

Maryland schools star ratings analysis

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An analysis of data from the [Maryland State Department of Education Report Card \(http://mdreportcard.org/\)](http://mdreportcard.org/) for a December 4, 2018 Baltimore Sun story titled "[Maryland releases first star ratings for every public school; 60 percent earn four or five stars out of five](https://www.baltimoresun.com/news/maryland/education/k-12/bs-md-star-rating-release-20181203-story.html)" (<https://www.baltimoresun.com/news/maryland/education/k-12/bs-md-star-rating-release-20181203-story.html>) by Liz Bowie and Talia Richman.

Here are the key findings:

- Only 35 of the state's more than 1,300 schools received one star, the lowest rating, while 219 received five stars.
- In Baltimore City, 23 schools earned one star.
- More than half of the city's schools received one- or two-star ratings.
- Howard County had 91 percent of its schools rated four and five stars, while Baltimore County had 96 of its 160 schools rated as four or five stars.
- In Harford County, 70 percent of schools earned either a four- or five-star rating.
- Fourteen school systems in the state had no one- or two-star schools.

How we did it

Import R data analysis libraries

```
In [1]: suppressMessages(library('tidyverse'))
        suppressMessages(library('janitor'))
```

Read in the scores data for analysis.

```
In [2]: scores <- suppressMessages(read_csv('input/accountability_schools_download_file.csv',
        na = 'na')) %>% clean_names()
```

Finding: Only 35 of the state's more than 1,300 schools received one star, the lowest rating, while 219 received five stars.

Print the number of schools in the state dataset.

```
In [3]: print(paste("There were", length(scores$school_name),
        "public schools in the Maryland school system in the 2017-18 school year."))
```

```
[1] "There were 1319 public schools in the Maryland school system in the 2017-18 school year."
```

Use `table()` to view the breakdown of schools by star rating.

```
In [4]: table(scores$star_rating)
```

```
 1    2    3    4    5
35 145 356 564 219
```

Finding: In Baltimore City, 23 schools earned one star.

Use `filter()` and `table()` to view the breakdown of schools in Baltimore City by star rating.

```
In [5]: scores %>% filter(lea_name == 'Baltimore City') %>% select(star_rating) %>% table()
```

```
1 2 3 4 5
23 76 45 19 3
```

Finding: More than half of the city's schools received one- or two-star ratings.

Use `group_by()` and `summarise()` to calculate the percentage breakdown of schools by star rating. Save this into a dataframe called `scores.sum`.

```
In [6]: scores.sum <- scores %>% group_by(lea_name, star_rating) %>%
  summarise(n = n()) %>%
  mutate(percent = n/sum(n) * 100)
```

Use `filter()` to look just at Baltimore City.

```
In [7]: scores.sum %>% filter(lea_name == 'Baltimore City')
```

lea_name	star_rating	n	percent
Baltimore City	1	23	13.855422
Baltimore City	2	76	45.783133
Baltimore City	3	45	27.108434
Baltimore City	4	19	11.445783
Baltimore City	5	3	1.807229

Print the percentage of Baltimore City schools receiving one- or two-star ratings.

```
In [8]: print(paste(round(scores.sum[scores.sum$star_rating == 1 & scores.sum$lea_name == '
Baltimore City', ]$percent +
  scores.sum[scores.sum$star_rating == 2 & scores.sum$lea_name == 'Baltimore Ci
ty', ]$percent),
  "percent of the city's schools (more than half) received one- or two-star rat
ings."))
```

[1] "60 percent of the city's schools (more than half) received one- or two-star ratings."

Finding: Howard County had 91 percent of its schools rated four and five stars, while Baltimore County had 96 of its 160 schools rated as four or five stars.

Use `filter()` on the `scores.sum` dataframe to view the number and percentage of schools in Howard and Baltimore County rated four or five stars.

```
In [9]: scores.sum %>% filter(lea_name == 'Howard' | lea_name == 'Baltimore County')
```

lea_name	star_rating	n	percent
Baltimore County	1	2	1.250000
Baltimore County	2	16	10.000000
Baltimore County	3	46	28.750000
Baltimore County	4	70	43.750000
Baltimore County	5	26	16.250000
Howard	1	1	1.351351
Howard	3	6	8.108108
Howard	4	36	48.648649
Howard	5	31	41.891892

Print the percentage of Howard County schools and the number of Baltimore County schools receiving one- or two-star ratings.

```
In [10]: print(paste(round(scores.sum[scores.sum$star_rating == 4 & scores.sum$lea_name == '
Howard', ]$percent +
  scores.sum[scores.sum$star_rating == 5 & scores.sum$lea_name == 'Howard', ]$p
ercent),
  "percent of Howard County schools received four- or five-star ratings."))

print(paste(scores.sum[scores.sum$star_rating == 4 & scores.sum$lea_name == 'Baltim
ore County', ]$n +
  scores.sum[scores.sum$star_rating == 5 & scores.sum$lea_name == 'Baltimore Co
unt', ]$n,
  "Baltimore County's", sum(scores.sum[scores.sum$lea_name == 'Baltimore County
', ]$n),
  "schools received four- or five-star ratings."))
```

[1] "91 percent of Howard County schools received four- or five-star ratings."

[1] "96 Baltimore County's 160 schools received four- or five-star ratings."

Finding: In Harford County, 70 percent of schools earned either a four- or five-star rating.

Use `filter()` on the `scores.sum` dataframe to view the number and percentage of schools in Harford County rated four or five stars.

```
In [11]: scores.sum %>% filter(lea_name == 'Harford')
```

lea_name	star_rating	n	percent
Harford	1	1	1.886792
Harford	2	1	1.886792
Harford	3	14	26.415094
Harford	4	27	50.943396
Harford	5	10	18.867925

Print the percentage of Harford County schools receiving one- or two-star ratings.

```
In [12]: print(paste(round(scores.sum[scores.sum$star_rating == 4 & scores.sum$lea_name == '
Harford', ]$percent +
    scores.sum[scores.sum$star_rating == 5 & scores.sum$lea_name == 'Harford',
]$percent),
    "percent of Harford County schools received four- or five-star ratings."))

[1] "70 percent of Harford County schools received four- or five-star ratings."
```

Fourteen school systems in the state had no one- or two-star schools.

Use `group_by()` and `mutate()` to create a column, `lowest_rating`, which gives lowest rating received by a school in the LEA (local education agency). Use `filter()` to include school with a lowest rating of three stars or above — meaning they had no one- or two-star schools. Use `select()`, `distinct()`, `ungroup()` and `mutate()` to print out and tally LEAs aka school systems with no one- or two-star schools.

```
In [13]: scores.sum %>% group_by(lea_name) %>%  
         mutate(lowest_rating = min(star_rating)) %>%  
         filter(lowest_rating >= 3) %>%  
         select(lea_name) %>%  
         distinct() %>%  
         ungroup() %>% mutate(row_number = row_number())
```

lea_name	row_number
Allegany	1
Calvert	2
Caroline	3
Cecil	4
Charles	5
Frederick	6
Garrett	7
Kent	8
Queen Anne's	9
Saint Mary's	10
Somerset	11
Talbot	12
Washington	13
Worcester	14

Distribution of star ratings

Ratings are assigned to schools based on the number of points a school receives as a percentage of the total possible points it could earn:

- Less than 30% = one star
- 30% or more and less than 45% = two stars
- 45% or more and less than 60% = three stars
- 60% or more and less than 75% = four stars
- 75% or more = five stars

For more information, read the [story \(https://www.baltimoresun.com/news/maryland/education/k-12/bs-md-star-rating-release-20181203-story.html\)](https://www.baltimoresun.com/news/maryland/education/k-12/bs-md-star-rating-release-20181203-story.html).

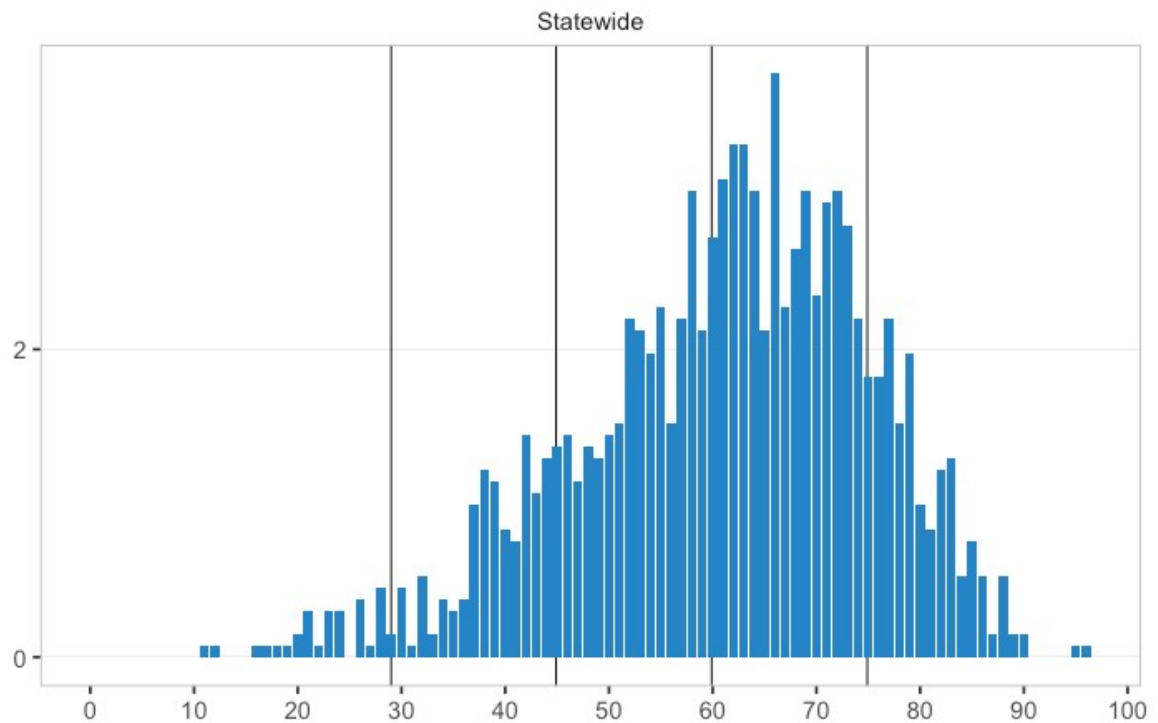
Below are a histogram of star ratings, showing the schools that fell into each "earned points percent" bucket.

Statewide

```
In [14]: scores.grouped.points.md <- scores %>% group_by(total_earned_points_percent) %>%
          summarise(n = n()) %>%
          mutate(perc = n/sum(n) * 100) %>% mutate(lea_name = 'Statewide')

options(repr.plot.width = 6, repr.plot.height = 4)

ggplot(scores.grouped.points.md, aes(x = total_earned_points_percent,
                                     y = perc)) +
  geom_bar(stat = 'identity', fill = '#2484C6') +
  scale_y_continuous(breaks = seq(0, 10, 2)) +
  geom_vline(xintercept = 29, size = .3) +
  geom_vline(xintercept = 44.9, size = .3) +
  geom_vline(xintercept = 59.9, size = .3) +
  geom_vline(xintercept = 74.9, size = .3) +
  geom_bar(stat = 'identity', fill = '#2484C6') +
  labs(x = '', y = '') +
  theme(panel.grid.major.x = element_blank(),
        panel.grid.minor.y = element_blank(),
        panel.grid.minor.x = element_blank(),
        panel.grid.major.y = element_line(color = 'lightgrey', size = .1),
        panel.background = element_blank(),
        strip.background = element_blank(),
        panel.border = element_rect(fill = NA, colour = "grey")) +
  facet_wrap(~lea_name) + scale_x_continuous(breaks = seq(0, 100, 10)) + expand_limits(x = 0)
```



Baltimore region, by county

```

In [16]: scores.grouped.points <- scores %>% group_by(lea_name, total_earned_points_percent)
%>%
      summarise(n = n()) %>%
      mutate(perc = n/sum(n) * 100)

scores.grouped.filter <- scores.grouped.points %>% filter(lea_name == 'Baltimore Ci
ty' |
      lea_name == 'Baltimore County' |
      lea_name == 'Anne Arundel' |
      lea_name == 'Carroll' |
      lea_name == 'Harford' |
      lea_name == 'Howard')

options(repr.plot.width = 6, repr.plot.height = 3)

ggplot(scores.grouped.filter, aes(x = total_earned_points_percent,
      y = perc)) +
  geom_bar(stat = 'identity', fill = '#2484C6') +
  scale_y_continuous(breaks = seq(0, 10, 2))+
  geom_vline(xintercept = 29, size = .3)+
  geom_vline(xintercept = 44.9, size = .3)+
  geom_vline(xintercept = 59.9, size = .3)+
  geom_vline(xintercept = 74.9, size = .3)+
  geom_bar(stat = 'identity', fill = '#2484C6')+
  labs(x = '', y = '') +
  theme(panel.grid.major.x = element_blank(),
        panel.grid.minor.y = element_blank(),
        panel.grid.minor.x = element_blank(),
        panel.grid.major.y = element_line(color = 'lightgrey', size = .1),
        panel.background = element_blank(),
        strip.background = element_blank(),
        panel.border = element_rect(fill = NA, colour = "grey")) +
  facet_wrap(~lea_name) + scale_x_continuous(breaks = seq(0, 100, 10))

```

