

A Better Way to Find the Central Tendency?

Background

Local County budget information tabulates hourly wage requirements to meet a family’s basic survival needs. A weighted average was calculated using population weights to find a Regional budget. It is not clear, however, if a weighted average is the best approach to find the central tendency for the larger Region.

Objective

Discuss other potential approaches, besides a weighted average, to find a representative Regional budget.

Current Approach

The budgets file contains hourly wage thresholds. Hourly wages are compiled at the County level by family type. Each Region contains multiple Counties. For example, the Appleton Region contains two sub-geographies: Calumet and Outagamie Counties. The cost of living in Outagamie is slightly higher than that in Calumet.

Wage	Budget	Region	County	Family	Amount
Hourly Wage	survival	Appleton	Calumet	SingleAdult	11.03
Hourly Wage	survival	Appleton	Calumet	TwoAdults	17.18
Hourly Wage	survival	Appleton	Calumet	TwoAdultWithSchoolAge	28.39
Hourly Wage	survival	Appleton	Calumet	TwoAdultNotSchoolAge	35.33
Hourly Wage	survival	Appleton	Outagamie	SingleAdult	11.29
Hourly Wage	survival	Appleton	Outagamie	TwoAdults	17.62
Hourly Wage	survival	Appleton	Outagamie	TwoAdultWithSchoolAge	29.29
Hourly Wage	survival	Appleton	Outagamie	TwoAdultNotSchoolAge	36.77

Population weights were applied to County Hourly Wages to find Regional budgets using the formula below:

$$Regional\ Hourly\ Wage\ By\ Family\ Type = \sum_i x_i * p_i$$

$x_i = County\ Hourly\ Wage$
 $p_i = County\ Population\ Weight$

Here are the Appleton weights:

Region	County	Population	Wt
Appleton	Calumet	49928	0.2118933
Appleton	Outagamie	185700	0.7881067

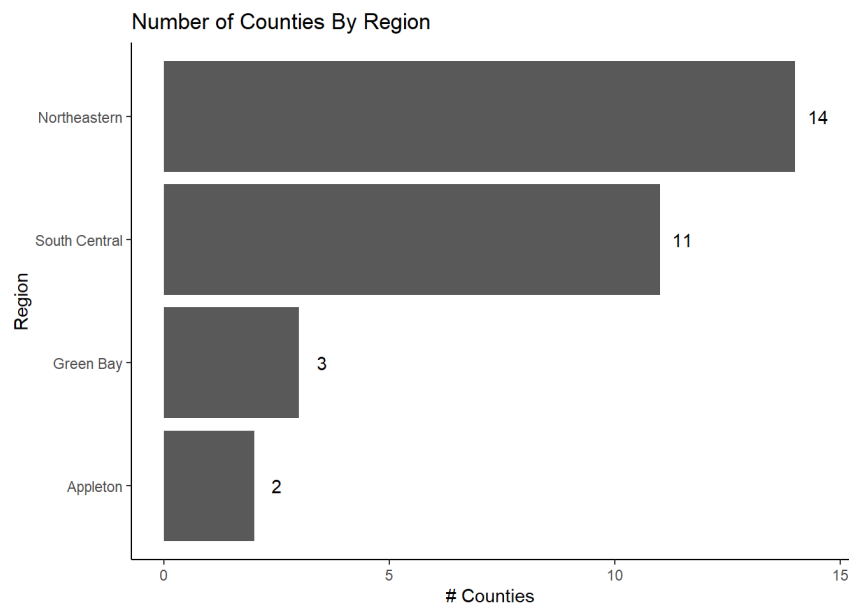
And here are the final Appleton budgets across the four families:

Region	Family	Wt_avg_hr_wage
Appleton	SingleAdult	11.23
Appleton	TwoAdultNotSchoolAge	36.46
Appleton	TwoAdults	17.53
Appleton	TwoAdultWithSchoolAge	29.10

The method described above does not take into account variability by Region or family type. The next section will explore variability in more detail.

Variability Assessment

Each Region consists of a different number of Counties. The Northeastern Region contains the most Counties while Appleton contains the fewest (14 vs 2).

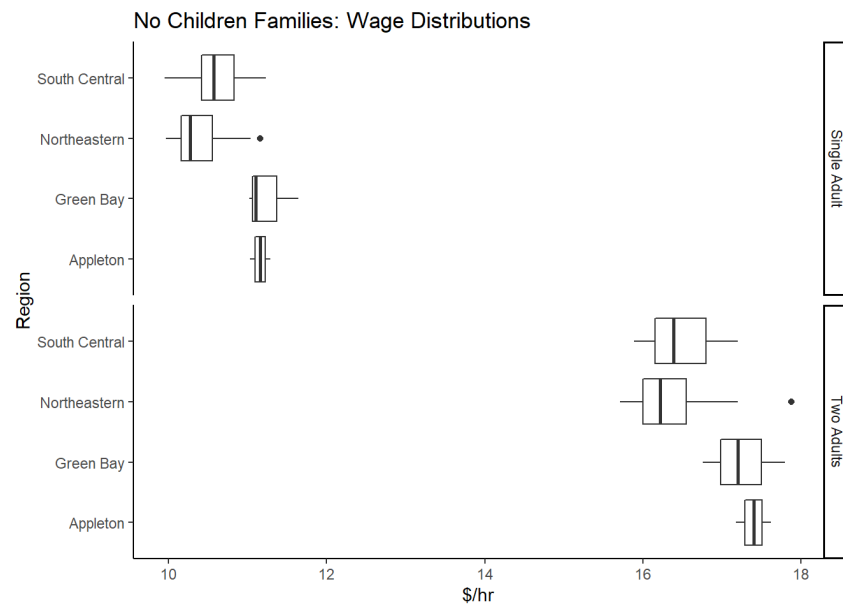


No Children

Wage distributions and summary stats for childless families are shown below.

- As expected, rural regions have lower wage thresholds vs urban
- Appleton has the lowest wage variation
- Green Bay only has 3 counties, but its counties appear more heterogeneous than those in 2-County Appleton

- Green Bay also shows more variability than South Central's 11 Counties for 2-Adult families.

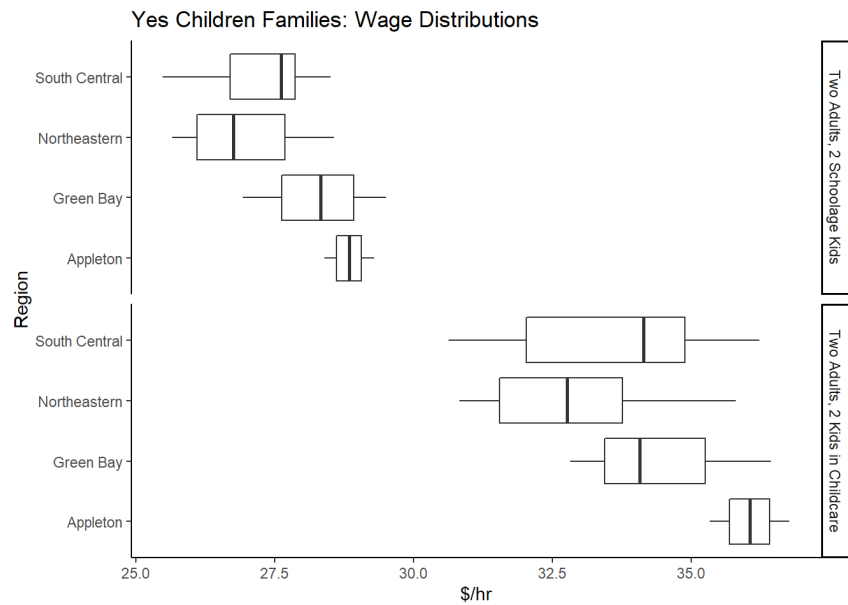


Region	Type	Counties	Family	avg	stdev	cv
1 Adult						
South Central	rural	11	Single Adult	10.61	0.39	3.60
Northeastern	rural	14	Single Adult	10.40	0.37	3.50
Green Bay	urban	3	Single Adult	11.25	0.34	3.00
Appleton	urban	2	Single Adult	11.16	0.18	1.60
2 Adults						
Northeastern	rural	14	Two Adults	16.36	0.59	3.60
Green Bay	urban	3	Two Adults	17.25	0.52	3.00
South Central	rural	11	Two Adults	16.48	0.45	2.70
Appleton	urban	2	Two Adults	17.40	0.31	1.80

Yes Children

Adding children adds variability to the budgets (and other types of chaos not captured here). That said, trends with kids are similar to those without:

- Rural regions have lower wage thresholds vs urban
- Appleton has the lowest wage variation
- Once again, Green Bay tends to have as much or more variability versus large-county Regions

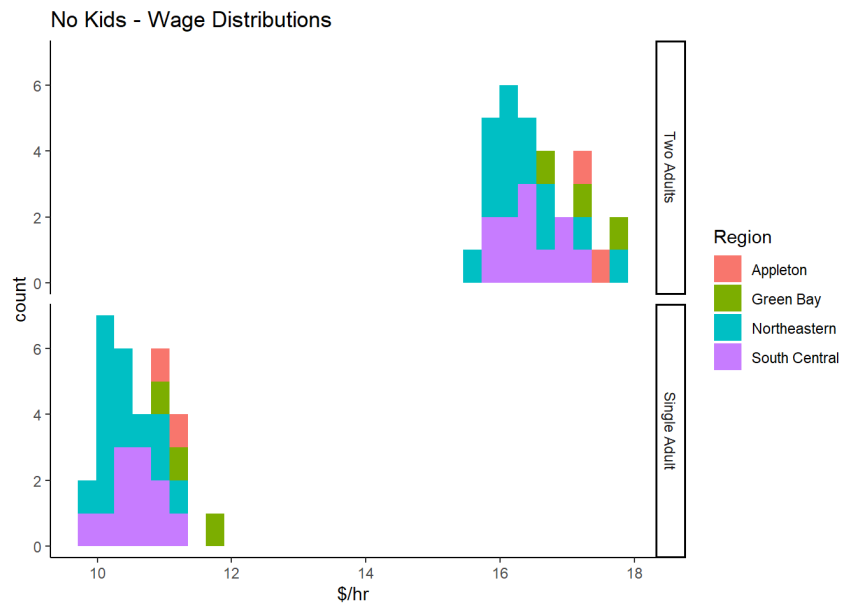


Region	Type	Counties	Family	avg	stdev	cv
2 Adults, 2 Kids in Childcare						
Green Bay	urban	3	Two Adults, 2 Schoolage Kids	28.26	1.29	4.60
South Central	rural	11	Two Adults, 2 Schoolage Kids	27.24	1.05	3.90
Northeastern	rural	14	Two Adults, 2 Schoolage Kids	26.90	0.98	3.70
Appleton	urban	2	Two Adults, 2 Schoolage Kids	28.84	0.64	2.20
2 Adults, 2 Schoolage Kids						
South Central	rural	11	Two Adults, 2 Kids in Childcare	33.59	1.98	5.90
Green Bay	urban	3	Two Adults, 2 Kids in Childcare	34.44	1.83	5.30
Northeastern	rural	14	Two Adults, 2 Kids in Childcare	32.92	1.58	4.80
Appleton	urban	2	Two Adults, 2 Kids in Childcare	36.05	1.02	2.80

The histograms below examine the different distribution shapes.

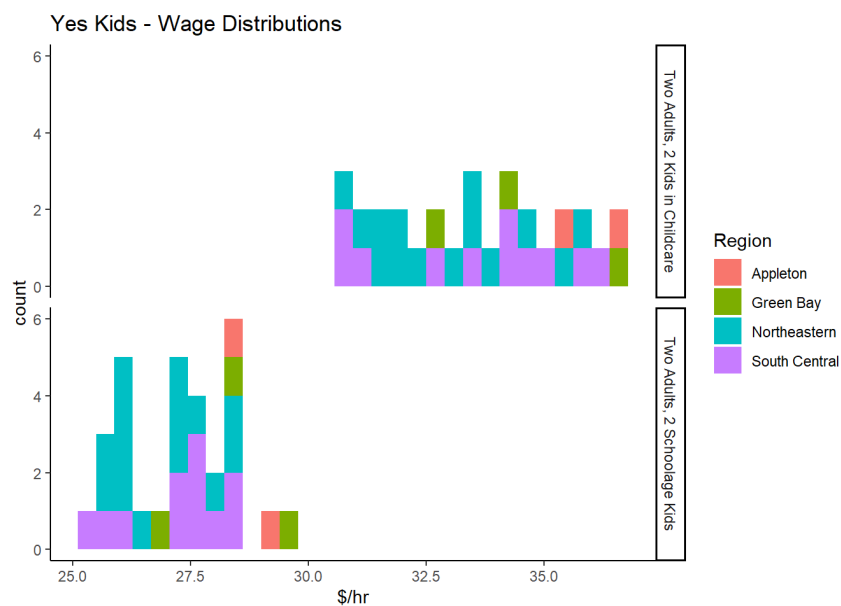
No Children

As previously seen, no-children distributions are relatively tight. Large-county Regions show a slight left skew to lower-wage thresholds in some cases.



Yes Children

Wage distributions for families with children take a very different shape than those without children. Ranges increase and large-county distributions appear less “normal” than their childless counterparts.



Summary

I addressed the problem of calculating a Regional budget with a one-size-fits-all solution. Maybe that's OK. Rather than listing specific questions, perhaps this project merits more of a philosophical discussion.

Clearly the Regions have different levels of variability in their County budgets. And family type also creates its own variability dynamic. How do these factors - and should they - affect my thinking? As always, I look forward to hearing your perspective.