

Question Three

Aldanah Al Saif, Andrew Dawson

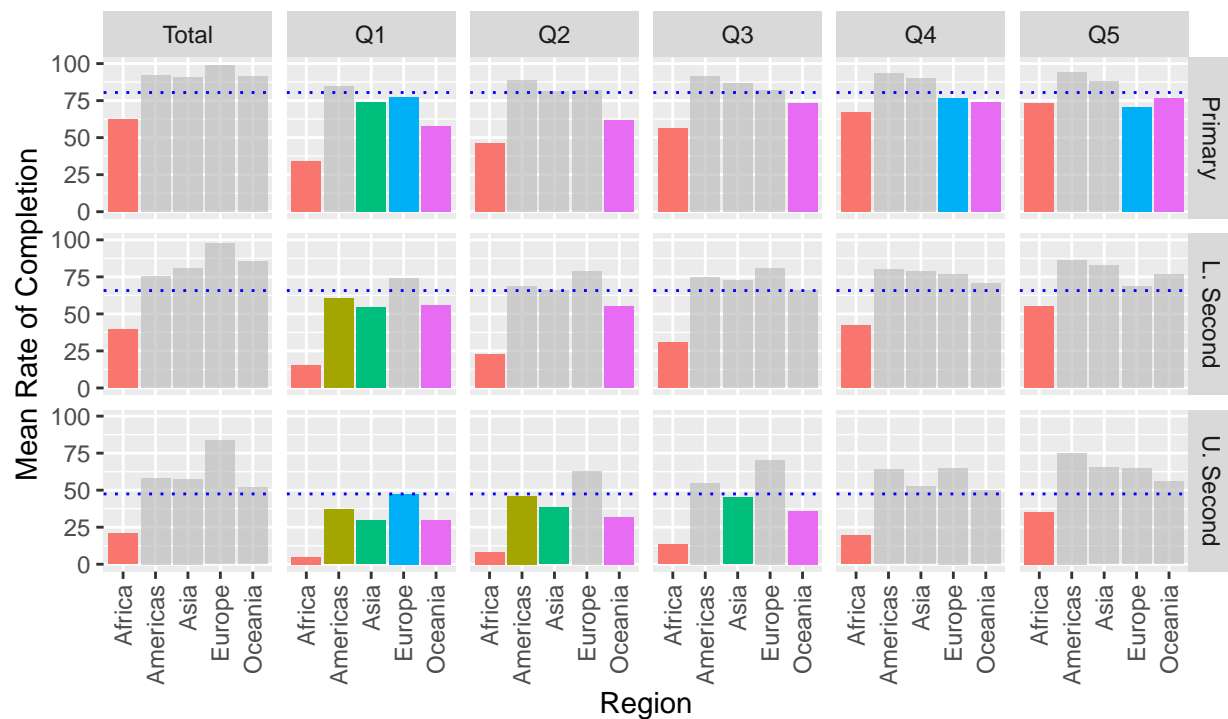
2025-12-01

Comparing Disparities in Educational Access

Wage

Comparing Wealth with Completion Rate

Coloured bars indicate below the mean



GDP Indicator 4.1.2

Within the plot, the blue dotted lines are the mean for the level of education, i.e. for primary, lower secondary, and upper secondary. Furthermore, when a bar is coloured this indicates that the region's mean is below the mean of the education level. The means for each the primary, lower secondary and upper secondary are 80, 66, and 47, respectively. When comparing the coloured bars, Africa noticeably is under the mean in all wealth quantiles, and all education levels.

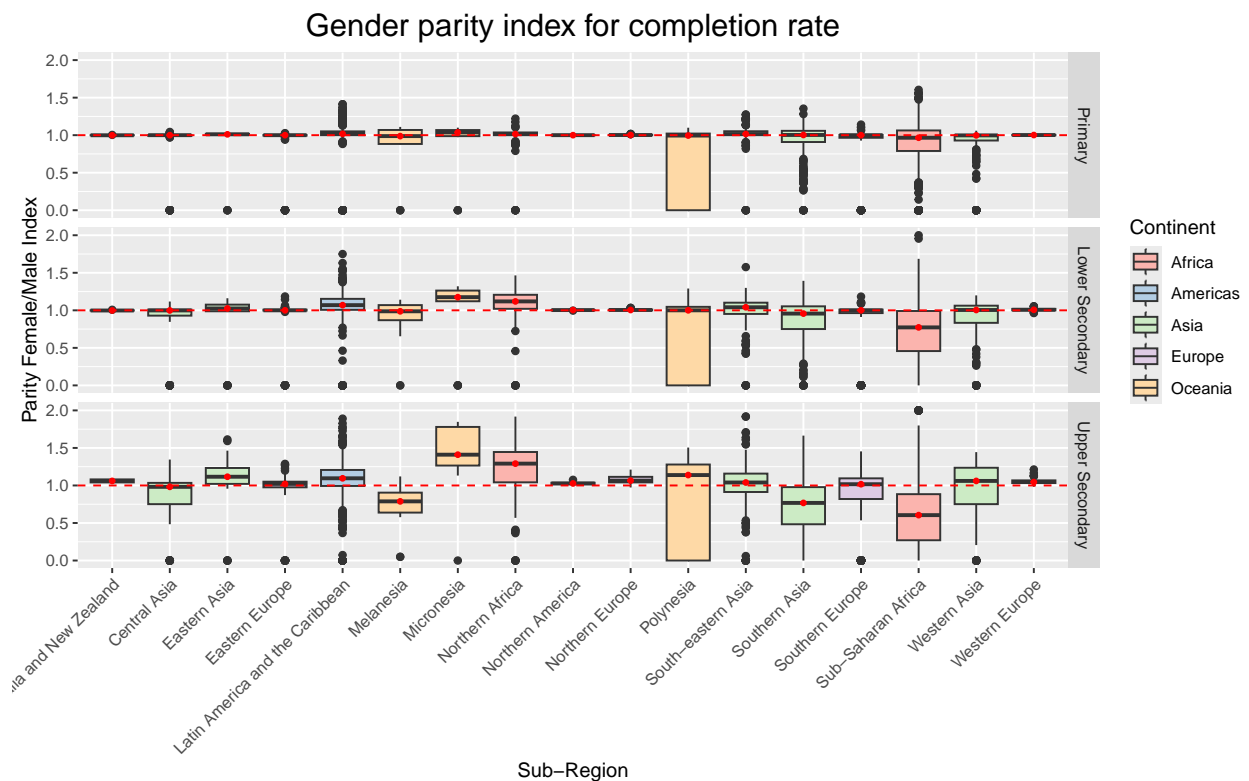
Comparing the wealthiest quantile to the poorest quantile, in primary education all three countries in the wealthiest quantile also show in the poorest quantile. Interestingly, this is the only instant where this happens. When looking at the two different secondary levels, in both wealthiest quantiles – Q5 and Q4 – only Africa is below the mean; however, when comparing that to the poorest quantile, nearly all regions show – bar Europe in the lower secondary category.

When looking across the different wealth quantiles, it is important to account for multiple things; for instance, when looking at the different education levels they are not independent of another. In order to progress to from Primary to Lower Secondary, you must complete and pass Primary education, the same goes for Upper Secondary with lower secondary. This is shown in the data with the lower rates of completion as the education level increases.

Another factor is informal education, defined by Weinland (2023) as “learning about cultural values, norms, and expected behaviours by participating in a society”, this affects the quantiles as when a child engages within their respective culture they may find a shift away from education towards something more culturally important – e.g. working within the family farm, supporting their parents or grandparents, etc.

Finally, this plot is not a perfect representation of the wealth between the regions, as it only captures the mean rate of completion. One cannot see the spread of information or outliers which may affect the mean, thus changing the information of the plot; however, this may be accounted for using weighted means instead.

Gender Parity Analysis



The provided figure analyzes the gender parity index for education completion rates across various continents and sub-regions. The key focus is on a red-dashed threshold line representing equality at a value of 1, indicating that female and male completion rates are equal. Each education level's median completion rates are highlighted by a red point, with box plots color-coded by continent to trace patterns.

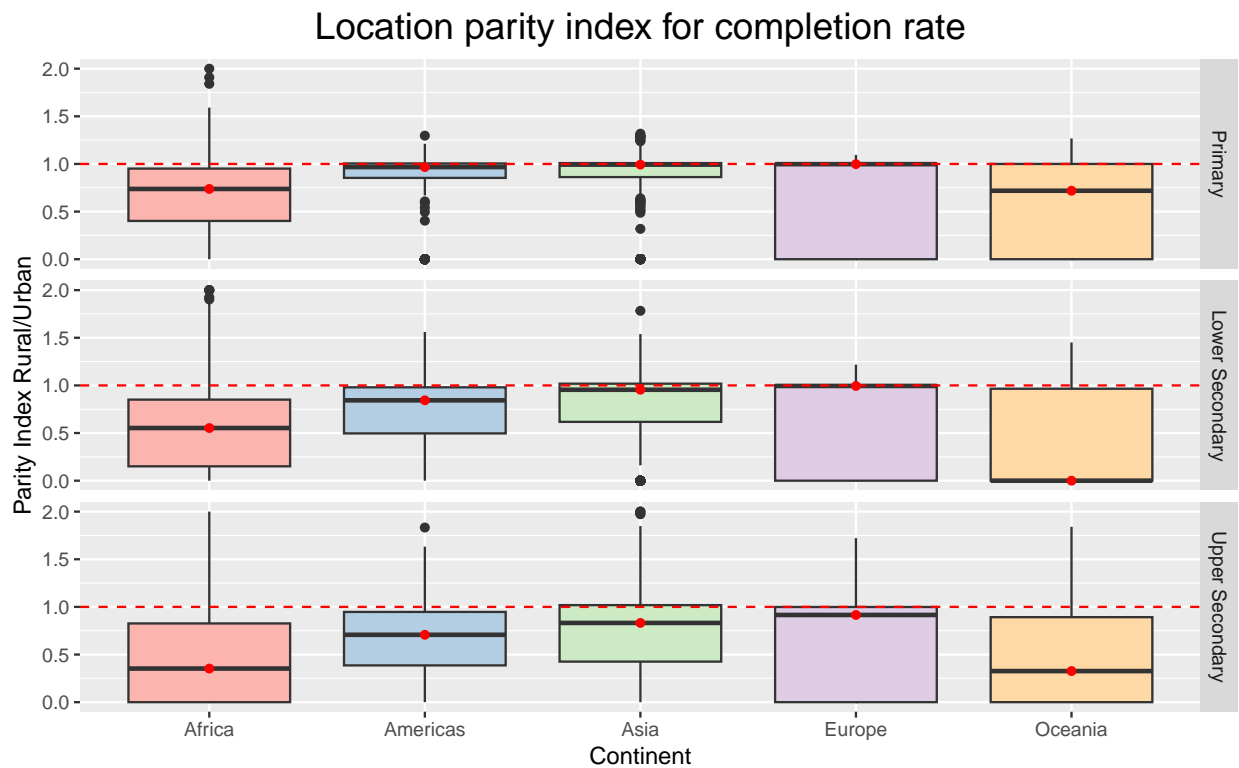
In Oceania, distinct trends emerge among its sub-regions. Melanesia reaches gender parity in primary and lower secondary education, with medians positioned at the equality point. This indicates that the genders are similarly distributed across these regions. However, this trend shifts when Melanesia displays a decline in favor of males in higher education. Conversely, Micronesia starts with a slight median advantage for females and has steadily maintained this preference. Moreover, Despite Polynesia having a large range of gender parities, the analysis reveals that more than half of these participants have a gender parity index, based on median values, indicating a preference for females in all education levels.

In Africa, Northern Africa and Sub-Saharan Africa exhibit contrasting trends. The data indicates that Northern Africa shows an increasing favorability toward females as education levels rise, while Sub-Saharan Africa displays trends in the opposite direction, reflecting a decline in gender parity. This analysis underscores varying patterns of gender equality in educational attainment across different regions.

Recommendations

- Conduct a thorough analysis of educational resources, models, and programs in Northern Africa and Sub-Saharan Africa to identify effective strategies for enhancing gender equality.
- Develop programs to address the decline in female enrollment in education at all levels in Polynesia. These programs should include mentorship initiatives and community awareness efforts, as well as campaigns specifically aimed at empowering girls.
- Ensure that educational resources are distributed equitably across sub-regions, providing learning materials that are accessible to both genders.

Location Parity Analysis



The figure above illustrates the location parity index for completion rates across various education levels and continents. The key focus is on a red-dashed threshold line representing equality at a value of 1 indicating the point of equality between rural and urban locations in terms of educational completion rates. For analysis, each education levels median completion rates are highlighted by a red point,

In Africa and Oceania, there’s a clear trend where participants generally demonstrate lower location parity that strongly favours urban areas across all education levels, with nearly all participants demonstrating lower completion rates in rural areas. Meanwhile, the Americas and Asia reflect a more mixed scenario: around half of the participants achieve parity in completion rates, while the other half still show a preference for urban education access. The bias towards urban settings is particularly pronounced in lower secondary and upper secondary education, where a significant majority favours urban completion rates. Notably, this urban bias

increases to over half of the data in lower secondary education and nearly all of the data in upper secondary education.

Europe presents a unique case; about half of the participants achieve equal completion rates, but the other half shows a consistent preference for urban education. This indicates varying levels of educational equity across different regions and levels of education.

Recommendations

- Invest in resources for rural schools to enhance educational access. This can involve providing digital tools for online learning and improving transportation options for students, especially at the lower and upper secondary education levels.
- Consider targeted training in rural areas of Africa and Oceania, as well as fostering strengths in the learning environment.

References

- Duncalfe, Luke. 2024. "ISO-3166 Country and Dependent Territories Lists with UN Regional Codes." github.com/luke/ISO-3166-Countries-with-Regional-Codes?tab=readme-ov-file.
- United Nations. 2023. "SGD Indicators Database." <https://unstats.un.org/sdgs/dataportal/database>.
- Weinland, Kathryn. 2023. "Intercultural Communication." Electronic Article. <https://open.library.okstate.edu/interculturalcommunication/chapter/education-around-the-world/>.

Appendix

```
##make the lines and means
#set up the data
DataComp <- Data %>% filter(Indicator == "4.1.2", Units == "PERCENT", !is.na(Continent))

#set up the
linesWage <- DataComp %>%
  group_by(`Education level`, Quantile) %>%
  summarise(quantileMean = mean(Value))
linesWage2 <- DataComp %>%
  group_by(`Education level`) %>%
  summarise(eduMean = mean(Value))

#join all together
pointsWage <- DataComp %>%
  group_by(`Education level`, Quantile, Continent) %>%
  summarise(regionalMean = mean(Value)) %>%
  left_join(linesWage, by = c("Education level" = "Education level", "Quantile" = "Quantile")) %>%
  left_join(linesWage2, by = c("Education level" = "Education level"))

#reorder data
pointsWage$`Education level` <- factor(pointsWage$`Education level`, levels = c("PRIMAR", "LOWSEC", "UPSEC"))

#plot the data
pointsWage %>% ggplot(aes(Continent, regionalMean, fill = Continent))+
  geom_col()+
  facet_grid(`Education level` ~ Quantile, labeller = labeller("Education level"=c("PRIMAR" = "Primary", "LOWSEC" = "Lower secondary", "UPSEC" = "Upper secondary")))+
  gghighlight(regionalMean < eduMean, calculate_per_facet = T)+
  geom_hline(aes(yintercept = eduMean), lty = 3, colour="blue")+
  theme(legend.position = "none")
```

```

theme(axis.text.x = element_text(angle = 90, vjust = 0.5, hjust = 1))+
labs(x = "Region", y="Mean Rate of Completion", title = "Comparing Wealth with Completion Rate", capt.
# Location Parity Analysis

# Filter out data needed to calculate gender parity index for completion rate
genderData <- subset(q3_4.5,
                     SeriesDescription == "Adjusted gender parity index for completion rate, by location",
                     select = c(`Education level`, Value_ratio, SubRegion, Continent))

# Produce plot of gender parity according to education levels over the sub-regions
ganderPlot <- ggplot(data = genderData, aes(x = factor(SubRegion), y = Value_ratio)) +
  geom_boxplot(aes(fill = Continent)) +
  facet_grid(`Education level` ~ .,
             labeller = labeller("Education level" = c("PRIMAR" = "Primary",
                                                         "LOWSEC" = "Lower Secondary",
                                                         "UPPSEC" = "Upper Secondary")))) +

  # Add threshold line for parity (=1 where equality happens)
  geom_hline(yintercept = 1,
             colour = "red",
             linetype = "dashed") +

  # Point out median parity by education level and year
  stat_summary(fun = median,
              shape = 19,
              size = 0.1,
              color = "red") +

  # Improve plot labels and theme
  labs(title = "Gender parity index for completion rate",
       x = "Sub-Region",
       y = "Parity Female/Male Index") +
  theme(plot.title = element_text(hjust = 0.5, size = 17),
        axis.text.x = element_text(angle = 45, vjust = 1, hjust = 1)) +
  scale_fill_brewer(palette = "Pastel1")
print(ganderPlot)

# Location Parity Analysis

# Filter out data needed to calculate location parity index for completion rate
locationData <- subset(q3_4.5,
                      SeriesDescription == "Adjusted location parity index for completion rate, by sex",
                      select = c(SubRegion, `Education level`, Value_ratio, Continent, TimePeriod))

# Produce plot of location parity according to education levels over the sub-regions
locationPlot <- ggplot(data = locationData, aes(x = factor(Continent), y = Value_ratio)) +
  geom_boxplot(aes(fill = Continent)) +
  facet_grid(`Education level` ~ .,
             labeller = labeller("Education level" = c("PRIMAR" = "Primary",
                                                         "LOWSEC" = "Lower Secondary",
                                                         "UPPSEC" = "Upper Secondary")))) +

  # Add threshold line for parity (=1 where equality happens)

```

```

geom_hline(yintercept = 1,
           colour = "red",
           linetype = "dashed") +

# Point out averages by education level and year
stat_summary(fun = median,
             shape = 19,
             size = 0.2,
             color = "red") +

# Improve plot labels and theme
labs(title = "Location parity index for completion rate",
     x = "Continent",
     y = "Parity Index Rural/Urban") +
theme(plot.title = element_text(hjust = 0.5, size = 17),
      legend.position = "none") +
scale_fill_brewer(palette = "Pastel1")
print(locationPlot)

```