large variance inherent to small sample sizes did not affect the results, we generated a three-year moving average for each state for both the adult and the child out-of-pocket spending. For the years at the beginning and end of the sample, we calculate a two-year average of that year's estimate and the closest available value (n+1 for the earliest year and n-1 for the latest year). We use the resulting averages as the estimates for child and adult out-of-pocket costs in a given year and MSA, and allocate them based on the number of children and adults for each family type.

Although most of the state identifiers can be accessed upon request, the AHRQ doesn't grant access to some state identifiers because of significantly small sample sizes. Some of these states are important to compute the TLC for a few of our target MSAs. To mitigate this problem, we assigned the regional out-of-pocket costs to MSAs where necessary state-level data is unavailable. While unideal, these imputations are necessary for MSAs that have a large portion or the totality of their population in a state without MEPS data. In these cases where we estimate regional out-of-pocket costs, we do not calculate a moving average for the region because sample size is sufficiently large to produce reliable estimates. Table 3 lists these MSAs.

For interstate MSAs, if we were able to estimate the out-of-pocket spending for one state, we would use this state-level value weighted by the state's relative importance in the MSA for

that year. Then, we add to the calculation the regional out-of-pocket expenditure incurred in the other state(s) of the MSA weighted by that state(s)' relative importance in the MSA for that year.

Table 3: List of states for which the AHRQ doesn't provide identifiers

State	Corresponding MSA	Relative Importance of State Value in that MSA (Averaged throughout the years)	Regional value used in place of state value
Arkansas	Memphis, TN-MS-AR	3.84%	South
District of Columbia	Washington-Arlington-Alexandria, DC-VA-MD-WV	10.86%	South
Delaware	Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	10.4%	South
Hawaii	Urban Honolulu, HI	100%	West
Kansas	Kansas City, MO-KS	40.83%	Midwest
Mississippi	Memphis, TN-MS-AR	17.65%	South
Missouri	Kansas City, MO-KS	59.17%	Midwest
Missouri	St. Louis, MO-IL	75.04%	Midwest
New Hampshire	Boston-Cambridge-Newton, MA-NH	9.12%	Northeast
Nevada	Las Vegas-Henderson-Paradise, NV	100%	West
Rhode Island	Providence-Warwick, RI-MA	65.79%	Northeast
Utah	Salt Lake City, UT	100%	West
West Virginia	Washington-Arlington-Alexandria, DC-VA-MD-WV	0.91%	South

3. Dental Care

We use the regional identifier (Northeast, West, South, Midwest) in the MEPS and the Consumer Expenditure (CE) survey and follow the same procedure as the national TLC to estimate the cost of dental premiums and out-of-pocket expenses. More granular data (state-level or MSA-level) is not available.

E. Childcare

To calculate the cost of childcare at the MSA level, we use the same methodology outlined in the national TLC. We obtain state-level data on childcare center fees from the nonprofit Child Care Aware Of America. For before and afterschool childcare fees for eight-

year-olds, we obtain state-level data from both Child Care Aware Of America and the National Database of Childcare Prices. For summer programming, we use state-level data from the Afterschool Alliance. These datasets do not have estimates for all years, so for years where cost estimates are missing between two known estimates, we perform linear interpolation to fill the gap. For years where data is not available before or after, we use the CPI for Daycare and Preschool for the U.S. average city to extend the cost estimates. This allows us to have a full dataset for all the years at the state level.

For MSAs that fall entirely within the borders of one state, we assign that state's childcare costs (centers, afterschool, and summer programming). For interstate MSAs, we consider the population distribution of the MSA between the states in which it lies for each year. For example, to calculate the childcare cost in the Boston MSA in 2005, we hold the MSA's current county composition constant over time. We then calculate that in 2005, 91% of the Boston MSA as defined today fell in Massachusetts and 9% fell in New Hampshire. We construct a composite childcare cost estimate that takes into account the childcare costs in those states in proportion to their share of the MSA population. In the Boston example, we calculate the childcare costs for this MSA to be the sum of 91% of the cost of childcare in Massachusetts and 9% of the cost in New Hampshire. As mentioned above, when we make this type of calculation, we implicitly make the assumption that the MSA family proportions are level across state lines within the MSA. It's worth noting that we calculate the population distribution of a given interstate MSA in the states over which it extends for every year in the sample. For example, while 76.5% of the Cincinnati MSA population lived in Ohio in 2005, this percentage was 75.8% in 2022. We use the CPI for childcare in the average U.S. city to extend these costs to the latest year.

F. Miscellaneous

For the cost of apparel, personal care and household items, we were unfortunately unable to obtain data any more granular than the regional data used in the calculation of the national TLC. We thus allocate regional cost estimates to each corresponding MSA.

G. Transportation

To calculate the cost of transportation at the MSA level, we first determine the MSA-level cost of car ownership. Our methodology was similar to the national TLC calculation where we took the American Automobile Association's data on car ownership costs published by the Bureau of Transportation Statistics (BTS). To determine costs by MSA, we replaced the average cost of insurance by the cost of purchasing minimum coverage for car insurance in each state. We also replaced the cost of fuel per mile driven at the national level by the average cost of fuel per mile at the state level. Finally, we assigned these minimum costs of owning a car for each family type in each MSA.

1. Car Insurance

To estimate the minimum coverage cost of automobile insurance at the state level, we needed to determine both the required level of insurance coverage for each state and the average premium price to meet those requirements for each year between 2005 and 2022. Since virtually every state requires a certain level of liability coverage to drive legally, we assume that meeting those requirements is the cost of car insurance needed to meet minimum adequate needs for drivers. While purchasing more comprehensive insurance coverage is a smart idea, this goes beyond the minimum adequate need of car insurance. Consequently, we calculate the average premium for each necessary liability coverage component rather than taking the average cost of insurance in each state since the latter is significantly higher due to more comprehensive insurance being more expensive.

We determined the insurance requirements for each state as established by the "Automobile Financial Responsibility Limits By State" archived tables from the Insurance Information Institute.[9] In general, most states require at least Bodily Injury (BI) and Property

[9] https://www.iii.org/table-archive/21211 accessed on 10/17/2023.

Damage (PD) liability coverage while some may additionally require at least one of Personal Injury Protection (PIP), Uninsured Motorist (UM), Underinsured Motorist (UIM) and Medical Payments (Med Pay) liability coverages. Each state sets the minimum limits for the amounts that insurers must cover per person and per incident. Below is a detailed table with the required type of liability coverage for each state.

Table 4: List of required type of liability coverage for each state

State	Insurance required	State	Insurance required
Alabama	BI & PD Liab	Montana	BI & PD Liab
Alaska	BI & PD Liab	Nebraska	BI & PD Liab, UM, UIM
Arizona	BI & PD Liab	Nevada	BI & PD Liab
Arkansas	BI & PD Liab, PIP	New Hampshire	BI & PD Liab, UM
California	BI & PD Liab	New Jersey	BI & PD Liab, PIP, UM, UIM
Colorado	BI & PD Liab	New Mexico	BI & PD Liab

Connecticut	BI & PD Liab, UM, UIM	New York	BI & PD Liab, PIP, UM, UIM
Delaware	BI & PD Liab, PIP	North Carolina	BI & PD Liab, UM, UIM
D.C.	BI & PD Liab, UM	North Dakota	BI & PD Liab, PIP, UM, UIM
Florida	PD Liab, PIP	Ohio	BI & PD Liab
Georgia	BI & PD Liab	Oklahoma	BI & PD Liab
Hawaii	BI & PD Liab, PIP	Oregon	BI & PD Liab, PIP, UM, UIM
Idaho	BI & PD Liab	Pennsylvania	BI & PD Liab, PIP
Illinois	BI & PD Liab, UM	Rhode Island	BI & PD Liab, UM
Indiana	BI & PD Liab	South Carolina	BI & PD Liab, UM

Iowa	BI & PD Liab	South Dakota	BI & PD Liab, UM, UIM
Kansas	BI & PD Liab, PIP, UM	Tennessee	BI & PD Liab
Kentucky	BI & PD Liab, PIP	Texas	BI & PD Liab
Louisiana	BI & PD Liab	Utah	BI & PD Liab, PIP
Maine	BI & PD Liab, UM, UIM	Vermont	BI & PD Liab, UM, UIM
Maryland	BI & PD Liab, PIP, UM, UIM	Virginia	BI & PD Liab, UM, UIM or $500 uninsured driver fee
Massachusetts	BI & PD Liab, PIP, UM	Washington	BI & PD Liab
Michigan	BI & PD Liab, PIP	West Virginia	BI & PD Liab, UM

Minnesota	BI & PD Liab, PIP, UM, UIM	Wisconsin	BI & PD Liab, UM
Mississippi	BI & PD Liab	Wyoming	BI & PD Liab
Missouri	BI & PD Liab, UM		

We calculate the average cost to meet each requirement in each state using earned premiums and earned exposure (corresponding to the risk of insuring a car for one year) data from the National Association of Insurance Commissioners (NAIC).[10] Their Auto Insurance Database Reports contains aggregated earned premiums and earned exposures numbers for each year and state for each relevant coverage type up to 2019, so we can calculate the average premium based on the formula that the NAIC uses (Premium/Exposure). For example, insurers in Nebraska earned $252,177,636 in premiums for BI Liability coverage as well as 1,485,205 in exposures in 2017, so the average BI Liability premium for Nebraska in 2017 was $169.79:

$$252{,}177{,}636 \div 1{,}485{,}205 \; = \; \$169.79$$

We repeat this calculation to estimate the cost of each liability coverage type and aggregate at the state level to determine the minimum cost of insurance for each state and year between 2005 and 2019. Since data for the years 2020, 2021 and 2022 is unavailable, we

[10] https://naic.soutronglobal.net/Portal/Public/en-GB/RecordView/Index/608

determine the minimum cost for car insurance in each state by taking the values from 2019 and adjusting them using the annual CPI for Motor Vehicle Insurance from the BLS.[11]

Special considerations for some states:

In addition to the considerations for New Hampshire and Virginia footnoted earlier, we needed to make special considerations for Florida, Tennessee and Utah as well as for Texas. In Florida, Tennessee and Utah, policyholders can satisfy the policy limits requirement with the BI/PD Combined Single Limits (CSL) Liability coverage. As a result, if for any given year the average premium for a BI/PD Combined Single Limits coverage is lower than the sum of BI and PD liability, the average CSL premium cost will replace the BI and PD cost. This change only impacts Utah where the CSL premium is lower than the sum of the BI and PD every year except for 2018.

In Texas, we use the "average number of vehicles reported for policies in force" to approximate the number of exposures each year since the number of written exposures for the state is not reported. The NAIC determines this number from voluntary BI Liability, involuntary BI liability and collision coverages collected quarterly by the Texas Department of Insurance, so this represents the best estimate for earned exposures in liability coverage.[12]

2. Fuel Costs

For fuel costs, we use data from the United States Energy Information Administration (EIA)[13]. This government agency provides data for both conventional and reformulated gas prices. Reformulated gas is blended so that it emits less when burning than does conventional

[11] https://data.bls.gov/pdq/SurveyOutputServlet

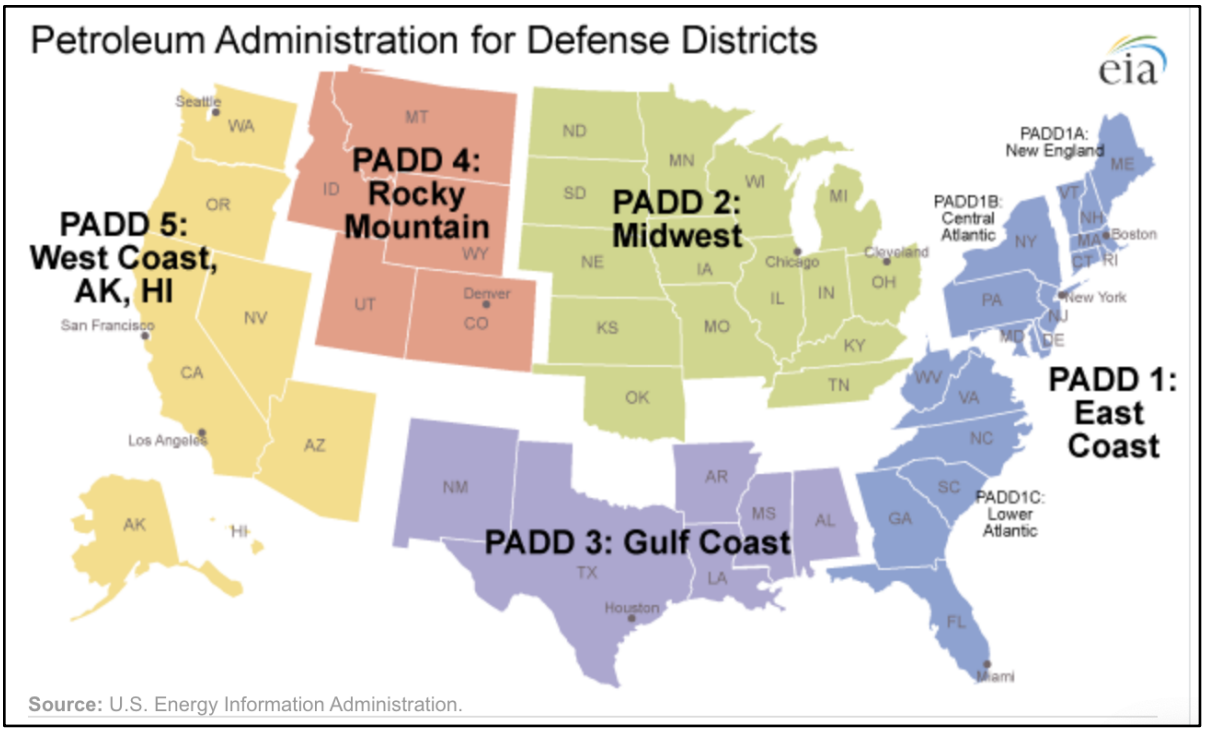
[12] *National Association of Insurance Commissioners. "2018/2019 Auto Insurance Database Report" p. 16, 2022* https://naic.soutronglobal.net/Portal/Public/en-GB/DownloadImageFile.ashx?objectId=7902&ownerType=0&ownerId=608

[13] *Petroleum & other liquids - U.S. energy information administration (EIA)*. Petroleum & Other Liquids - U.S. Energy Information Administration (EIA). (n.d.). Retrieved October 18, 2022, from https://www.eia.gov/petroleum/

gasoline.[14]“ Because of the Clean Air Act amendments passed in 1990, certain cities and areas are mandated to sell only reformulated gasoline. Other states have voluntarily opted into this program of reformulated gas sale as well.[15] We use the average gas price for regular (lowest grade) reformulated gas in the areas that have the reformulation mandate and the average gas price for regular (lowest grade) conventional gas for the areas that do not have the mandate. The EIA provides average prices for certain cities, states, and for Petroleum Administration for Defense Districts (PADDs). The PADD’s are shown in the map below. For the MSAs in which there was data at the city level, we use that data. If city-level data was not available, we use the state average. If neither city nor state data were available, we use the PADD average applicable to the MSA. If any of the major cities in the MSA had the reformulation mandate, we consider that MSA to be mandated overall and use the price for reformulated fuel for the most granular geography we can find.

[14] Environmental Protection Agency. (n.d.). *Reformulated Gasoline*. EPA. Retrieved October 18, 2022, from https://www.epa.gov/gasoline-standards/reformulated-gasoline

[15] The cities which use reformulated is shown here: https://www.epa.gov/gasoline-standards/reformulated-gasoline.



Source: *Padd regions enable regional analysis of petroleum product supply and movements*. Homepage - U.S. Energy Information Administration (EIA). (n.d.). Retrieved October 18, 2022, from https://www.eia.gov/todayinenergy/detail.php?id=4890

3. Aggregating Costs

For the other costs, we use the same methodology as in the National TLC Index. To estimate the cost of public transit for those who don't drive to work, we use data from the Bureau of Public Transportation. We combine the data from insurance costs and gas prices with the data from the AAA for owning a car that were not related to insurance costs and gas prices (nationally). Thus, the cost of owning a car is made up of two MSA-level components for which we had the data to confidently apply more granular costs to MSAs. The other components, for which we lacked data, were just the national averages.

To determine the allocation of cars, we use the same methodology as the overall TLC but instead of taking the national average of cars for each family type, we break down this average for each metropolitan area. This then allows for the MSA's transportation infrastructure, if it

affects the car buying decision of the families in the MSA, to affect the allocation of transportation costs.

H. Technology

To calculate the cost of minimal technology, we use the approach of the national TLC Index. We did not localize this number anymore because regional identifiers were not available for each expenditure category (i.e. hardware found on archived web pages).

Appendix 1

County Delineations of Documented Metropolitan Statistical Areas

CBSA Code	County Name	CBSA Title	CBSA Code	County Name	CBSA Title
12060	Barrow County	Atlanta-Sandy Springs-Roswell, GA	35380	Jefferson Parish	New Orleans-Metairie, LA
12060	Bartow County		35380	Orleans Parish	
12060	Butts County		35380	Plaquemines Parish	
12060	Carroll County		35380	St. Bernard Parish	
12060	Cherokee County		35380	St. Charles Parish	
12060	Clayton County		35380	St. James Parish	
12060	Cobb County		35380	St. John the Baptist Parish	
12060	Coweta County		35380	St. Tammany Parish	
12060	Dawson County		35620	Nassau County	New York-Newark-Jersey City, NY-NJ-PA
12060	DeKalb County		35620	Suffolk County	
12060	Douglas County		35620	Essex County	
12060	Fayette County		35620	Hunterdon County	
12060	Forsyth County		35620	Morris County	
12060	Fulton County		35620	Sussex County	
12060	Gwinnett County		35620	Union County	
12060	Haralson County		35620	Pike County	
12060	Heard County		35620	Middlesex County	
12060	Henry County		35620	Monmouth County	

12060	Jasper County		35620	Ocean County	
12060	Lamar County		35620	Somerset County	
12060	Meriwether County		35620	Bergen County	
12060	Morgan County		35620	Hudson County	
12060	Newton County		35620	Passaic County	
12060	Paulding County		35620	Bronx County	
12060	Pickens County		35620	Kings County	
12060	Pike County		35620	New York County	
12060	Rockdale County		35620	Putnam County	
12060	Spalding County		35620	Queens County	
12060	Walton County		35620	Richmond County	
12420	Bastrop County	Austin-Round Rock, TX	35620	Rockland County	
12420	Caldwell County		35620	Westchester County	
12420	Hays County		36420	Canadian County	Oklahoma City, OK
12420	Travis County		36420	Cleveland County	
12420	Williamson County		36420	Grady County	
12580	Anne Arundel County	Baltimore-Columbia-Towson, MD	36420	Lincoln County	
12580	Baltimore County		36420	Logan County	
12580	Carroll County		36420	McClain County	
12580	Harford County		36420	Oklahoma County	
12580	Howard County		36740	Lake County	

12580	Queen Anne's County		36740	Orange County	Orlando-Kissimmee-Sanford, FL
12580	Baltimore city		36740	Osceola County	
14460	Norfolk County	Boston-Cambridge-Newton, MA-NH	36740	Seminole County	
14460	Plymouth County		37980	Burlington County	Philadelphia-Camden-Wilmington, PA-NJ-DE-MD
14460	Suffolk County		37980	Camden County	
14460	Essex County		37980	Gloucester County	
14460	Middlesex County		37980	Bucks County	
14460	Rockingham County		37980	Chester County	
14460	Strafford County		37980	Montgomery County	
15380	Erie County	Buffalo-Cheektowaga-Niagara Falls, NY	37980	Delaware County	
15380	Niagara County		37980	Philadelphia County	
16980	Cook County	Chicago-Naperville-Elgin, IL-IN-WI	37980	New Castle County	
16980	DuPage County		37980	Cecil County	
16980	Grundy County		37980	Salem County	
16980	McHenry County		38060	Maricopa County	Phoenix-Mesa-Scottsdale, AZ
16980	Will County		38060	Pinal County	
16980	DeKalb County		38300	Allegheny County	Pittsburgh, PA
16980	Kane County		38300	Armstrong County	
16980	Kendall County		38300	Beaver County	
16980	Jasper County		38300	Butler County	
16980	Lake County		38300	Fayette County	

16980	Newton County		38300	Washington County	
16980	Porter County		38300	Westmoreland County	
16980	Lake County		38900	Clackamas County	
16980	Kenosha County		38900	Columbia County	
17140	Dearborn County		38900	Multnomah County	Portland-Vancouver-Hillsboro, OR-WA
17140	Franklin County		38900	Washington County	
17140	Ohio County		38900	Yamhill County	
17140	Union County		38900	Clark County	
17140	Boone County		38900	Skamania County	
17140	Bracken County		39300	Bristol County	
17140	Campbell County	Cincinnati, OH-KY-IN	39300	Bristol County	
17140	Gallatin County		39300	Kent County	Providence-Warwick, RI-MA
17140	Grant County		39300	Newport County	
17140	Kenton County		39300	Providence County	
17140	Pendleton County		39300	Washington County	
17140	Brown County		39580	Franklin County	
17140	Butler County		39580	Johnston County	Raleigh, NC
17140	Clermont County		39580	Wake County	

17140	Hamilton County		40060	Amelia County	
17140	Warren County		40060	Charles City County	
17460	Cuyahoga County	Cleveland-Elyria, OH	40060	Chesterfield County	
17460	Geauga County		40060	Dinwiddie County	
17460	Lake County		40060	Goochland County	
17460	Lorain County		40060	Hanover County	
17460	Medina County		40060	Henrico County	
18140	Delaware County	Columbus, OH	40060	King and Queen County	Richmond, VA
18140	Fairfield County		40060	King William County	
18140	Franklin County		40060	New Kent County	
18140	Hocking County		40060	Powhatan County	
18140	Licking County		40060	Prince George County	
18140	Madison County		40060	Sussex County	
18140	Morrow County		40060	Colonial Heights city	
18140	Perry County		40060	Hopewell city	
18140	Pickaway County		40060	Petersburg city	
18140	Union County		40060	Richmond city	
19100	Collin County	Dallas-Fort Worth-Arlington, TX	40140	Riverside County	Riverside-San Bernardino-Ontario, CA
19100	Dallas County		40140	San Bernardino County	
19100	Denton County		40380	Livingston County	Rochester, NY
19100	Ellis County		40380	Monroe County	
19100	Hunt County		40380	Ontario County	

19100	Kaufman County		40380	Orleans County	
19100	Rockwall County		40380	Wayne County	
19100	Johnson County		40380	Yates County	
19100	Parker County		40900	El Dorado County	Sacramento--Roseville--Arden-Arcade, CA
19100	Tarrant County		40900	Placer County	
19100	Wise County		40900	Sacramento County	
19740	Adams County	Denver-Aurora-Lakewood, CO	40900	Yolo County	
19740	Arapahoe County		41180	Bond County	St. Louis, MO-IL
19740	Broomfield County		41180	Calhoun County	
19740	Clear Creek County		41180	Clinton County	
19740	Denver County		41180	Jersey County	
19740	Douglas County		41180	Macoupin County	
19740	Elbert County		41180	Madison County	
19740	Gilpin County		41180	Monroe County	
19740	Jefferson County		41180	St. Clair County	
19740	Park County		41180	Franklin County	
19820	Wayne County	Detroit-Warren-Dearborn, MI	41180	Jefferson County	
19820	Lapeer County		41180	Lincoln County	
19820	Livingston County		41180	St. Charles County	
19820	Macomb County		41180	St. Louis County	
19820	Oakland County		41180	Warren County	

19820	St. Clair County		41180	St. Louis city	
23420	Fresno County	Fresno, CA	41620	Salt Lake County	Salt Lake City, UT
25540	Hartford County	Hartford-West Hartford-East Hartford, CT	41620	Tooele County	
25540	Middlesex County		41700	Atascosa County	San Antonio-New Braunfels, TX
25540	Tolland County		41700	Bandera County	
26420	Austin County	Houston-The Woodlands-Sugar Land, TX	41700	Bexar County	
26420	Brazoria County		41700	Comal County	
26420	Chambers County		41700	Guadalupe County	
26420	Fort Bend County		41700	Kendall County	
26420	Galveston County		41700	Medina County	
26420	Harris County		41700	Wilson County	
26420	Liberty County		41740	San Diego County	San Diego-Carlsbad, CA
26420	Montgomery County		41860	Alameda County	San Francisco-Oakland-Hayward, CA
26420	Waller County		41860	Contra Costa County	
27260	Baker County	Jacksonville, FL	41860	San Francisco County	
27260	Clay County		41860	San Mateo County	
27260	Duval County		41860	Marin County	
27260	Nassau County		41940	San Benito County	San Jose-Sunnyvale-Santa Clara, CA
27260	St. Johns County		41940	Santa Clara County	
28140	Johnson County	Kansas City, MO-KS	42660	King County	Seattle-Tacoma-Bellevue, WA
28140	Leavenworth County		42660	Snohomish County	
28140	Linn County		42660	Pierce County	

28140	Miami County		45300	Hernando County	Tampa-St. Petersburg-Clearwater, FL
28140	Wyandotte County		45300	Hillsborough County	
28140	Bates County		45300	Pasco County	
28140	Caldwell County		45300	Pinellas County	
28140	Cass County		46060	Pima County	Tucson, AZ
28140	Clay County		46140	Creek County	Tulsa, OK
28140	Clinton County		46140	Okmulgee County	
28140	Jackson County		46140	Osage County	
28140	Lafayette County		46140	Pawnee County	
28140	Platte County		46140	Rogers County	
28140	Ray County		46140	Tulsa County	
29820	Clark County	Las Vegas-Henderson-Paradise, NV	46140	Wagoner County	
31080	Orange County	Los Angeles-Long Beach-Anaheim, CA	46520	Honolulu County	Urban Honolulu, HI
31080	Los Angeles County		47260	Camden County	Virginia Beach-Norfolk-Newport News, VA-NC
32820	Crittenden County	Memphis, TN-MS-AR	47260	Currituck County	
32820	DeSoto County		47260	Gates County	
32820	Marshall County		47260	Gloucester County	
32820	Tate County		47260	Isle of Wight County	
32820	Tunica County		47260	James City County	
32820	Fayette County		47260	Mathews County	
32820	Shelby County		47260	Southampton County	
32820	Tipton County		47260	York County	
33100	Broward County	Miami-Fort Lauderdale-	47260	Chesapeake city	

33100	Miami-Dade County	West Palm Beach, FL	47260	Franklin city	
33100	Palm Beach County		47260	Hampton city	
33340	Milwaukee County	Milwaukee-Waukesha-West Allis, WI	47260	Newport News city	
33340	Ozaukee County		47260	Norfolk city	
33340	Washington County		47260	Poquoson city	
33340	Waukesha County		47260	Portsmouth city	
33460	Anoka County	Minneapolis-St. Paul-Bloomington, MN-WI	47260	Suffolk city	
33460	Carver County		47260	Virginia Beach city	
33460	Chisago County		47260	Williamsburg city	
33460	Dakota County		47900	Frederick County	Washington-Arlington-Alexandria, DC-VA-MD-WV
33460	Hennepin County		47900	Montgomery County	
33460	Isanti County		47900	District of Columbia	
33460	Le Sueur County		47900	Calvert County	
33460	Mille Lacs County		47900	Charles County	
33460	Ramsey County		47900	Prince George's County	
33460	Scott County		47900	Arlington County	
33460	Sherburne County		47900	Clarke County	
33460	Washington County		47900	Culpeper County	
33460	Wright County		47900	Fairfax County	
33460	Pierce County		47900	Fauquier County	
33460	St. Croix County		47900	Loudoun County	

47900	Madison County	
47900	Prince William County	
47900	Rappahannock County	
47900	Spotsylvania County	
47900	Stafford County	
47900	Warren County	
47900	Alexandria city	
47900	Fairfax city	
47900	Falls Church city	
47900	Fredericksburg city	
47900	Manassas city	
47900	Manassas Park city	
47900	Jefferson County	