TABLE ONE

```r
library(tidyverse)
library(finalfit)
library(gtsummary)
library(patchwork)
```

```r
rakai = read_csv("rakai_updated.csv")
dim(rakai)
```

```
[1] 2839    79
```

```r
#glimpse(rakai)
#missing_glimpse(rakai)
```

```r
df1 <- rakai %>%
  select(ageyrs,sex,locate,occup1,currmarr,evermarr,mobility,
         artdays,artwks,artmos,artyrs,comm_num,educyrs,religion)
```

```r
df2 <- rakai %>%
  select(ageyrs,sex,locate,occup1,currmarr,evermarr,mobility,
  artdays,artwks,artmos,artyrs,comm_num,artrunbc,artstrbc,hivac,copies,new_copies)
```

```r
df3 <- df1 %>%
  mutate(ageyrs = ageyrs %>%  ff_label("Age (years)"),
         sex = if_else(sex == "F","Female","Male") %>%
           as_factor() %>%
           fct_relevel("Female") %>%
           ff_label("Sex"),
         mobility = case_when(
           mobility %in% c(3,8,10) ~ "In-migrant",
           .default = "Long-term resident") %>%
```

```
      fct_relevel("In-migrant") %>%
      ff_label("Migration"),
    community_type = case_when(
      comm_num %in% c(38,770,771,774) ~ "Fishing community",
                              .default = "Inland Community") %>%
      fct_relevel("Inland Community") %>%
      ff_label("Community type"),
    fishing_comm = if_else(community_type == "Fishing Community",1,0) %>%
      ff_label("Lake Victoria Fishing Community"),

    primary_occupation = case_when(
      occup1 %in% c(1,2,5) ~ "Agriculture/Homebrewing",
      occup1 %in% c(10,11) ~ "Trading or shopkeeping",
      occup1 %in% c(12,18) ~ "Bar work or waitressing",
      occup1 %in% c(2,3,4) ~ "House work",
      occup1   == 7 ~ "Fishing-related occupation",
      .default = "Other") %>%
      fct_relevel("Agriculture/Homebrewing","Trading or shopkeeping") %>%
      ff_label("Primary Occupation"),

    age_cat = case_when(
                    ageyrs < 30 ~ "<30",
                    ageyrs >= 30 & ageyrs <= 39 ~  "30-39",
                    ageyrs >=40 & ageyrs <= 49 ~ "40-49") %>%
      fct_relevel("<30") %>%
      ff_label("Age group"),

    current_marital_status = case_when(
      currmarr == 1 ~ "Currently married",
      currmarr == 2 ~ "Previously married",
      currmarr == 8 ~ "Never married"
      ) %>%
      fct_relevel("Never married","Currently married") %>%
      ff_label("Current marital status"),

    art_duration = case_when(
      artyrs >= 1 & artyrs < 2 ~ "1-2 years",
      artyrs > 2 &  artyrs <= 5 ~ "2-5 years",
      artyrs > 5 ~ ">5 years",
      .default =   "<1 year"
    ) %>%
      fct_relevel("<1 year","1-2 years","2-5 years") %>%
```

```r
        ff_label("Time on ART"),

      education_level = case_when(
        educyrs == 8 ~ "No formal education",
        educyrs %in% c(1,2) ~ "Primary",
        educyrs %in% c(3,4) ~ "Secondary",
        educyrs %in% c(5,6,7,10,11) ~ "Technical/University"

      ) %>%
        fct_relevel("No formal education") %>%
        ff_label("Educational attainment"),

      religion = case_when(
        religion %in% c(1,6) ~ "Other or none",
        religion %in% c(2,3,4) ~ "Catholic/Christian",
        religion == 5 ~ "Muslim"
      ) %>%
        ff_label("Religion")


  )
```

```r
df4 <- df3 %>%
  select(
    ageyrs,age_cat,sex,current_marital_status,education_level,primary_occupation,
    mobility,community_type,art_duration
  )
```

Table One

```r
df4 %>%
  tbl_summary(
    by = sex,
    statistic = list(
      all_categorical() ~ "{n} ({p}%)",
      all_continuous()  ~ "{median} ({IQR})"
    ),
    digits = list(
      all_categorical() ~ 0,
      all_continuous()  ~ 0
```

```
  )
) %>%
add_overall() %>%
 bold_labels() %>%
italicize_levels() %>%
modify_spanning_header(
  update = all_stat_cols() ~ "**Sex**"
)
```

Characteristic	Overall, N = 2,839	Female, N = 1,824	Male, N = 1,015
Age (years)	38 (11)	37 (11)	39 (9)
Age group			
<30	437 (15%)	347 (19%)	90 (9%)
30-39	1,229 (43%)	809 (44%)	420 (41%)
40-49	1,173 (41%)	668 (37%)	505 (50%)
Current marital status			
Never married	142 (5%)	96 (5%)	46 (5%)
Currently married	1,720 (61%)	1,036 (57%)	684 (67%)
Previously married	977 (34%)	692 (38%)	285 (28%)
Educational attainment			
No formal education	266 (9%)	174 (10%)	92 (9%)
Primary	1,931 (68%)	1,193 (65%)	738 (73%)
Secondary	406 (14%)	287 (16%)	119 (12%)
Technical/University	236 (8%)	170 (9%)	66 (7%)
Primary Occupation			
Agriculture/Homebrewing	709 (25%)	529 (29%)	180 (18%)
Trading or shopkeeping	543 (19%)	430 (24%)	113 (11%)
Bar work or waitressing	282 (10%)	278 (15%)	4 (0%)
Fishing-related occupation	504 (18%)	3 (0%)	501 (49%)
House work	287 (10%)	283 (16%)	4 (0%)
Other	514 (18%)	301 (17%)	213 (21%)
Migration			
In-migrant	637 (22%)	464 (25%)	173 (17%)
Long-term resident	2,202 (78%)	1,360 (75%)	842 (83%)
Community type			
Inland Community	1,284 (45%)	943 (52%)	341 (34%)
Fishing community	1,555 (55%)	881 (48%)	674 (66%)
Time on ART			

Characteristic	Overall, N = 2,839	Female, N = 1,824	Male, N = 1,015
<1 year	222 (8%)	152 (8%)	70 (7%)
1-2 years	79 (3%)	50 (3%)	29 (3%)
2-5 years	750 (26%)	446 (24%)	304 (30%)
>5 years	1,788 (63%)	1,176 (64%)	612 (60%)

```r
df5 <- rakai %>%
  select(sex,artrunbc,artrunac,
         hivac,hivbc,copies,new_copies,artstrac,artstrbc) %>%
  filter(hivac !=8, hivbc!=8,artrunbc!=8,artstrac!=8,artstrbc!=8,artrunac!=8)
```

```r
df6 <- df5 %>%
  mutate(
    sex = if_else(sex == "F","Female","Male") %>%
      as_factor() %>%
      fct_relevel("Female") %>%
      as_factor() %>%
      ff_label("Sex"),

    hivac = if_else(hivac ==1, "Yes","No") %>%
    ff_label("Missed scheduled visit for HIV care") %>%
      as_factor(),

     hivbc = if_else(hivbc ==1,"Yes","No") %>%
    ff_label("Missed scheduled visit for HIV care") %>%
    as_factor(),

     artrunac = if_else(artrunac ==1,"Yes","No") %>%
    as_factor() %>%
    ff_label("Run out of ART before next refill"),

   artrunbc = if_else(artrunbc ==1,"Yes","No") %>%
    as_factor() %>%
    ff_label("Run out of ART before next refill"),

  artstrac = if_else(artstrac ==1,"Yes","No") %>%
    as_factor() %>%
    ff_label("Taken ART pills less frequently / in smaller
amounts to conserve supply"),

  artstrbc = if_else(artstrbc ==1,"Yes","No") %>%
```

```
    as_factor() %>%
    ff_label("Taken ART pills less frequently / in smaller
amounts to conserve supply")
  )
```

Viral Load Suppression

```
df7 <- df6 %>% filter(copies != "INV.IC ",!is.na(copies),!is.na(new_copies)) %>%
  mutate(
    copies = str_remove_all(copies, "<\\s*"),
    copies = if_else(copies == "BD", "0", copies),
    copies = as.numeric(copies),

    new_copies = str_remove_all(new_copies, "<\\s*"),
    new_copies = if_else(new_copies == "BD", "0", new_copies),
    new_copies = as.numeric(new_copies)
  ) %>%
  mutate(viral_load_b4 = if_else(copies < 200, "Viral Load Sppression","Viraemia") %>%
           ff_label("HIV RNA viral load, in copies/ml"),
         viral_load_after = if_else(new_copies < 200,"Viral Load Sppression","Viraemia") %>%
           ff_label("HIV RNA viral load, in copies/ml"))
```

```
df_vl_supp  <- df7 %>%
  mutate(
    suppbc = if_else(viral_load_b4 == "Viral Load Suppression", 1, 0),
    suppac = if_else(viral_load_after == "Viral Load Suppression", 1, 0)
  ) %>%
  select(-c(copies,new_copies))%>%
  pivot_longer(
    cols = c(viral_load_b4,viral_load_after),
    names_to = "variable",
    values_to = "viral_load"
  ) %>%
  mutate(
    time = if_else(grepl("b4$", variable), "Before Covid-19", "After Covid-19"),
  )


df_vl_summary <- df_vl_supp %>% filter(!is.na(viral_load)) %>%
  group_by(time,viral_load) %>%
```

```r
  summarise(
    n_suppressed = n(),
    .groups = "drop"
  ) %>%
  mutate(time = as_factor(time) %>%  fct_relevel("Before Covid-19"),
          viral_load = as_factor(viral_load) %>%
            fct_relevel("Viral Load Suppression"))

df_vl_summary <-  df_vl_summary %>%
  group_by(time) %>%
  summarise(n = sum(n_suppressed)) %>%
  left_join(df_vl_summary,join_by(time))

df_vl_summary <- df_vl_summary  %>%
  mutate(
    proportion = n_suppressed / n,
    se = sqrt(proportion * (1 - proportion) / n),
    lower = proportion - 1.96 * se,
    upper = proportion + 1.96 * se
  )
df_vl_summary
```

time	n	viral_load	n_suppressed	proportion	se	lower	upper
Before Covid-19	2779	Viraemia	135	0.0485786	0.0040782	0.0405854	0.0565718
Before Covid-19	2779	Viral Load Sppression	2644	0.9514214	0.0040782	0.9434282	0.9594146
After Covid-19	2780	Viraemia	135	0.0485612	0.0040767	0.0405707	0.0565516
After Covid-19	2780	Viral Load Sppression	2645	0.9514388	0.0040767	0.9434484	0.9594293

```r
ggplot(df_vl_summary, aes(x = viral_load, y = proportion, fill = time)) +
  geom_bar(
    stat = "identity",
    position = position_dodge(width = 0.7),
    width = 0.5
  ) +
  geom_errorbar(
    aes(ymin = lower, ymax = upper),
```

```
    position = position_dodge(width = 0.7),
    width = 0.2,
    size = 0.5
) +
scale_y_continuous(labels = scales::percent_format()) +
labs(x = "Viral Load", y = "Proportion of individuals", fill = "Time") +

theme_minimal()+
theme(
    plot.title = element_text(hjust = 0.5, face = "bold", size = 10),
    axis.title.x = element_text(face = "bold", size = 10),
    axis.title.y = element_text(face = "bold", size = 10),
    legend.title = element_text(face = "bold", size = 10),
    legend.text = element_text(size = 10),
    legend.position = "top"
)
```
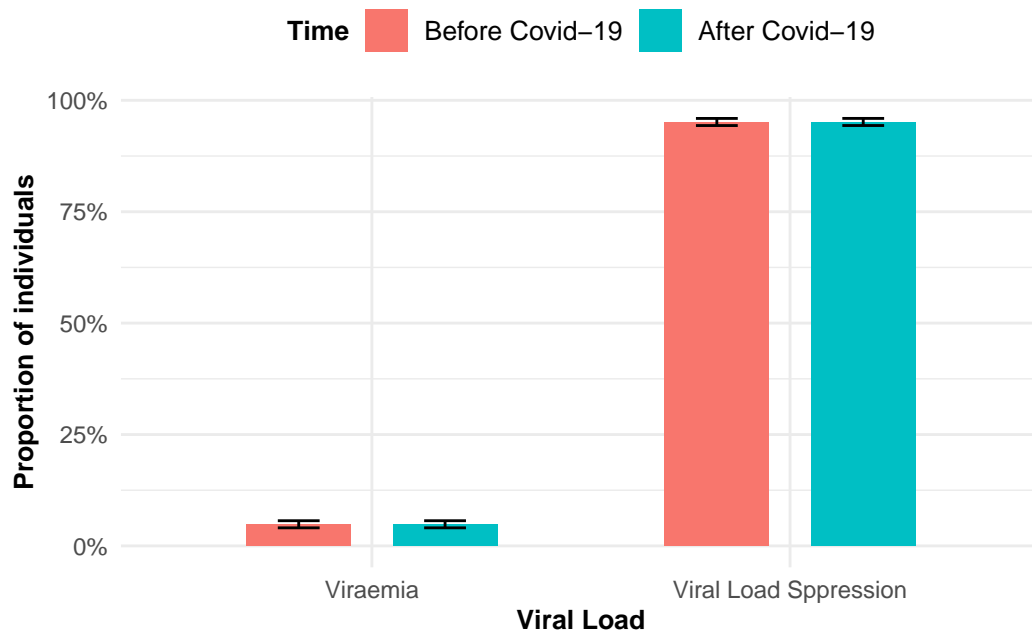

Proportion taking ART pills less frequently / in smaller amounts

```
df6 %>% group_by(sex,artstrbc) %>%
    count()
```

sex	artstrbc	n
Female	No	1799
Female	Yes	21
Male	No	1003
Male	Yes	11

```
df6 %>% group_by(sex,artstrac) %>%
  count()
```

sex	artstrac	n
Female	No	1775
Female	Yes	45
Male	No	985
Male	Yes	29

```
df_artstr <- df6 %>%
  pivot_longer(
    cols = c(artstrbc, artstrac),
    names_to = "variable",
    values_to = "response"
  ) %>%
  mutate(
    time = if_else(grepl("bc$", variable), "Before Covid-19", "After Covid-19")
  )

df_artstr_summary <- df_artstr %>%
  group_by(time,sex) %>%
  summarise(
    n_yes = sum(response == "Yes", na.rm = TRUE),
    n = n(),
    .groups = "drop"
  )

df_artstr_totals <- df_artstr %>%
  group_by(time) %>%
  summarise(
    n_yes = sum(response == "Yes", na.rm = TRUE),
    n = n(),
    .groups = "drop"
```

```
  )

df_artstr_summary <- bind_rows(df_artstr_summary, df_artstr_totals) %>%
  mutate(
    proportion = n_yes / n,
    se = sqrt(proportion * (1 - proportion) / n),
    lower = proportion - 1.96 * se,
    upper = proportion + 1.96 * se
  ) %>%
  mutate(time = as_factor(time) %>%
           fct_relevel("Before Covid-19"),
         sex= if_else(is.na(sex),"Total",sex))



df_artstr_summary
```

time	sex	n_yes	n	proportion	se	lower	upper
After Covid-19	Female	45	1820	0.0247253	0.0036400	0.0175909	0.0318596
After Covid-19	Male	29	1014	0.0285996	0.0052343	0.0183403	0.0388589
Before Covid-19	Female	21	1820	0.0115385	0.0025033	0.0066319	0.0164450
Before Covid-19	Male	11	1014	0.0108481	0.0032530	0.0044722	0.0172241
After Covid-19	Total	74	2834	0.0261115	0.0029955	0.0202403	0.0319827
Before Covid-19	Total	32	2834	0.0112915	0.0019848	0.0074013	0.0151816

```
reduced_art_intake_plot <- ggplot(df_artstr_summary, aes(x = sex, y = proportion, fill = time
  geom_col(position = position_dodge(width = 0.7), width = 0.5) +
  geom_errorbar(
    aes(ymin = lower, ymax = upper),
    position = position_dodge(width = 0.7),
    width = 0.2,
    size = 1
  ) +
  scale_y_continuous(labels = scales::percent_format(accuracy = 1),limits = c(0, 0.12))+
  labs(
    title = " Reduced ART Intake",
    x = "Sex",
    y = "Proportion of Individuals",
    fill = "Time"
  ) +
```
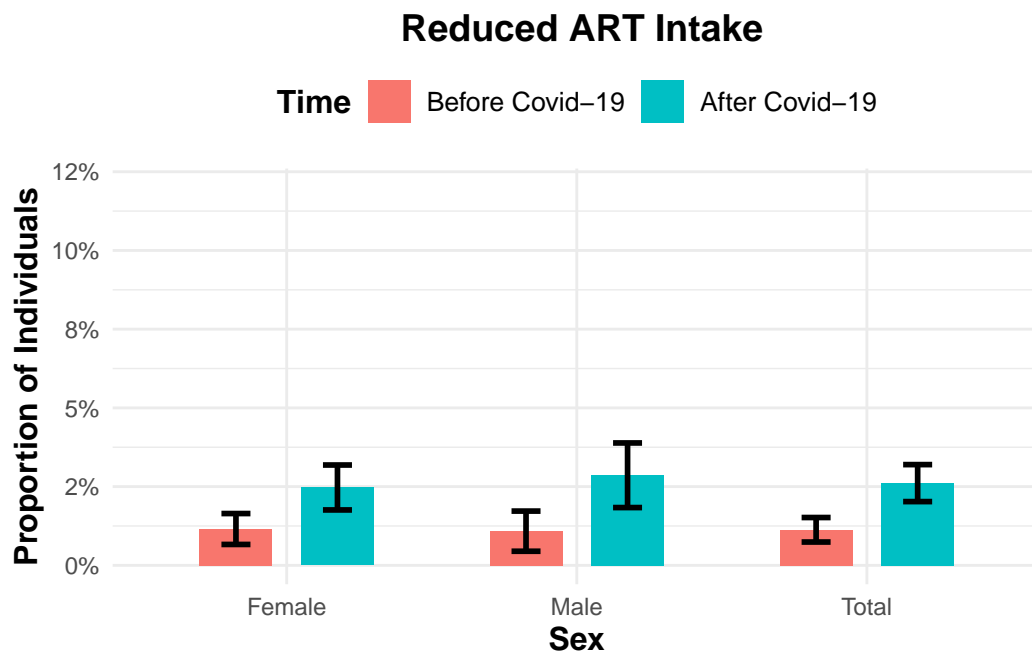
```
  theme_minimal() +
  theme(
    plot.title = element_text(hjust = 0.5, face = "bold", size = 14),
    axis.title.x = element_text(face = "bold", size = 12),
    axis.title.y = element_text(face = "bold", size = 12),
    legend.title = element_text(face = "bold", size = 12),
    legend.text = element_text(size = 10),
    legend.position = "top"
  )

reduced_art_intake_plot
```


Run out of ART before next refill

```
df6 %>% group_by(sex,artrunbc) %>%
  count()
```

sex	artrunbc	n
Female	No	1777

sex	artrunbc	n
Female	Yes	43
Male	No	990
Male	Yes	24

```
df6 %>% group_by(sex,artrunac) %>%
  count()
```

sex	artrunac	n
Female	No	1714
Female	Yes	106
Male	No	968
Male	Yes	46

```
df_artrun <- df6 %>%
  pivot_longer(
    cols = c(artrunbc, artrunac),
    names_to = "variable",
    values_to = "response"
  ) %>%
  mutate(
    time = if_else(grepl("bc$", variable), "Before", "After"),
    variable = "Run out of ART before next refill"
  )


df_artrun_summary <- df_artrun %>%
  group_by(time,sex) %>%
  summarise(
    n_yes = sum(response == "Yes", na.rm = TRUE),
    n = n(),
    .groups = "drop"
  )

df_artrun_totals <- df_artrun %>%
  group_by(time) %>%
  summarise(
    n_yes = sum(response == "Yes", na.rm = TRUE),
    n = n(),
```

```
    .groups = "drop"
  )
```

```
df_artrun_totals
```

time	n__yes	n
After	152	2834
Before	67	2834

```
df_artrun_summary <- bind_rows(df_artrun_summary, df_artrun_totals) %>%
  mutate(
    proportion = n_yes / n,
    se = sqrt(proportion * (1 - proportion) / n),
    lower = proportion - 1.96 * se,
    upper = proportion + 1.96 * se
  )%>%
  mutate(time = as_factor(time) %>%
           fct_relevel("Before Covid-19"),
         sex= if_else(is.na(sex),"Total",sex))
```

```
df_artrun_summary
```

| time	sex	n__yes	n	proportion	se	lower	upper
After	Female	106	1820	0.0582418	0.0054897	0.0474819	0.0690016
After	Male	46	1014	0.0453649	0.0065352	0.0325559	0.0581739
Before	Female	43	1820	0.0236264	0.0035602	0.0166484	0.0306043
Before	Male	24	1014	0.0236686	0.0047738	0.0143119	0.0330253
After	Total	152	2834	0.0536344	0.0042321	0.0453396	0.0619293
Before	Total	67	2834	0.0236415	0.0028539	0.0180478	0.0292352

```
run_out_of_art_plot <- ggplot(df_artrun_summary, aes(x = sex, y = proportion,fill = time)) +
  geom_col(position = position_dodge(width = 0.7), width = 0.5) +
  geom_errorbar(
    aes(ymin = lower, ymax = upper),
    position = position_dodge(width = 0.7),
    width = 0.2,
```

```
    size = 1
  ) +
  scale_y_continuous(labels = scales::percent_format(accuracy = 1),limits = c(0, 0.12)) +
  labs(
    title = "Run Out of ART",
    x = "Sex",
    y = "Proportion of individuals",
    fill = "Time"
  ) +
  theme_minimal() +
  theme(
    plot.title = element_text(hjust = 0.5, face = "bold", size = 14),
    axis.title.x = element_text(face = "bold", size = 12),
    axis.title.y = element_text(face = "bold", size = 12),
    legend.title = element_text(face = "bold", size = 12),
    legend.text = element_text(size = 10),
    legend.position = "top"
  )
run_out_of_art_plot
```
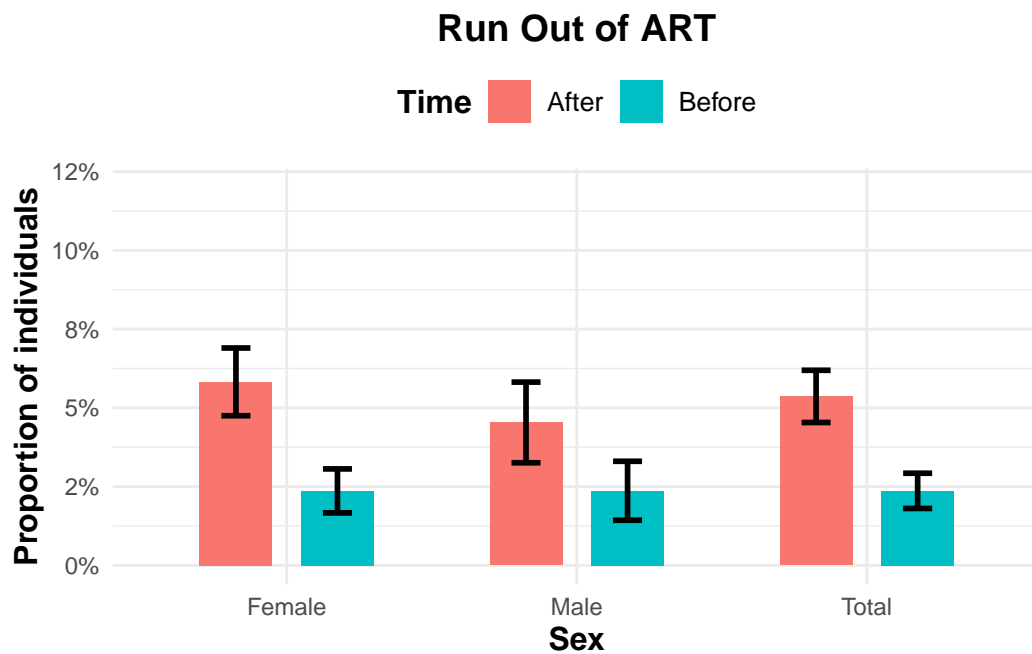
Missed Scheduled Visits

```
df6 %>% group_by(sex,hivbc) %>%
  count()
```

sex	hivbc	n
Female	No	1763
Female	Yes	57
Male	No	976
Male	Yes	38

```
df6 %>% group_by(sex,hivac) %>%
  count()
```

sex	hivac	n
Female	No	1642
Female	Yes	178
Male	No	917
Male	Yes	97

```
df_hiv <- df6 %>%
  pivot_longer(
    cols = c(hivbc, hivac),
    names_to = "variable",
    values_to = "response"
  ) %>%
  mutate(
    time = if_else(grepl("bc$", variable), "Before", "After"),
    variable = "Missed Scheduled Visits"
  )

df_hiv_summary <- df_hiv %>%
  group_by(time,sex) %>%
  summarise(
    n_yes = sum(response == "Yes", na.rm = TRUE),
    n = n(),
    .groups = "drop"
  )
```

```
df_hiv_totals <- df_hiv %>%
  group_by(time) %>%
  summarise(
    n_yes = sum(response == "Yes", na.rm = TRUE),
    n = n(),
    .groups = "drop"
  )

df_hiv_summary <- bind_rows(df_hiv_summary, df_hiv_totals) %>%
  mutate(
    proportion = n_yes / n,
    se = sqrt(proportion * (1 - proportion) / n),
    lower = proportion - 1.96 * se,
    upper = proportion + 1.96 * se
  )%>%
  mutate(time = as_factor(time) %>%
           fct_relevel("Before Covid-19"),
         sex= if_else(is.na(sex),"Total",sex))



df_hiv_summary
```

time	sex	n_yes	n	proportion	se	lower	upper
After	Female	178	1820	0.0978022	0.0069629	0.0841549	0.1114495
After	Male	97	1014	0.0956607	0.0092366	0.0775570	0.1137645
Before	Female	57	1820	0.0313187	0.0040828	0.0233164	0.0393209
Before	Male	38	1014	0.0374753	0.0059643	0.0257853	0.0491654
After	Total	275	2834	0.0970360	0.0055603	0.0861377	0.1079343
Before	Total	95	2834	0.0335215	0.0033811	0.0268946	0.0401485

```
missed_scheduled_visit_plot <-  ggplot(df_hiv_summary, aes(x = sex, y = proportion, fill = t:
  geom_col(position = position_dodge(width = 0.7), width = 0.5) +
  geom_errorbar(
    aes(ymin = lower, ymax = upper),
    position = position_dodge(width = 0.7),
    width = 0.2,
    size = 1
  ) +
  scale_y_continuous(labels = scales::percent_format(accuracy = 1),limits = c(0, 0.12)) +
```
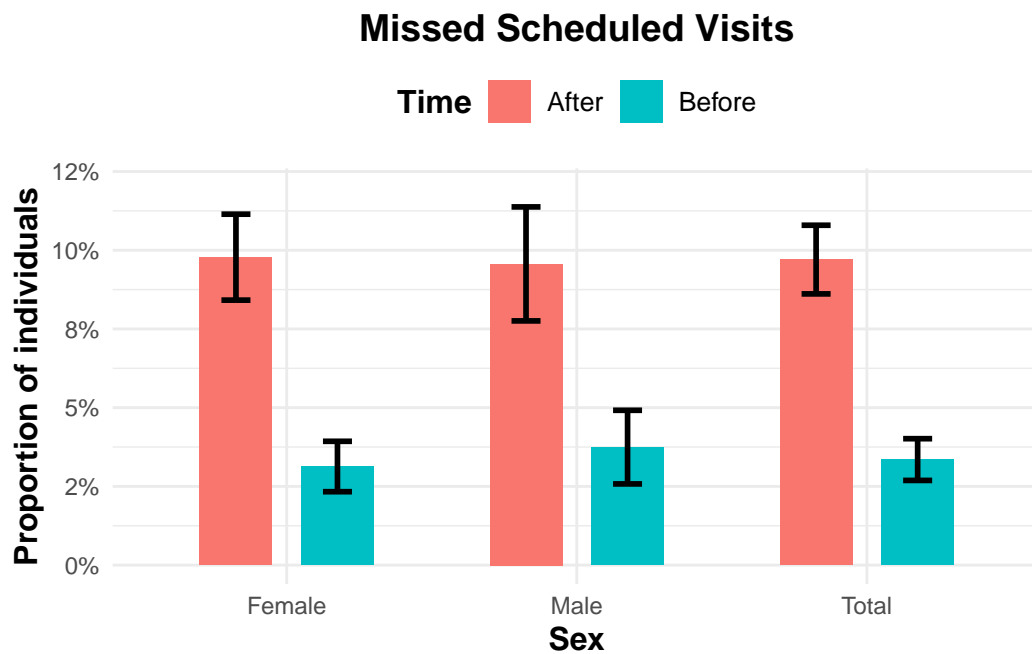
```
  labs(
    title = "Missed Scheduled Visits",
    x = "Sex",
    y = "Proportion of individuals",
    fill = "Time"
  ) +
  theme_minimal() +
  theme(
    plot.title = element_text(hjust = 0.5, face = "bold", size = 14),
    axis.title.x = element_text(face = "bold", size = 12),
    axis.title.y = element_text(face = "bold", size = 12),
    legend.title = element_text(face = "bold", size = 12),
    legend.text = element_text(size = 10),
    legend.position = "top"
  )

missed_scheduled_visit_plot
```


Missed Scheduled Visits

Combined Plots

```
a <- missed_scheduled_visit_plot
b <- reduced_art_intake_plot
c <- run_out_of_art_plot
```

```
ps1 <- ggplot(df_hiv_summary, aes(x = sex, y = proportion, fill = time)) +
  geom_col(position = position_dodge(width = 0.7), width = 0.5) +
  geom_errorbar(
    aes(ymin = lower, ymax = upper),
    position = position_dodge(width = 0.7),
    width = 0.2,
    size = 1
  ) +
  scale_y_continuous(labels = scales::percent_format(accuracy = 1),limits = c(0, 0.12)) +
  labs(
    caption = "Missed Scheduled Visits",
    x = "Sex",
    y = "Proportion of individuals",
    fill = "Time"
  ) +
  theme_minimal() +
  theme(
    plot.caption = element_text(hjust = 0, face = "bold", size = 10),
    axis.title.x = element_text(face = "bold", size = 10),
    axis.title.y = element_text(face = "bold", size = 10),
    legend.title = element_text(face = "bold", size = 10),
    legend.text = element_text(size = 10),
    legend.position = "top"
  )
ps1 ## Missed scheduled visits
```
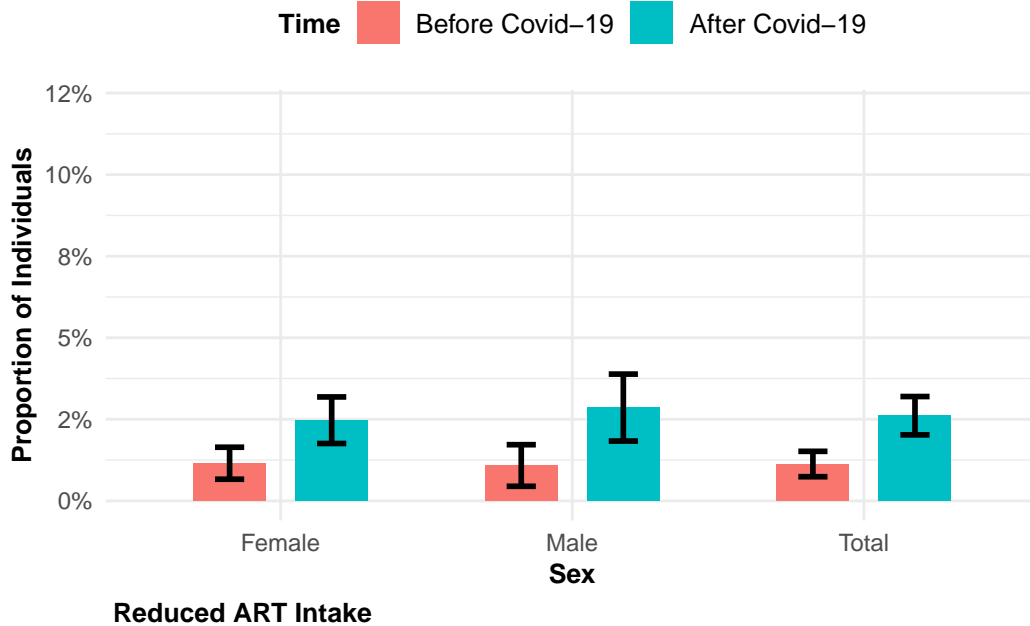
Missed Scheduled Visits
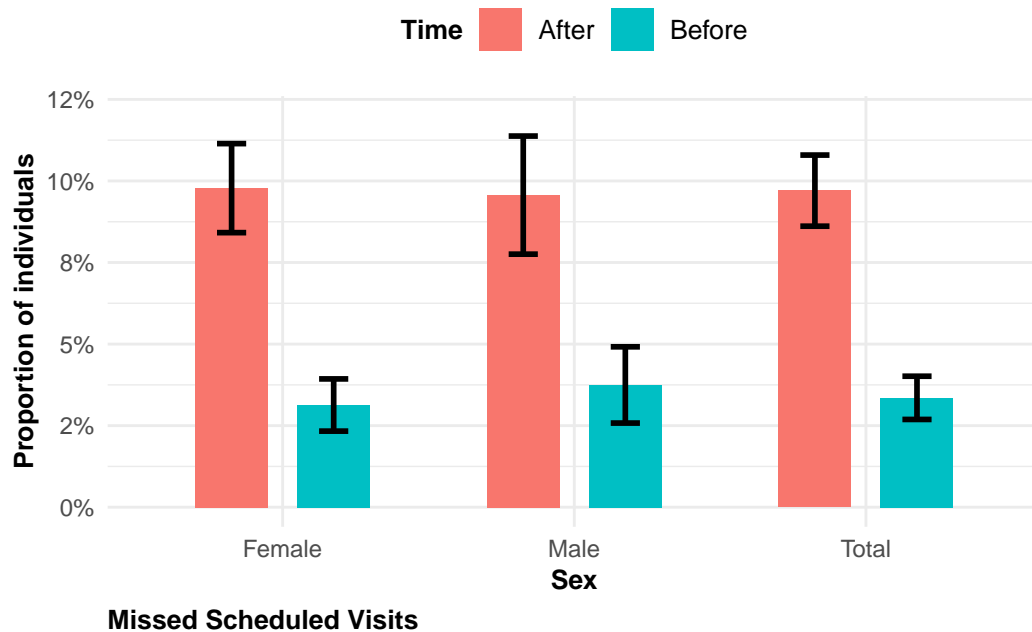
```r
### Reduced pill intake
ps2 <- ggplot(df_artstr_summary, aes(x = sex, y = proportion, fill = time)) +
  geom_col(position = position_dodge(width = 0.7), width = 0.5) +
  geom_errorbar(
    aes(ymin = lower, ymax = upper),
    position = position_dodge(width = 0.7),
    width = 0.2,
    size = 1
  ) +
  scale_y_continuous(labels = scales::percent_format(accuracy = 1),limits = c(0, 0.12))+
  labs(
    caption = " Reduced ART Intake",
    x = "Sex",
    y = "Proportion of Individuals",
    fill = "Time"
  ) +
  theme_minimal() +
  theme(
    plot.caption = element_text(hjust = 0, face = "bold", size = 10),
    axis.title.x = element_text(face = "bold", size = 10),
    axis.title.y = element_text(face = "bold", size = 10),
    legend.title = element_text(face = "bold", size = 10),
    legend.text = element_text(size = 10),
```

```
    legend.position = "top"
  )
ps2
```


Reduced ART Intake

```
## Run out of pills
ps3 <- ggplot(df_artrun_summary, aes(x = sex, y = proportion, fill = time)) +
  geom_col(position = position_dodge(width = 0.7), width = 0.5) +
  geom_errorbar(
    aes(ymin = lower, ymax = upper),
    position = position_dodge(width = 0.7),
    width = 0.2,
    size = 1
  ) +
  scale_y_continuous(labels = scales::percent_format(accuracy = 1),limits = c(0, 0.12)) +
  labs(
    caption =  "Run Out of ART",
    x = "Sex",
    y = "Proportion of individuals",
    fill = "Time"
  ) +
  theme_minimal() +
  theme(
```
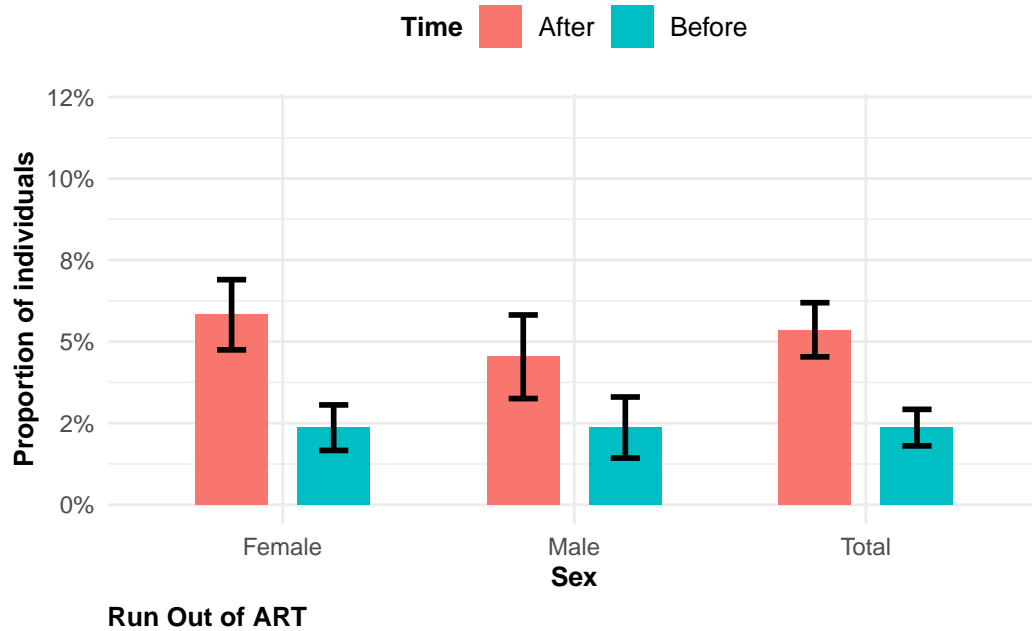
```
    plot.caption =  element_text(hjust = 0, face = "bold", size = 10),
    axis.title.x = element_text(face = "bold", size = 10),
    axis.title.y = element_text(face = "bold", size = 10),
    legend.title = element_text(face = "bold", size = 10),
    legend.text = element_text(size = 10),
    legend.position = "top"
  )

ps3
```
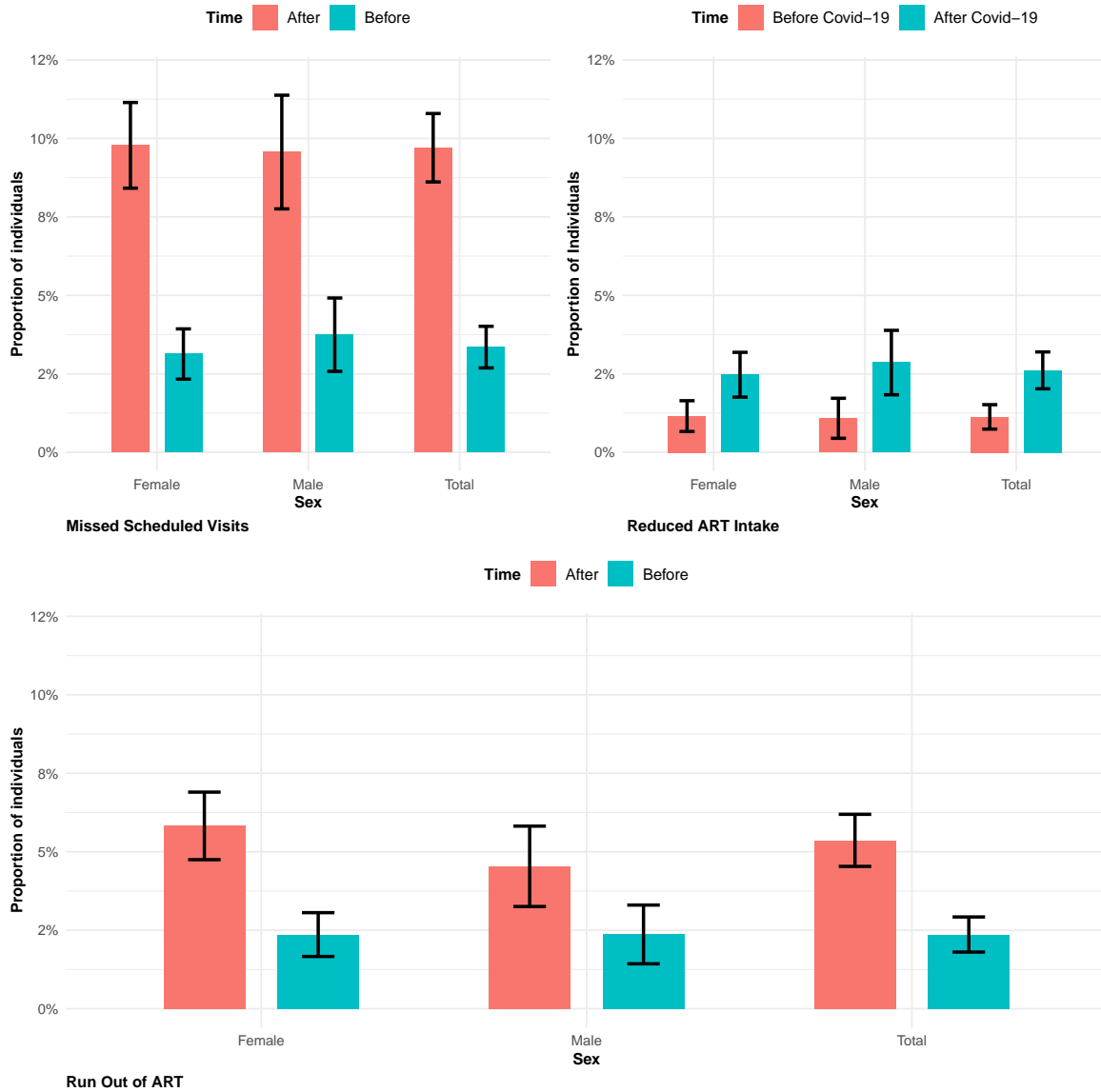

Run Out of ART

```
### Combined plot
(ps1 + ps2)/ps3
```

Missed Scheduled Visits

Reduced ART Intake

Run Out of ART

SUBPLOTS

Community Type

```
df_com <-  rakai %>%
  select(comm_num,artrunbc,artrunac,
```

```
        hivac,hivbc,copies,new_copies,artstrac,artstrbc) %>%
  filter(hivac !=8, hivbc!=8,artrunbc!=8,artstrac!=8,artstrbc!=8,artrunac!=8) %>%
  mutate(
    community_type = case_when(
      comm_num %in% c(38,770,771,774) ~ "Fishing community",
      .default = "Inland Community") %>%
      fct_relevel("Inland Community") %>%
      ff_label("Community type"),

    hivac = if_else(hivac ==1, "Yes","No") %>%
    ff_label("Missed scheduled visit for HIV care") %>%
      as_factor(),

     hivbc = if_else(hivbc ==1,"Yes","No") %>%
    ff_label("Missed scheduled visit for HIV care") %>%
    as_factor(),

     artrunac = if_else(artrunac ==1,"Yes","No") %>%
    as_factor() %>%
    ff_label("Run out of ART before next refill"),

   artrunbc = if_else(artrunbc ==1,"Yes","No") %>%
    as_factor() %>%
    ff_label("Run out of ART before next refill"),

  artstrac = if_else(artstrac ==1,"Yes","No") %>%
    as_factor() %>%
    ff_label("Taken ART pills less frequently / in smaller
amounts to conserve supply"),

  artstrbc = if_else(artstrbc ==1,"Yes","No") %>%
    as_factor() %>%
    ff_label("Taken ART pills less frequently / in smaller
amounts to conserve supply")
  ) %>%
  select(-comm_num)
```

```
# df_com
```

Reduced ART intake by Community

```r
df_com %>% group_by(community_type,artstrbc) %>%
  count()
```

community_type	artstrbc	n
Inland Community	No	1272
Inland Community	Yes	11
Fishing community	No	1530
Fishing community	Yes	21

```r
df_com %>% group_by(community_type,artstrac) %>%
  count()
```

community_type	artstrac	n
Inland Community	No	1268
Inland Community	Yes	15
Fishing community	No	1492
Fishing community	Yes	59

```r
df_com_artstr <- df_com %>%
  pivot_longer(
    cols = c(artstrbc, artstrac),
    names_to = "variable",
    values_to = "response"
  ) %>%
  mutate(
    time = if_else(grepl("bc$", variable), "Before Covid-19", "After Covid-19")
  )

df_com_artstr_summary <- df_com_artstr %>%
  group_by(time,community_type) %>%
  summarise(
    n_yes = sum(response == "Yes", na.rm = TRUE),
    n = n(),
    .groups = "drop"
  )
```

```
df_com_artstr_totals <- df_com_artstr %>%
  group_by(time) %>%
  summarise(
    n_yes = sum(response == "Yes", na.rm = TRUE),
    n = n(),
    .groups = "drop"
  )

df_com_artstr_summary <- bind_rows(df_com_artstr_summary, df_com_artstr_totals) %>%
  mutate(
    proportion = n_yes / n,
    se = sqrt(proportion * (1 - proportion) / n),
    lower = proportion - 1.96 * se,
    upper = proportion + 1.96 * se
  ) %>%
  mutate(time = as_factor(time) %>%
           fct_relevel("Before Covid-19"),
         community_type = if_else(is.na(community_type),"Total",community_type))

df_com_artstr_summary
```

time	community_type	n_yes	n	proportion	se	lower	upper
After Covid-19	Inland Community	15	1283	0.0116913	0.0030010	0.0058094	0.0175733
After Covid-19	Fishing community	59	1551	0.0380400	0.0048573	0.0285197	0.0475602
Before Covid-19	Inland Community	11	1283	0.0085737	0.0025739	0.0035287	0.0136186
Before Covid-19	Fishing community	21	1551	0.0135397	0.0029345	0.0077880	0.0192913
After Covid-19	Total	74	2834	0.0261115	0.0029955	0.0202403	0.0319827
Before Covid-19	Total	32	2834	0.0112915	0.0019848	0.0074013	0.0151816

```
reduced_art_intake_by_community_plot <- ggplot(df_com_artstr_summary, aes(x = community_type
  geom_col(position = position_dodge(width = 0.7), width = 0.5) +
  geom_errorbar(
    aes(ymin = lower, ymax = upper),
    position = position_dodge(width = 0.7),
```
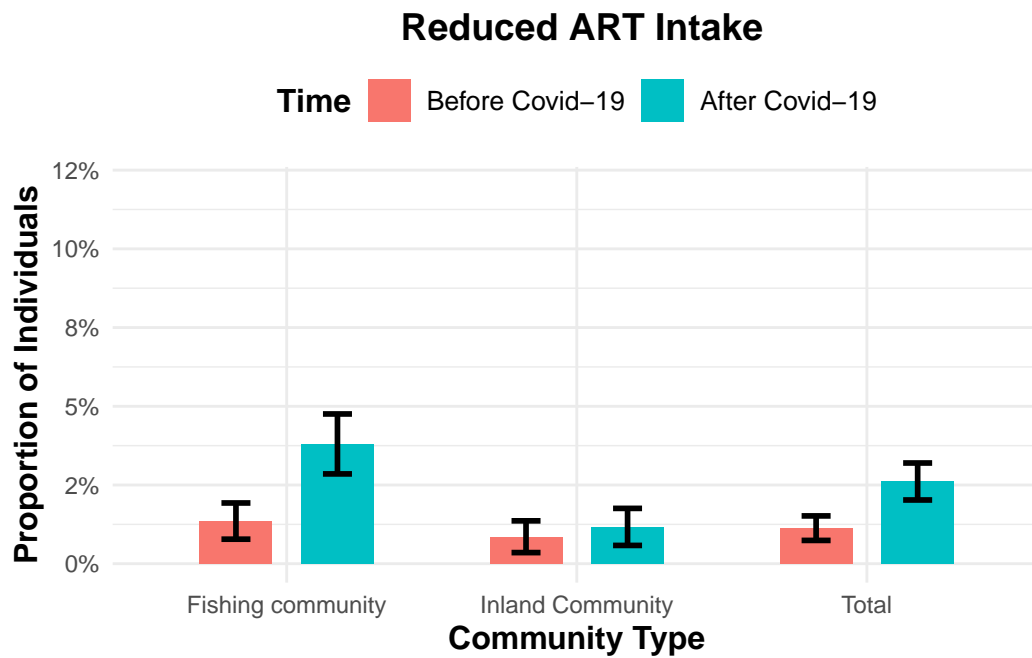
```
    width = 0.2,
    size = 1
  ) +
  scale_y_continuous(labels = scales::percent_format(accuracy = 1),limits = c(0, 0.12))+
  labs(
    title = " Reduced ART Intake",
    x = "Community Type",
    y = "Proportion of Individuals",
    fill =  "Time"
  ) +
  theme_minimal() +
  theme(
    plot.title = element_text(hjust = 0.5, face = "bold", size = 14),
    axis.title.x = element_text(face = "bold", size = 12),
    axis.title.y = element_text(face = "bold", size = 12),
    legend.title = element_text(face = "bold", size = 12),
    legend.text = element_text(size = 10),
    legend.position = "top"
  )

reduced_art_intake_by_community_plot
```

Missed Scheduled Visits by Community

```
df_com %>% group_by(community_type,hivbc) %>%
  count()
```

community_type	hivbc	n
Inland Community	No	1257
Inland Community	Yes	26
Fishing community	No	1482
Fishing community	Yes	69

```
df_com %>% group_by(community_type,hivac) %>%
  count()
```

community_type	hivac	n
Inland Community	No	1198
Inland Community	Yes	85
Fishing community	No	1361
Fishing community	Yes	190

```
df_com_hiv <- df_com %>%
  mutate(
    hivbc = as.character(hivbc),
    hivac = as.character(hivac)
  ) %>%
  pivot_longer(
    cols = c(hivbc, hivac),
    names_to = "variable",
    values_to = "response"
  ) %>%
  mutate(
    time = if_else(grepl("bc$", variable), "Before Covid-19", "After Covid-19")
  )

df_com_hiv_summary <- df_com_hiv %>%
  group_by(time,community_type) %>%
  summarise(
    n_yes = sum(response == "Yes", na.rm = TRUE),
```

```
    n = n(),
    .groups = "drop"
  )

df_com_hiv_totals <- df_com_hiv %>%
  group_by(time) %>%
  summarise(
    n_yes = sum(response == "Yes", na.rm = TRUE),
    n = n(),
    .groups = "drop"
  )

df_com_hiv_summary <- bind_rows(df_com_hiv_summary, df_com_hiv_totals) %>%
  mutate(
    proportion = n_yes / n,
    se = sqrt(proportion * (1 - proportion) / n),
    lower = proportion - 1.96 * se,
    upper = proportion + 1.96 * se
  )%>%
  mutate(time = as_factor(time) %>%
           fct_relevel("Before Covid-19"),
         community_type = if_else(is.na(community_type),"Total",community_type))



df_com_hiv_summary
```

time	community_type	n_yes	n	proportion	se	lower	upper
After Covid-19	Inland Community	85	1283	0.0662510	0.0069438	0.0526411	0.0798608
After Covid-19	Fishing community	190	1551	0.1225016	0.0083251	0.1061845	0.1388188
Before Covid-19	Inland Community	26	1283	0.0202650	0.0039338	0.0125547	0.0279753
Before Covid-19	Fishing community	69	1551	0.0444874	0.0052352	0.0342265	0.0547484
After Covid-19	Total	275	2834	0.0970360	0.0055603	0.0861377	0.1079343
Before Covid-19	Total	95	2834	0.0335215	0.0033811	0.0268946	0.0401485

```r
missed_scheduled_visit_by_community_type_plot <-  ggplot(df_com_hiv_summary, aes(x = communit
  geom_col(position = position_dodge(width = 0.7), width = 0.5) +
  geom_errorbar(
    aes(ymin = lower, ymax = upper),
    position = position_dodge(width = 0.7),
    width = 0.2,
    size = 1
  ) +
  scale_y_continuous(labels = scales::percent_format(accuracy = 1),limits = c(0, 0.15)) +
  labs(
    title = "Missed Scheduled Visits",
    x = "Community Type",
    y = "Proportion of individuals",
    fill = "Time"
  ) +
  theme_minimal() +
  theme(
    plot.title = element_text(hjust = 0.5, face = "bold", size = 14),
    axis.title.x = element_text(face = "bold", size = 12),
    axis.title.y = element_text(face = "bold", size = 12),
    legend.title = element_text(face = "bold", size = 12),
    legend.text = element_text(size = 10),
    legend.position = "top"
  )

missed_scheduled_visit_by_community_type_plot
```

Missed Scheduled Visits
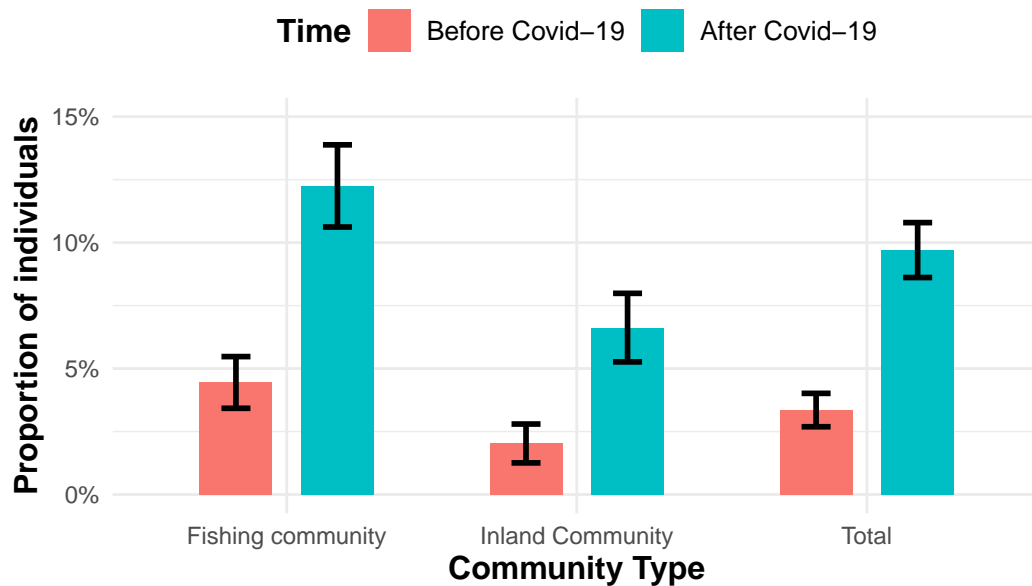
Run out of ART by Community

```
df_com %>% group_by(community_type,artrunbc) %>%
  count()
```

community_type	artrunbc	n
Inland Community	No	1253
Inland Community	Yes	30
Fishing community	No	1514
Fishing community	Yes	37

```
df_com %>% group_by(community_type,artrunac) %>%
  count()
```

community_type	artrunac	n
Inland Community	No	1225
Inland Community	Yes	58
Fishing community	No	1457

community_type	artrunac	n
Fishing community	Yes	94

```r
df_com_artrun <- df_com %>%
  mutate(
    artrunbc = as.character(artrunbc),
    artrunac = as.character(artrunac)
  ) %>%
  pivot_longer(
    cols = c(artrunbc, artrunac),
    names_to = "variable",
    values_to = "response"
  ) %>%
  mutate(
    time = if_else(grepl("bc$", variable), "Before Covid-19", "After Covid-19")
  )

df_com_artrun_summary <- df_com_artrun %>%
  group_by(time,community_type) %>%
  summarise(
    n_yes = sum(response == "Yes", na.rm = TRUE),
    n = n(),
    .groups = "drop"
  )

df_com_artrun_totals <- df_com_artrun %>%
  group_by(time) %>%
  summarise(
    n_yes = sum(response == "Yes", na.rm = TRUE),
    n = n(),
    .groups = "drop"
  )

df_com_artrun_summary <- bind_rows(df_com_artrun_summary, df_com_artrun_totals) %>%
  mutate(
    proportion = n_yes / n,
    se = sqrt(proportion * (1 - proportion) / n),
    lower = proportion - 1.96 * se,
    upper = proportion + 1.96 * se
  ) %>%
 mutate(time = as_factor(time) %>%
```

```
            fct_relevel("Before Covid-19"),
        community_type = if_else(is.na(community_type),"Total",community_type))


df_com_artrun_summary
```

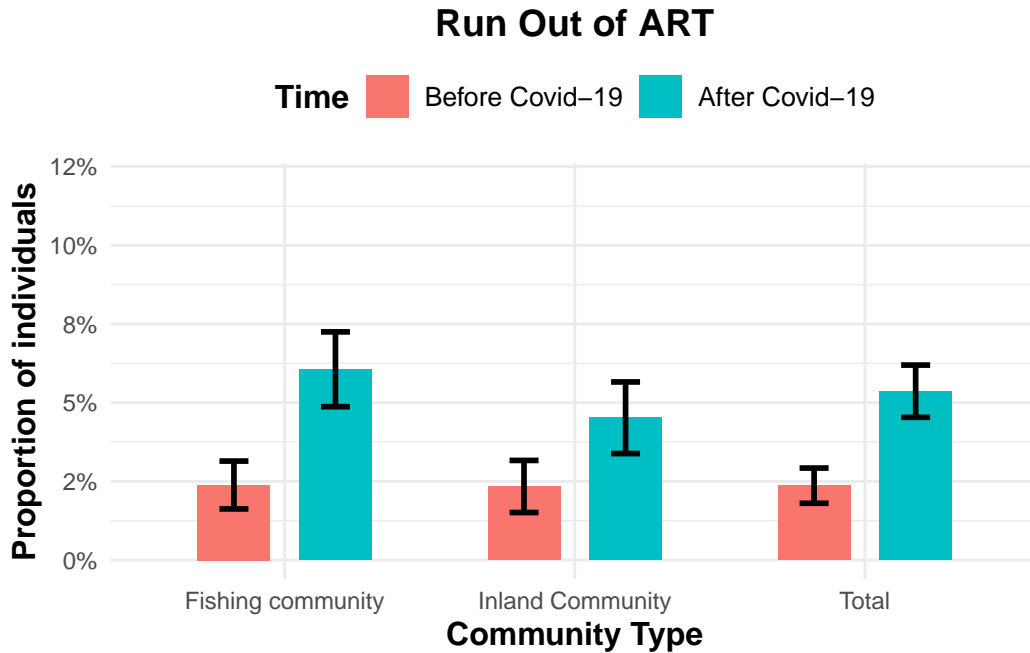| time	community_type	n_yes	n	proportion	se	lower	upper
After Covid-19	Inland Community	58	1283	0.0452065	0.0058002	0.0338382	0.0565749
After Covid-19	Fishing community	94	1551	0.0606061	0.0060587	0.0487311	0.0724810
Before Covid-19	Inland Community	30	1283	0.0233827	0.0042189	0.0151137	0.0316517
Before Covid-19	Fishing community	37	1551	0.0238556	0.0038748	0.0162610	0.0314501
After Covid-19	Total	152	2834	0.0536344	0.0042321	0.0453396	0.0619293
Before Covid-19	Total	67	2834	0.0236415	0.0028539	0.0180478	0.0292352

```
run_out_of_art_by_community_plot <- ggplot(df_com_artrun_summary, aes(x = community_type, y =
  geom_col(position = position_dodge(width = 0.7), width = 0.5) +
  geom_errorbar(
    aes(ymin = lower, ymax = upper),
    position = position_dodge(width = 0.7),
    width = 0.2,
    size = 1
  ) +
  scale_y_continuous(labels = scales::percent_format(accuracy = 1),limits = c(0, 0.12)) +
  labs(
    title = "Run Out of ART",
    x = "Community Type",
    y = "Proportion of individuals",
    fill = "Time"
  ) +
  theme_minimal() +
  theme(
```

```
    plot.title = element_text(hjust = 0.5, face = "bold", size = 14),
    axis.title.x = element_text(face = "bold", size = 12),
    axis.title.y = element_text(face = "bold", size = 12),
    legend.title = element_text(face = "bold", size = 12),
    legend.text = element_text(size = 10),
    legend.position = "top"
  )
run_out_of_art_by_community_plot
```
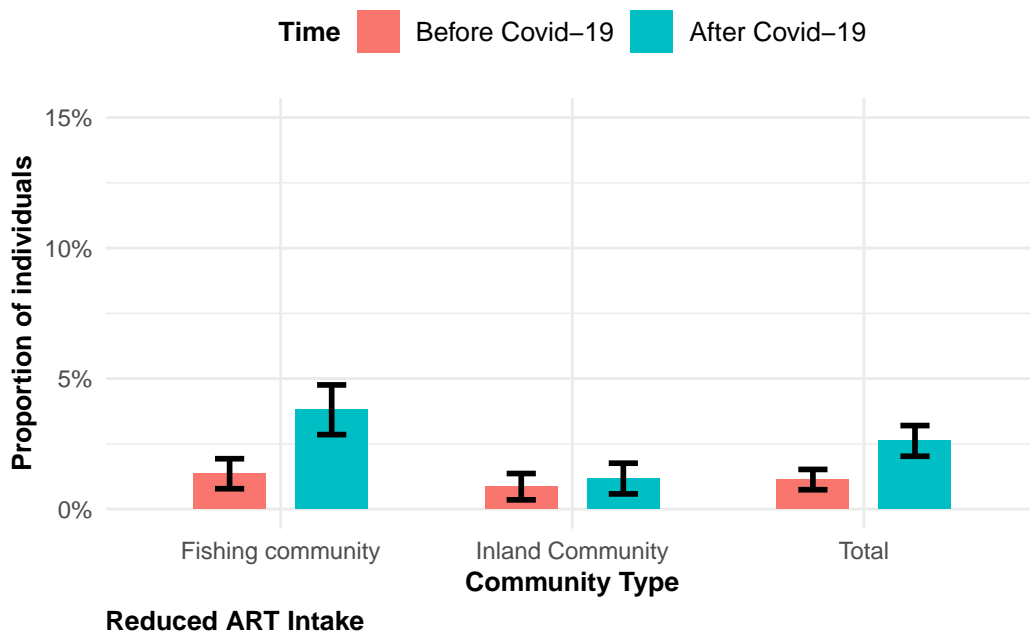


```
pc1 <- ggplot(df_com_artstr_summary, aes(x = community_type, y = proportion, fill =time)) +
  geom_col(position = position_dodge(width = 0.7), width = 0.5) +
  geom_errorbar(
    aes(ymin = lower, ymax = upper),
    position = position_dodge(width = 0.7),
    width = 0.2,
    size = 1
  ) +
  scale_y_continuous(labels = scales::percent_format(accuracy = 1),limits = c(0, 0.15)) +
  labs(
    caption = "Reduced ART Intake",
    x = "Community Type",
    y = "Proportion of individuals",
```

```
      fill = "Time"
    ) +
    theme_minimal() +
    theme(
      plot.caption = element_text(hjust = 0, face = "bold", size = 10),
      axis.title.x = element_text(face = "bold", size = 10),
      axis.title.y = element_text(face = "bold", size = 10),
      legend.title = element_text(face = "bold", size = 10),
      legend.text = element_text(size = 10),
      legend.position = "top"
    )
pc1 ##
```
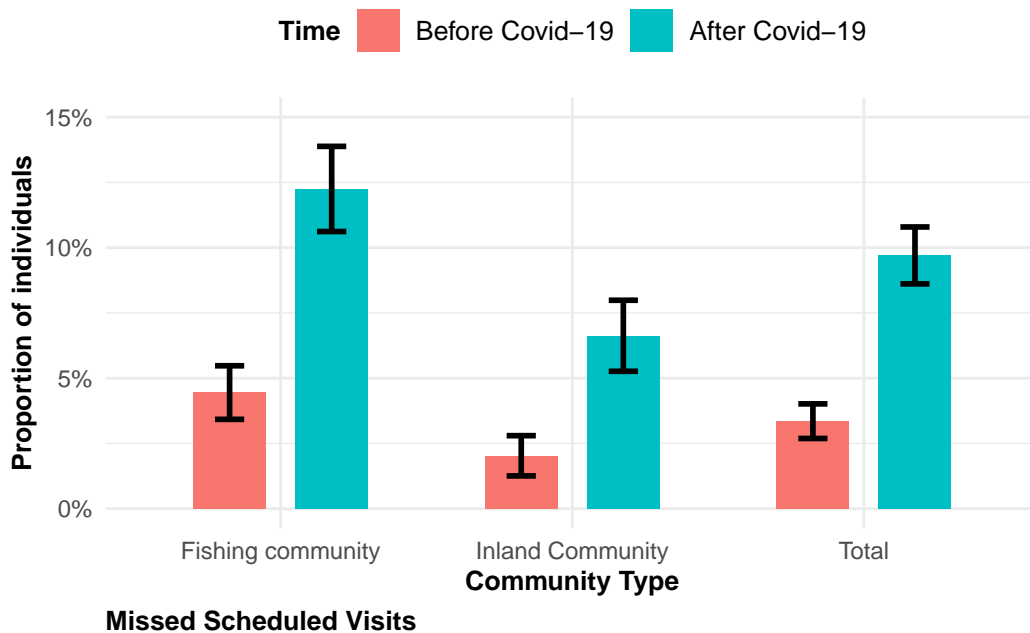


```
pc2 <- ggplot(df_com_hiv_summary, aes(x = community_type, y = proportion, fill = time)) +
    geom_col(position = position_dodge(width = 0.7), width = 0.5) +
    geom_errorbar(
      aes(ymin = lower, ymax = upper),
      position = position_dodge(width = 0.7),
      width = 0.2,
      size = 1
    ) +
    scale_y_continuous(labels = scales::percent_format(accuracy = 1),limits = c(0, 0.15)) +
```

```
  labs(
    caption = "Missed Scheduled Visits",
    x = "Community Type",
    y = "Proportion of individuals",
    fill = "Time"
  ) +
  theme_minimal() +
  theme(
    plot.caption = element_text(hjust = 0, face = "bold", size = 10),
    axis.title.x = element_text(face = "bold", size = 10),
    axis.title.y = element_text(face = "bold", size = 10),
    legend.title = element_text(face = "bold", size = 10),
    legend.text = element_text(size = 10),
    legend.position = "top"
  )
pc2 ## Missed scheduled visits
```
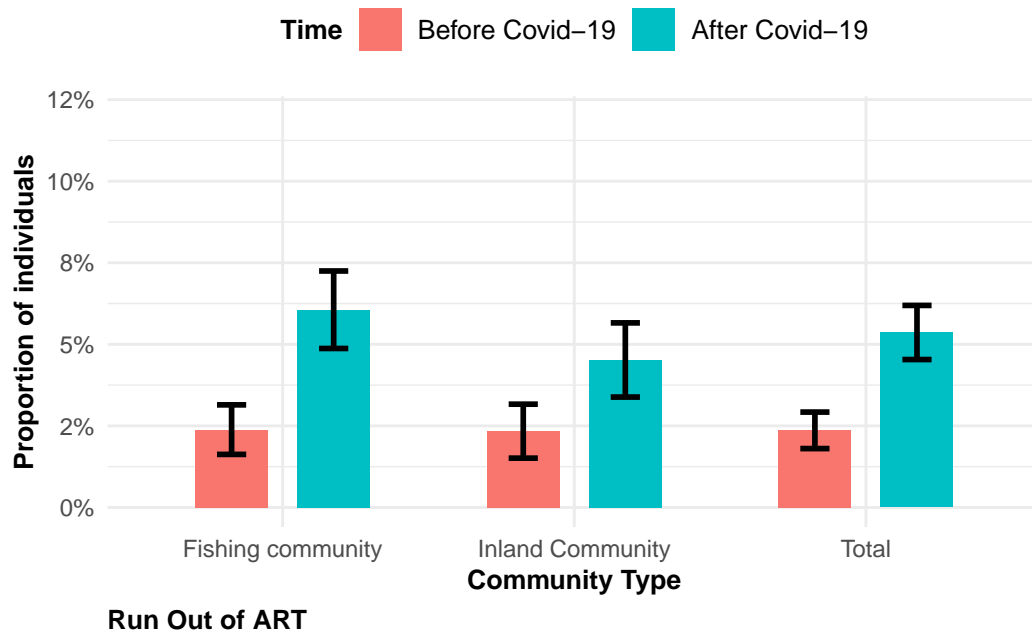

Missed Scheduled Visits

```
## Run out of pills
pc3 <- ggplot(df_com_artrun_summary, aes(x = community_type, y = proportion, fill =time)) +
  geom_col(position = position_dodge(width = 0.7), width = 0.5) +
  geom_errorbar(
    aes(ymin = lower, ymax = upper),
```

```
    position = position_dodge(width = 0.7),
    width = 0.2,
    size = 1
) +
scale_y_continuous(labels = scales::percent_format(accuracy = 1),limits = c(0, 0.12)) +
labs(
    caption =  "Run Out of ART",
    x = "Community Type",
    y = "Proportion of individuals",
    fill = "Time"
) +
theme_minimal() +
theme(
    plot.caption =  element_text(hjust = 0, face = "bold", size = 10),
    axis.title.x = element_text(face = "bold", size = 10),
    axis.title.y = element_text(face = "bold", size = 10),
    legend.title = element_text(face = "bold", size = 10),
    legend.text = element_text(size = 10),
    legend.position = "top"
)

pc3
```


Run Out of ART

```
### Combined plot
(pc1 + pc2)/pc3
```


Reduced ART Intake

Missed Scheduled Visits

Run Out of ART
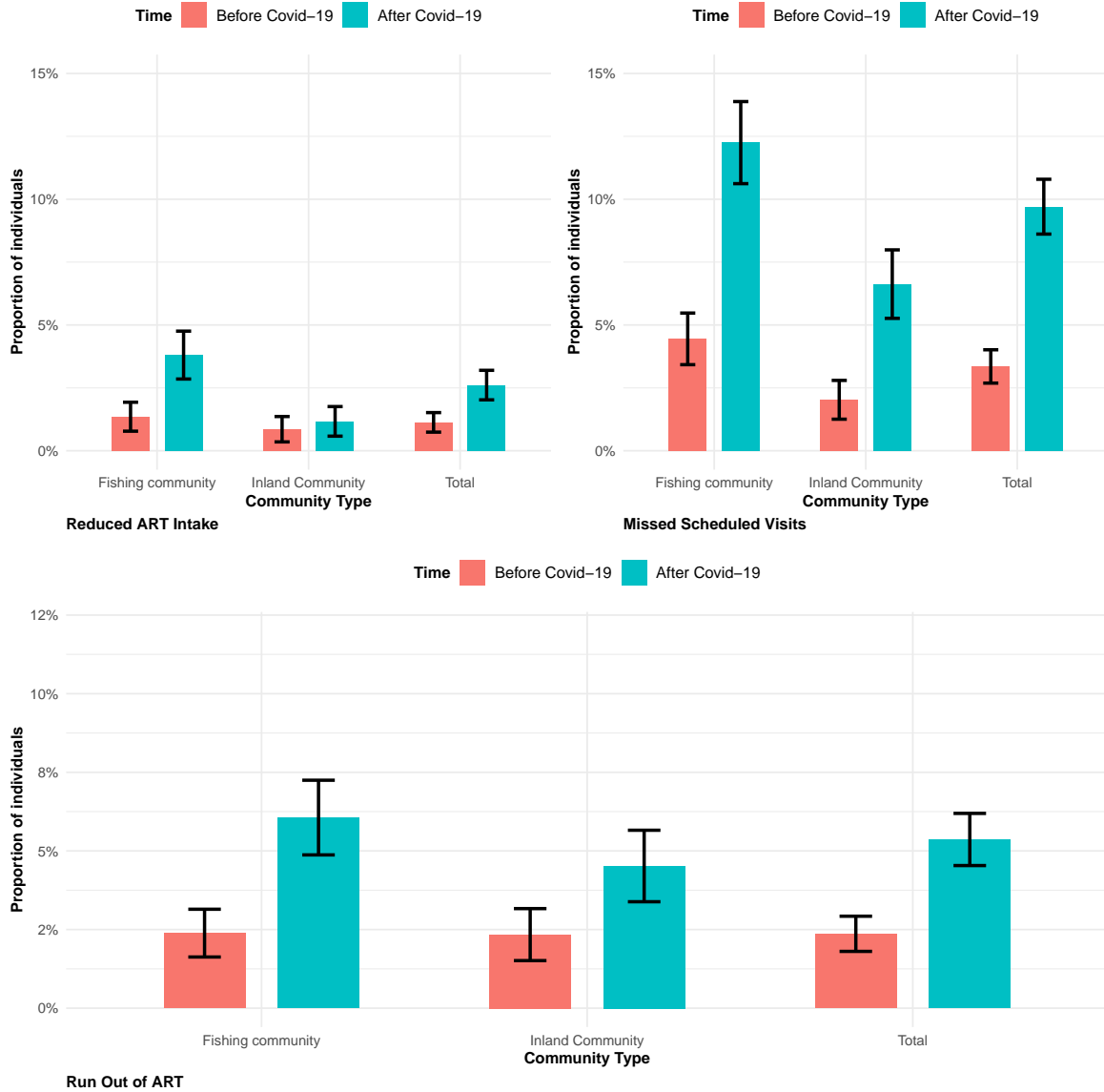
Mobility

```
df_mob <-  rakai %>%
  select(mobility,artrunbc,artrunac,
         hivac,hivbc,copies,new_copies,artstrac,artstrbc) %>%
  filter(hivac !=8, hivbc!=8,artrunbc!=8,artstrac!=8,artstrbc!=8,artrunac!=8) %>%
  mutate(
    mobility = case_when(
           mobility %in% c(3,8,10) ~ "In-migrant",
           .default = "Long-term resident") %>%
           fct_relevel("In-migrant") %>%
           ff_label("Migration"),

    hivac = if_else(hivac ==1, "Yes","No") %>%
    ff_label("Missed scheduled visit for HIV care") %>%
      as_factor(),

     hivbc = if_else(hivbc ==1,"Yes","No") %>%
    ff_label("Missed scheduled visit for HIV care") %>%
    as_factor(),

     artrunac = if_else(artrunac ==1,"Yes","No") %>%
    as_factor() %>%
    ff_label("Run out of ART before next refill"),

   artrunbc = if_else(artrunbc ==1,"Yes","No") %>%
    as_factor() %>%
    ff_label("Run out of ART before next refill"),

   artstrac = if_else(artstrac ==1,"Yes","No") %>%
    as_factor() %>%
    ff_label("Taken ART pills less frequently / in smaller
amounts to conserve supply"),

   artstrbc = if_else(artstrbc ==1,"Yes","No") %>%
    as_factor() %>%
    ff_label("Taken ART pills less frequently / in smaller
amounts to conserve supply")
  )
```

Run Out of ART by mobility

```r
df_mob %>% group_by(mobility,artrunbc) %>%
  count()
```

mobility	artrunbc	n
In-migrant	No	610
In-migrant	Yes	22
Long-term resident	No	2157
Long-term resident	Yes	45

```r
df_mob %>% group_by(mobility,artrunac) %>%
  count()
```

mobility	artrunac	n
In-migrant	No	582
In-migrant	Yes	50
Long-term resident	No	2100
Long-term resident	Yes	102

```r
df_mob_artrun <- df_mob %>%
  mutate(
    artrunbc = as.character(artrunbc),
    artrunac = as.character(artrunac)
  ) %>%
  pivot_longer(
    cols = c(artrunbc, artrunac),
    names_to = "variable",
    values_to = "response"
  ) %>%
  mutate(
    time = if_else(grepl("bc$", variable), "Before Covid-19", "After Covid-19")
  )

df_mob_artrun_summary <- df_mob_artrun %>%
  group_by(time,mobility) %>%
  summarise(
    n_yes = sum(response == "Yes", na.rm = TRUE),
```

```
    n = n(),
    .groups = "drop"
  )

df_mob_artrun_totals <- df_mob_artrun %>%
  group_by(time) %>%
  summarise(
    n_yes = sum(response == "Yes", na.rm = TRUE),
    n = n(),
    .groups = "drop"
  )

df_mob_artrun_summary <- bind_rows(df_mob_artrun_summary, df_mob_artrun_totals) %>%
  mutate(
    proportion = n_yes / n,
    se = sqrt(proportion * (1 - proportion) / n),
    lower = proportion - 1.96 * se,
    upper = proportion + 1.96 * se
  ) %>%
 mutate(time = as_factor(time) %>%
          fct_relevel("Before Covid-19"),
        mobility = if_else(is.na(mobility),"Total",mobility))




df_mob_artrun_summary
```

time	mobility	n_yes	n	proportion	se	lower	upper
After Covid-19	In-migrant	50	632	0.0791139	0.0107367	0.0580700	0.1001579
After Covid-19	Long-term resident	102	2202	0.0463215	0.0044790	0.0375426	0.0551004
Before Covid-19	In-migrant	22	632	0.0348101	0.0072912	0.0205193	0.0491009
Before Covid-19	Long-term resident	45	2202	0.0204360	0.0030151	0.0145263	0.0263456
After Covid-19	Total	152	2834	0.0536344	0.0042321	0.0453396	0.0619293

time	mobility	n_yes	n	proportion	se	lower	upper
Before Covid-19	Total	67	2834	0.0236415	0.0028539	0.0180478	0.0292352

```
run_out_of_art_by_mobility_plot <- ggplot(df_mob_artrun_summary, aes(x = mobility, y = propor
  geom_col(position = position_dodge(width = 0.7), width = 0.5) +
  geom_errorbar(
    aes(ymin = lower, ymax = upper),
    position = position_dodge(width = 0.7),
    width = 0.2,
    size = 1
  ) +
  scale_y_continuous(labels = scales::percent_format(accuracy = 1),limits = c(0, 0.12)) +
  labs(
    title = "Run Out of ART",
    x = "Mobility",
    y = "Proportion of individuals",
    fill = "Time"
  ) +
  theme_minimal() +
  theme(
    plot.title = element_text(hjust = 0.5, face = "bold", size = 14),
    axis.title.x = element_text(face = "bold", size = 12),
    axis.title.y = element_text(face = "bold", size = 12),
    legend.title = element_text(face = "bold", size = 12),
    legend.text = element_text(size = 10),
    legend.position = "top"
  )
run_out_of_art_by_mobility_plot
```

Run Out of ART

reduced ART Intake by mobility

```
df_mob %>% group_by(mobility,artstrbc) %>%
  count()
```

mobility	artstrbc	n
In-migrant	No	625
In-migrant	Yes	7
Long-term resident	No	2177
Long-term resident	Yes	25

```
df_mob %>% group_by(mobility,artstrac) %>%
  count()
```

mobility	artstrac	n
In-migrant	No	611
In-migrant	Yes	21
Long-term resident	No	2149

mobility	artstrac	n
Long-term resident	Yes	53

```
df_mob_artstr <- df_mob %>%
  pivot_longer(
    cols = c(artstrbc, artstrac),
    names_to = "variable",
    values_to = "response"
  ) %>%
  mutate(
    time = if_else(grepl("bc$", variable), "Before Covid-19", "After Covid-19")
  )

df_mob_artstr_summary <- df_mob_artstr %>%
  group_by(time,mobility) %>%
  summarise(
    n_yes = sum(response == "Yes", na.rm = TRUE),
    n = n(),
    .groups = "drop"
  )

df_mob_artstr_totals <- df_mob_artstr %>%
  group_by(time) %>%
  summarise(
    n_yes = sum(response == "Yes", na.rm = TRUE),
    n = n(),
    .groups = "drop"
  )

df_mob_artstr_summary <- bind_rows(df_mob_artstr_summary, df_mob_artstr_totals) %>%
  mutate(
    proportion = n_yes / n,
    se = sqrt(proportion * (1 - proportion) / n),
    lower = proportion - 1.96 * se,
    upper = proportion + 1.96 * se
  ) %>%
  mutate(time = as_factor(time) %>%
           fct_relevel("Before Covid-19"),
         mobility = if_else(is.na(mobility),"Total",mobility))

df_mob_artstr_summary
```

time	mobility	n_yes	n	proportion	se	lower	upper
After Covid-19	In-migrant	21	632	0.0332278	0.0071294	0.0192542	0.0472015
After Covid-19	Long-term resident	53	2202	0.0240690	0.0032661	0.0176675	0.0304706
Before Covid-19	In-migrant	7	632	0.0110759	0.0041631	0.0029163	0.0192356
Before Covid-19	Long-term resident	25	2202	0.0113533	0.0022577	0.0069282	0.0157785
After Covid-19	Total	74	2834	0.0261115	0.0029955	0.0202403	0.0319827
Before Covid-19	Total	32	2834	0.0112915	0.0019848	0.0074013	0.0151816

```
reduced_art_intake_by_mobility_plot <- ggplot(df_mob_artstr_summary, aes(x = mobility, y = pi
  geom_col(position = position_dodge(width = 0.7), width = 0.5) +
  geom_errorbar(
    aes(ymin = lower, ymax = upper),
    position = position_dodge(width = 0.7),
    width = 0.2,
    size = 1
  ) +
  scale_y_continuous(labels = scales::percent_format(accuracy = 1),limits = c(0, 0.20))+
  labs(
    title = " Reduced ART Intake",
    x = "Mobility",
    y = "Proportion of Individuals",
    fill =  "Time"
  ) +
  theme_minimal() +
  theme(
    plot.title = element_text(hjust = 0.5, face = "bold", size = 14),
    axis.title.x = element_text(face = "bold", size = 12),
    axis.title.y = element_text(face = "bold", size = 12),
    legend.title = element_text(face = "bold", size = 12),
    legend.text = element_text(size = 10),
    legend.position = "top"
  )

reduced_art_intake_by_mobility_plot
```

Reduced ART Intake
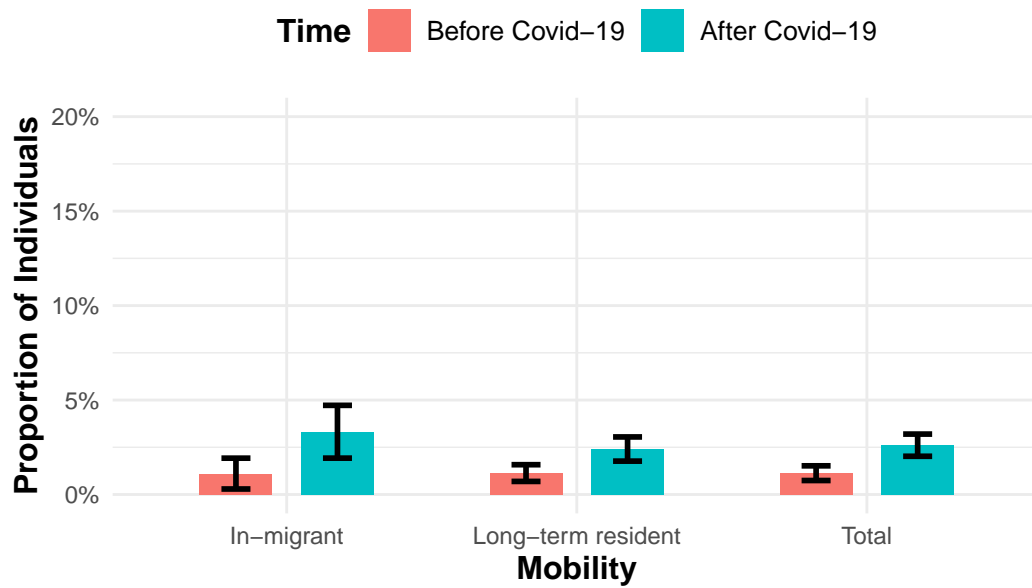
Missed scheduled visits by mobility

```
df_mob %>% group_by(mobility,hivbc) %>%
  count()
```

mobility	hivbc	n
In-migrant	No	595
In-migrant	Yes	37
Long-term resident	No	2144
Long-term resident	Yes	58

```
df_mob %>% group_by(mobility,hivac) %>%
  count()
```

mobility	hivac	n
In-migrant	No	534
In-migrant	Yes	98
Long-term resident	No	2025

mobility	hivac	n
Long-term resident	Yes	177

```r
df_mob_hiv <- df_mob %>%
  mutate(
    hivbc = as.character(hivbc),
    hivac = as.character(hivac)
  ) %>%
  pivot_longer(
    cols = c(hivbc, hivac),
    names_to = "variable",
    values_to = "response"
  ) %>%
  mutate(
    time = if_else(grepl("bc$", variable), "Before Covid-19", "After Covid-19")
  )

df_mob_hiv_summary <- df_mob_hiv %>%
  group_by(time,mobility) %>%
  summarise(
    n_yes = sum(response == "Yes", na.rm = TRUE),
    n = n(),
    .groups = "drop"
  )

df_mob_hiv_totals <- df_mob_hiv %>%
  group_by(time) %>%
  summarise(
    n_yes = sum(response == "Yes", na.rm = TRUE),
    n = n(),
    .groups = "drop"
  )

df_mob_hiv_summary <- bind_rows(df_mob_hiv_summary, df_mob_hiv_totals) %>%
  mutate(
    proportion = n_yes / n,
    se = sqrt(proportion * (1 - proportion) / n),
    lower = proportion - 1.96 * se,
    upper = proportion + 1.96 * se
  )%>%
  mutate(time = as_factor(time) %>%
```

```
        fct_relevel("Before Covid-19"),
      mobility = if_else(is.na(mobility),"Total",mobility))
```
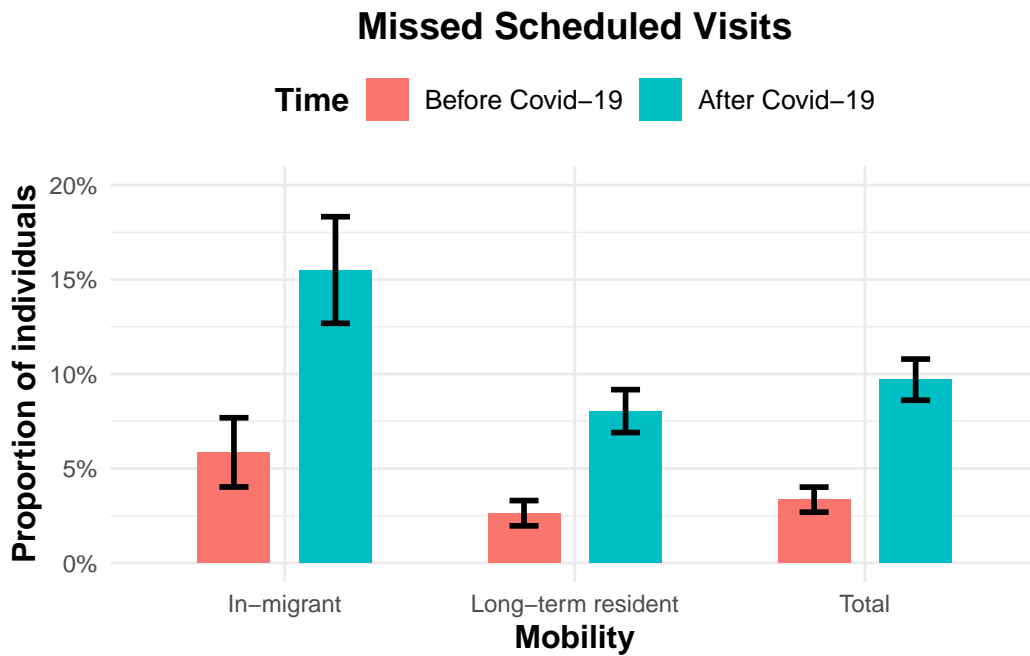
`df_com_hiv_summary`

time	community_type	n_yes	n	proportion	se	lower	upper
After Covid-19	Inland Community	85	1283	0.0662510	0.0069438	0.0526411	0.0798608
After Covid-19	Fishing community	190	1551	0.1225016	0.0083251	0.1061845	0.1388188
Before Covid-19	Inland Community	26	1283	0.0202650	0.0039338	0.0125547	0.0279753
Before Covid-19	Fishing community	69	1551	0.0444874	0.0052352	0.0342265	0.0547484
After Covid-19	Total	275	2834	0.0970360	0.0055603	0.0861377	0.1079343
Before Covid-19	Total	95	2834	0.0335215	0.0033811	0.0268946	0.0401485

```
missed_scheduled_visit_by_mobility_plot <-  ggplot(df_mob_hiv_summary, aes(x = mobility, y =
  geom_col(position = position_dodge(width = 0.7), width = 0.5) +
  geom_errorbar(
    aes(ymin = lower, ymax = upper),
    position = position_dodge(width = 0.7),
    width = 0.2,
    size = 1
  ) +
  scale_y_continuous(labels = scales::percent_format(accuracy = 1),limits = c(0, 0.2)) +
  labs(
    title = "Missed Scheduled Visits",
    x = "Mobility",
    y = "Proportion of individuals",
    fill = "Time"
  ) +
  theme_minimal() +
  theme(
    plot.title = element_text(hjust = 0.5, face = "bold", size = 14),
    axis.title.x = element_text(face = "bold", size = 12),
```

```
    axis.title.y = element_text(face = "bold", size = 12),
    legend.title = element_text(face = "bold", size = 12),
    legend.text = element_text(size = 10),
    legend.position = "top"
  )

missed_scheduled_visit_by_mobility_plot
```
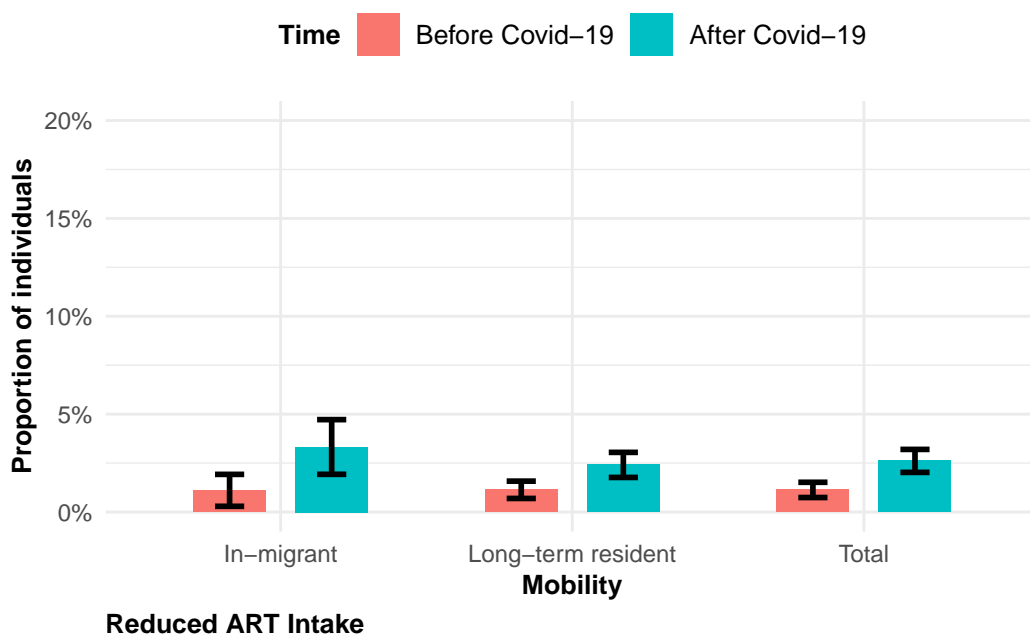
Missed Scheduled Visits


```
pm1 <- ggplot(df_mob_artstr_summary, aes(x = mobility, y = proportion, fill =time)) +
  geom_col(position = position_dodge(width = 0.7), width = 0.5) +
  geom_errorbar(
    aes(ymin = lower, ymax = upper),
    position = position_dodge(width = 0.7),
    width = 0.2,
    size = 1
  ) +
  scale_y_continuous(labels = scales::percent_format(accuracy = 1),limits = c(0, 0.20)) +
  labs(
    caption = "Reduced ART Intake",
    x = "Mobility",
    y = "Proportion of individuals",
    fill = "Time"
```

```
  ) +
  theme_minimal() +
  theme(
    plot.caption = element_text(hjust = 0, face = "bold", size = 10),
    axis.title.x = element_text(face = "bold", size = 10),
    axis.title.y = element_text(face = "bold", size = 10),
    legend.title = element_text(face = "bold", size = 10),
    legend.text = element_text(size = 10),
    legend.position = "top"
  )
pm1 ##
```
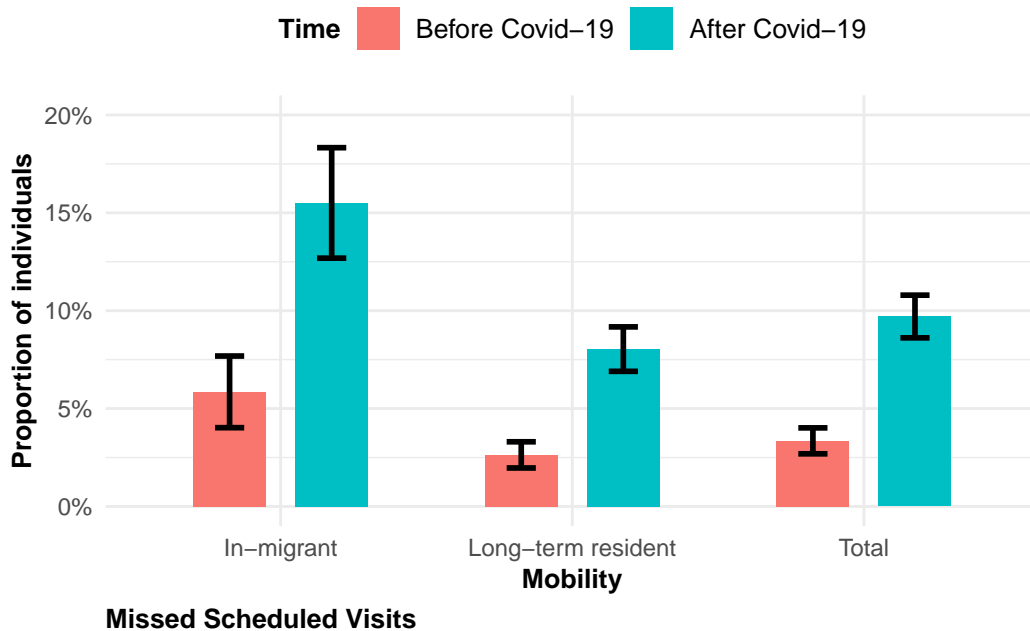


```
pm2 <- ggplot(df_mob_hiv_summary, aes(x = mobility, y = proportion, fill = time)) +
  geom_col(position = position_dodge(width = 0.7), width = 0.5) +
  geom_errorbar(
    aes(ymin = lower, ymax = upper),
    position = position_dodge(width = 0.7),
    width = 0.2,
    size = 1
  ) +
  scale_y_continuous(labels = scales::percent_format(accuracy = 1),limits = c(0, 0.20)) +
  labs(
```

```
    caption = "Missed Scheduled Visits",
    x = "Mobility",
    y = "Proportion of individuals",
    fill = "Time"
  ) +
  theme_minimal() +
  theme(
    plot.caption = element_text(hjust = 0, face = "bold", size = 10),
    axis.title.x = element_text(face = "bold", size = 10),
    axis.title.y = element_text(face = "bold", size = 10),
    legend.title = element_text(face = "bold", size = 10),
    legend.text = element_text(size = 10),
    legend.position = "top"
  )
pm2 ## Missed scheduled vis
```


Missed Scheduled Visits

```
pm3 <- ggplot(df_mob_artrun_summary, aes(x = mobility, y = proportion, fill =time)) +
  geom_col(position = position_dodge(width = 0.7), width = 0.5) +
  geom_errorbar(
    aes(ymin = lower, ymax = upper),
    position = position_dodge(width = 0.7),
    width = 0.2,
```
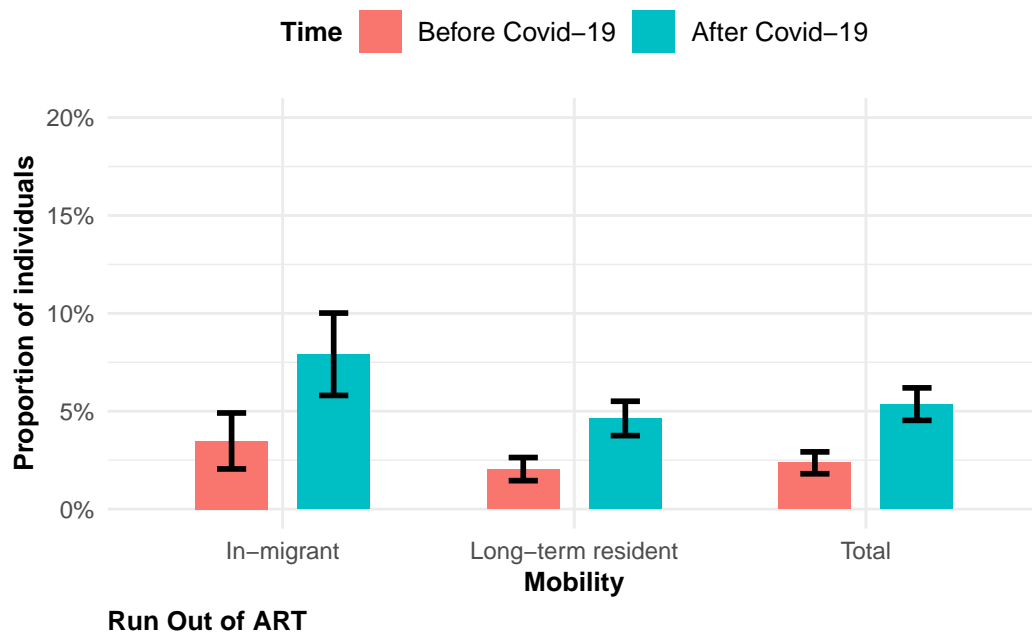
```
    size = 1
  ) +
  scale_y_continuous(labels = scales::percent_format(accuracy = 1),limits = c(0, 0.20)) +
  labs(
    caption =  "Run Out of ART",
    x = "Mobility",
    y = "Proportion of individuals",
    fill = "Time"
  ) +
  theme_minimal() +
  theme(
    plot.caption =  element_text(hjust = 0, face = "bold", size = 10),
    axis.title.x = element_text(face = "bold", size = 10),
    axis.title.y = element_text(face = "bold", size = 10),
    legend.title = element_text(face = "bold", size = 10),
    legend.text = element_text(size = 10),
    legend.position = "top"
  )

pm3
```

```
### Combined plot
(pm1 + pm2)/pm3
```


Reduced ART Intake

Missed Scheduled Visits

Run Out of ART
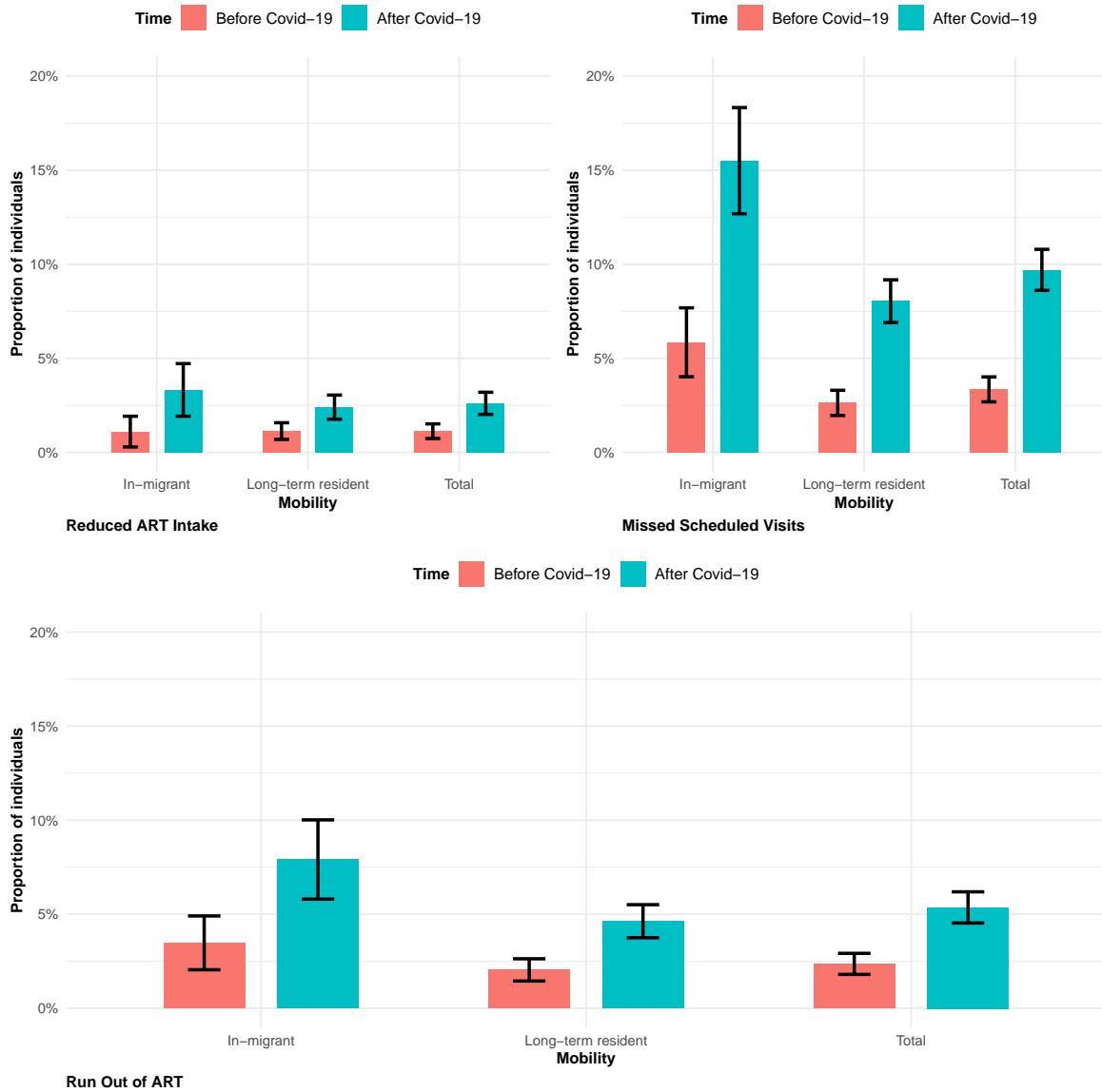
Age Categories

```r
df_age <-  rakai %>%
  select(ageyrs,artrunbc,artrunac,
         hivac,hivbc,copies,new_copies,artstrac,artstrbc) %>%
  filter(hivac !=8, hivbc!=8,artrunbc!=8,artstrac!=8,artstrbc!=8,artrunac!=8) %>%
  mutate(
    age_cat = case_when(
                            ageyrs < 30 ~ "<30",
                            ageyrs >= 30 & ageyrs <= 39 ~  "30-39",
                            ageyrs >=40 & ageyrs <= 49 ~ "40-49") %>%
          fct_relevel("<30") %>%
          ff_label("Age group"),

    hivac = if_else(hivac ==1, "Yes","No") %>%
    ff_label("Missed scheduled visit for HIV care") %>%
      as_factor(),

     hivbc = if_else(hivbc ==1,"Yes","No") %>%
    ff_label("Missed scheduled visit for HIV care") %>%
    as_factor(),

     artrunac = if_else(artrunac ==1,"Yes","No") %>%
    as_factor() %>%
    ff_label("Run out of ART before next refill"),

   artrunbc = if_else(artrunbc ==1,"Yes","No") %>%
    as_factor() %>%
    ff_label("Run out of ART before next refill"),

  artstrac = if_else(artstrac ==1,"Yes","No") %>%
    as_factor() %>%
    ff_label("Taken ART pills less frequently / in smaller
amounts to conserve supply"),

  artstrbc = if_else(artstrbc ==1,"Yes","No") %>%
    as_factor() %>%
    ff_label("Taken ART pills less frequently / in smaller
amounts to conserve supply")
  ) %>%
  select(-ageyrs)
```

```
# df_age
```

Run out of ART by Age Category

```
df_age %>% group_by(age_cat,artrunbc) %>%
  count()
```

age_cat	artrunbc	n
<30	No	421
<30	Yes	12
30-39	No	1198
30-39	Yes	31
40-49	No	1148
40-49	Yes	24

```
df_age %>% group_by(age_cat,artrunac) %>%
  count()
```

age_cat	artrunac	n
<30	No	401
<30	Yes	32
30-39	No	1158
30-39	Yes	71
40-49	No	1123
40-49	Yes	49

```
df_age_artrun <- df_age %>%
  mutate(
    artrunbc = as.character(artrunbc),
    artrunac = as.character(artrunac)
  ) %>%
  pivot_longer(
    cols = c(artrunbc, artrunac),
    names_to = "variable",
    values_to = "response"
  ) %>%
  mutate(
```

```
    time = if_else(grepl("bc$", variable), "Before Covid-19", "After Covid-19")
  )

df_age_artrun_summary <- df_age_artrun %>%
  group_by(time, age_cat) %>%
  summarise(
    n_yes = sum(response == "Yes", na.rm = TRUE),
    n = n(),
    .groups = "drop"
  )

df_age_artrun_totals <- df_age_artrun %>%
  group_by(time) %>%
  summarise(
    n_yes = sum(response == "Yes", na.rm = TRUE),
    n = n(),
    .groups = "drop"
  )

df_age_artrun_summary <- bind_rows(df_age_artrun_summary, df_age_artrun_totals) %>%
  mutate(
    proportion = n_yes / n,
    se = sqrt(proportion * (1 - proportion) / n),
    lower = proportion - 1.96 * se,
    upper = proportion + 1.96 * se
  ) %>%
  mutate(
    time = as_factor(time) %>%
      fct_relevel("Before Covid-19"),
    age_cat = if_else(is.na(age_cat), "Total", age_cat)
  )

df_age_artrun_summary
```

time	age_cat	n_yes	n	proportion	se	lower	upper
After Covid-19	<30	32	433	0.0739030	0.0125723	0.0492613	0.0985447
After Covid-19	30-39	71	1229	0.0577705	0.0066551	0.0447265	0.0708146
After Covid-19	40-49	49	1172	0.0418089	0.0058465	0.0303497	0.0532680
Before Covid-19	<30	12	433	0.0277136	0.0078886	0.0122520	0.0431753

time	age_cat	n_yes	n	proportion	se	lower	upper
Before Covid-19	30-39	31	1229	0.0252238	0.0044728	0.0164570	0.0339905
Before Covid-19	40-49	24	1172	0.0204778	0.0041370	0.0123693	0.0285863
After Covid-19	Total	152	2834	0.0536344	0.0042321	0.0453396	0.0619293
Before Covid-19	Total	67	2834	0.0236415	0.0028539	0.0180478	0.0292352

```r
run_out_of_art_by_age_plot <- ggplot(df_age_artrun_summary, aes(x = age_cat, y = proportion,
  geom_col(position = position_dodge(width = 0.7), width = 0.5) +
  geom_errorbar(
    aes(ymin = lower, ymax = upper),
    position = position_dodge(width = 0.7),
    width = 0.2,
    size = 1
  ) +
  scale_y_continuous(labels = scales::percent_format(accuracy = 1), limits = c(0, 0.15)) +
  labs(
    title = "Run Out of ART",
    x = "Age Category",
    y = "Proportion of individuals",
    fill = "Time"
  ) +
  theme_minimal() +
  theme(
    plot.title = element_text(hjust = 0.5, face = "bold", size = 14),
    axis.title.x = element_text(face = "bold", size = 12),
    axis.title.y = element_text(face = "bold", size = 12),
    legend.title = element_text(face = "bold", size = 12),
    legend.text = element_text(size = 10),
    legend.position = "top"
  )
run_out_of_art_by_age_plot
```

Run Out of ART

Time ■ Before Covid–19 ■ After Covid–19
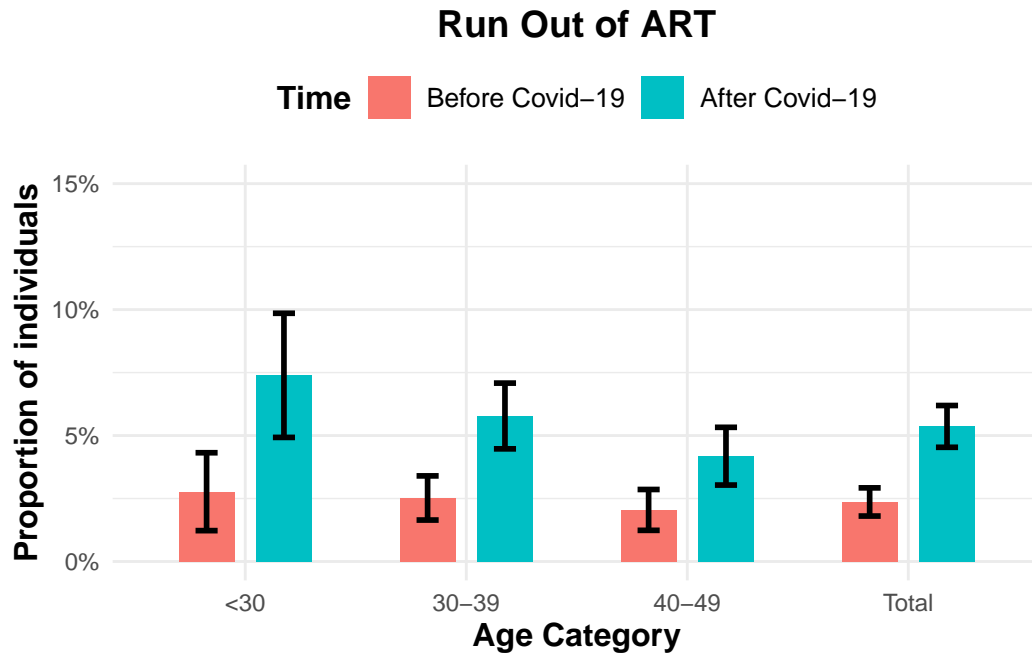
Missed Scheduled Visits by Age Category

```r
df_age %>% group_by(age_cat,hivbc) %>%
  count()
```

age_cat	hivbc	n
<30	No	411
<30	Yes	22
30-39	No	1186
30-39	Yes	43
40-49	No	1142
40-49	Yes	30

```r
df_age %>% group_by(age_cat,hivac) %>%
  count()
```

age_cat	hivac	n
<30	No	383

age_cat	hivac	n
<30	Yes	50
30-39	No	1095
30-39	Yes	134
40-49	No	1081
40-49	Yes	91

```r
df_age_hiv <- df_age %>%
  mutate(
    hivbc = as.character(hivbc),
    hivac = as.character(hivac)
  ) %>%
  pivot_longer(
    cols = c(hivbc, hivac),
    names_to = "variable",
    values_to = "response"
  ) %>%
  mutate(
    time = if_else(grepl("bc$", variable), "Before Covid-19", "After Covid-19")
  )

df_age_hiv_summary <- df_age_hiv %>%
  group_by(time, age_cat) %>%
  summarise(
    n_yes = sum(response == "Yes", na.rm = TRUE),
    n = n(),
    .groups = "drop"
  )

df_age_hiv_totals <- df_age_hiv %>%
  group_by(time) %>%
  summarise(
    n_yes = sum(response == "Yes", na.rm = TRUE),
    n = n(),
    .groups = "drop"
  )

df_age_hiv_summary <- bind_rows(df_age_hiv_summary, df_age_hiv_totals) %>%
  mutate(
    proportion = n_yes / n,
    se = sqrt(proportion * (1 - proportion) / n),
```

```
    lower = proportion - 1.96 * se,
    upper = proportion + 1.96 * se
  ) %>%
  mutate(
    time = as_factor(time) %>%
      fct_relevel("Before Covid-19"),
    age_cat = if_else(is.na(age_cat), "Total", age_cat)
  )

df_age_hiv_summary
```

time	age_cat	n_yes	n	proportion	se	lower	upper
After Covid-19	<30	50	433	0.1154734	0.0153586	0.0853705	0.1455764
After Covid-19	30-39	134	1229	0.1090317	0.0088906	0.0916061	0.1264573
After Covid-19	40-49	91	1172	0.0776451	0.0078170	0.0623237	0.0929664
Before Covid-19	<30	22	433	0.0508083	0.0105536	0.0301233	0.0714934
Before Covid-19	30-39	43	1229	0.0349878	0.0052414	0.0247146	0.0452610
Before Covid-19	40-49	30	1172	0.0255973	0.0046132	0.0165554	0.0346391
After Covid-19	Total	275	2834	0.0970360	0.0055603	0.0861377	0.1079343
Before Covid-19	Total	95	2834	0.0335215	0.0033811	0.0268946	0.0401485

```
missed_scheduled_visit_by_age_plot <- ggplot(df_age_hiv_summary, aes(x = age_cat, y = propor
  geom_col(position = position_dodge(width = 0.7), width = 0.5) +
  geom_errorbar(
    aes(ymin = lower, ymax = upper),
    position = position_dodge(width = 0.7),
    width = 0.2,
    size = 1
  ) +
  scale_y_continuous(labels = scales::percent_format(accuracy = 1), limits = c(0, 0.15)) +
  labs(
    title = "Missed Scheduled Visits",
    x = "Age Category",
    y = "Proportion of individuals",
    fill = "Time"
  ) +
```
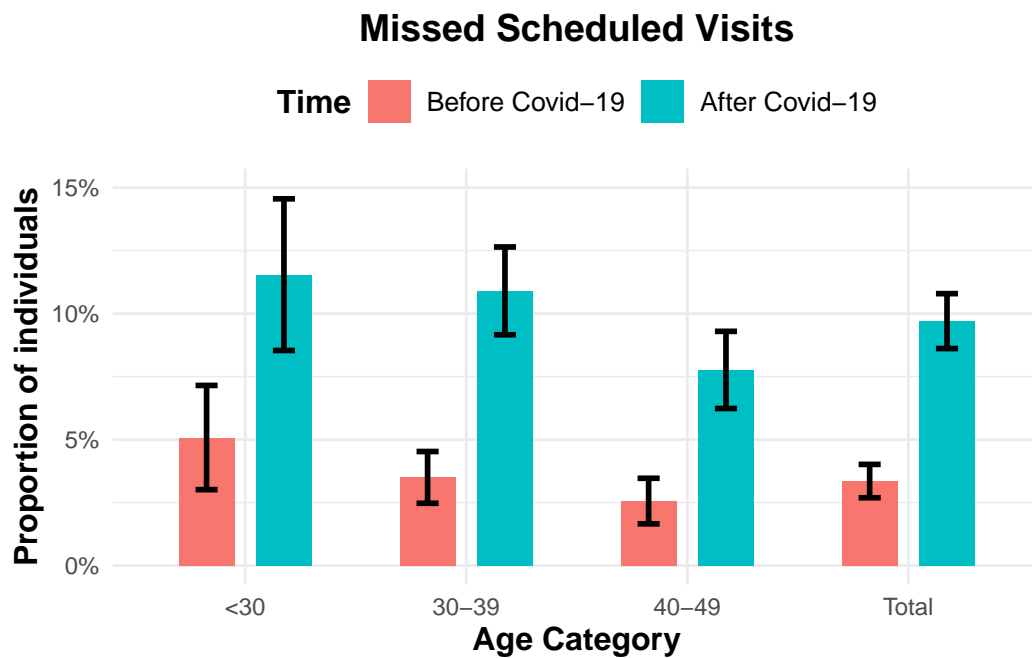
```
  theme_minimal() +
  theme(
    plot.title = element_text(hjust = 0.5, face = "bold", size = 14),
    axis.title.x = element_text(face = "bold", size = 12),
    axis.title.y = element_text(face = "bold", size = 12),
    legend.title = element_text(face = "bold", size = 12),
    legend.text = element_text(size = 10),
    legend.position = "top"
  )

missed_scheduled_visit_by_age_plot
```


Reduced ART Intake by Age Category

```
df_age %>% group_by(age_cat,artstrbc) %>%
  count()
```

age_cat	artstrbc	n
<30	No	426

age_cat	artstrbc	n
<30	Yes	7
30-39	No	1213
30-39	Yes	16
40-49	No	1163
40-49	Yes	9

```
df_age %>% group_by(age_cat,artstrac) %>%
  count()
```

age_cat	artstrac	n
<30	No	418
<30	Yes	15
30-39	No	1190
30-39	Yes	39
40-49	No	1152
40-49	Yes	20

```
df_age_artstr <- df_age %>%
  pivot_longer(
    cols = c(artstrbc, artstrac),
    names_to = "variable",
    values_to = "response"
  ) %>%
  mutate(
    time = if_else(grepl("bc$", variable), "Before Covid-19", "After Covid-19")
  )

df_age_artstr_summary <- df_age_artstr %>%
  group_by(time, age_cat) %>%
  summarise(
    n_yes = sum(response == "Yes", na.rm = TRUE),
    n = n(),
    .groups = "drop"
  )

df_age_artstr_totals <- df_age_artstr %>%
  group_by(time) %>%
  summarise(
```

```
    n_yes = sum(response == "Yes", na.rm = TRUE),
    n = n(),
    .groups = "drop"
  )

df_age_artstr_summary <- bind_rows(df_age_artstr_summary, df_age_artstr_totals) %>%
  mutate(
    proportion = n_yes / n,
    se = sqrt(proportion * (1 - proportion) / n),
    lower = proportion - 1.96 * se,
    upper = proportion + 1.96 * se
  ) %>%
  mutate(
    time = as_factor(time) %>%
      fct_relevel("Before Covid-19"),
    age_cat = if_else(is.na(age_cat), "Total", age_cat)
  )

df_age_artstr_summary
```

time	age_cat	n_yes	n	proportion	se	lower	upper
After Covid-19	<30	15	433	0.0346420	0.0087882	0.0174171	0.0518670
After Covid-19	30-39	39	1229	0.0317331	0.0050001	0.0219329	0.0415333
After Covid-19	40-49	20	1172	0.0170648	0.0037831	0.0096499	0.0244798
Before Covid-19	<30	7	433	0.0161663	0.0060607	0.0042873	0.0280452
Before Covid-19	30-39	16	1229	0.0130187	0.0032334	0.0066812	0.0193562
Before Covid-19	40-49	9	1172	0.0076792	0.0025499	0.0026814	0.0126769
After Covid-19	Total	74	2834	0.0261115	0.0029955	0.0202403	0.0319827
Before Covid-19	Total	32	2834	0.0112915	0.0019848	0.0074013	0.0151816

```
reduced_art_intake_by_age_plot <- ggplot(df_age_artstr_summary, aes(x = age_cat, y = proporti
  geom_col(position = position_dodge(width = 0.7), width = 0.5) +
  geom_errorbar(
    aes(ymin = lower, ymax = upper),
    position = position_dodge(width = 0.7),
    width = 0.2,
```
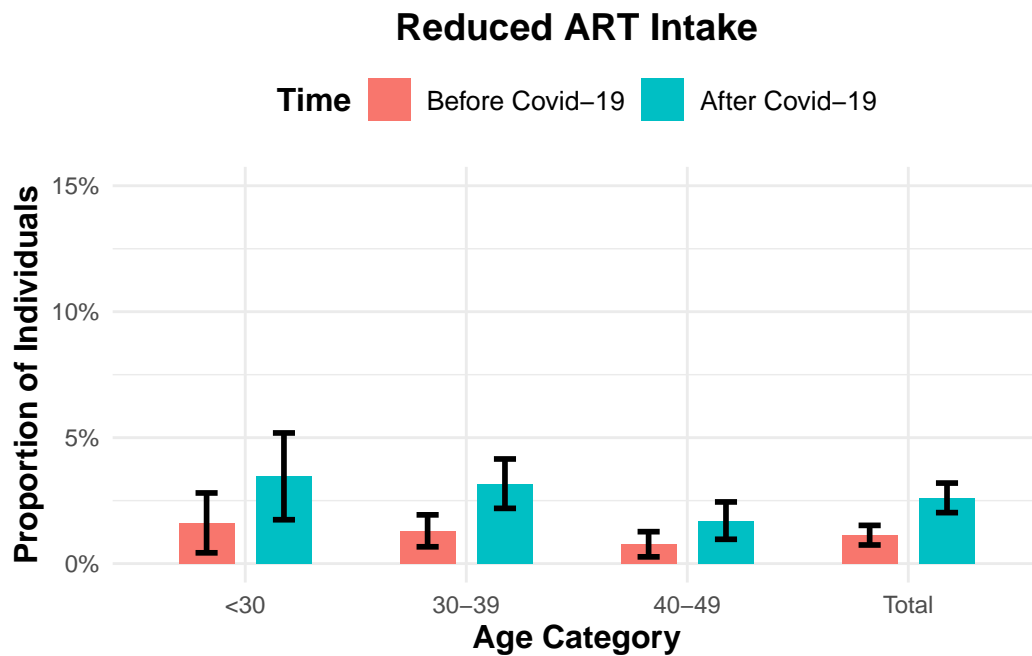
```
    size = 1
  ) +
  scale_y_continuous(labels = scales::percent_format(accuracy = 1), limits = c(0, 0.15)) +
  labs(
    title = "Reduced ART Intake",
    x = "Age Category",
    y = "Proportion of Individuals",
    fill = "Time"
  ) +
  theme_minimal() +
  theme(
    plot.title = element_text(hjust = 0.5, face = "bold", size = 14),
    axis.title.x = element_text(face = "bold", size = 12),
    axis.title.y = element_text(face = "bold", size = 12),
    legend.title = element_text(face = "bold", size = 12),
    legend.text = element_text(size = 10),
    legend.position = "top"
  )

reduced_art_intake_by_age_plot
```
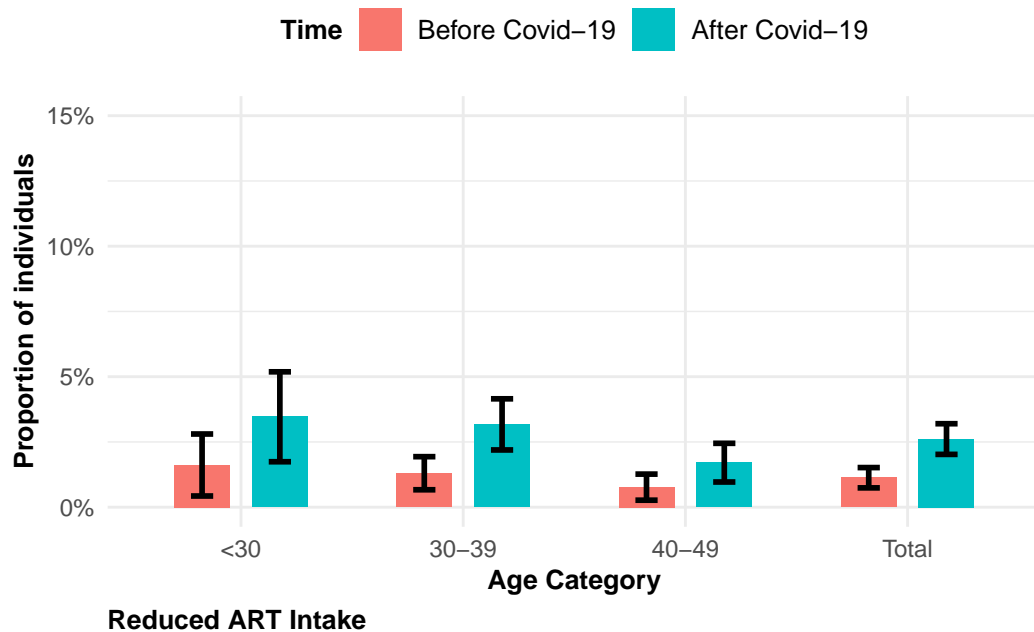

Reduced ART Intake

```r
pa1 <- ggplot(df_age_artstr_summary, aes(x = age_cat, y = proportion, fill = time)) +
  geom_col(position = position_dodge(width = 0.7), width = 0.5) +
  geom_errorbar(
    aes(ymin = lower, ymax = upper),
    position = position_dodge(width = 0.7),
    width = 0.2,
    size = 1
  ) +
  scale_y_continuous(labels = scales::percent_format(accuracy = 1), limits = c(0, 0.15)) +
  labs(
    caption = "Reduced ART Intake",
    x = "Age Category",
    y = "Proportion of individuals",
    fill = "Time"
  ) +
  theme_minimal() +
  theme(
    plot.caption = element_text(hjust = 0, face = "bold", size = 10),
    axis.title.x = element_text(face = "bold", size = 10),
    axis.title.y = element_text(face = "bold", size = 10),
    legend.title = element_text(face = "bold", size = 10),
    legend.text = element_text(size = 10),
    legend.position = "top"
  )
pa1
```
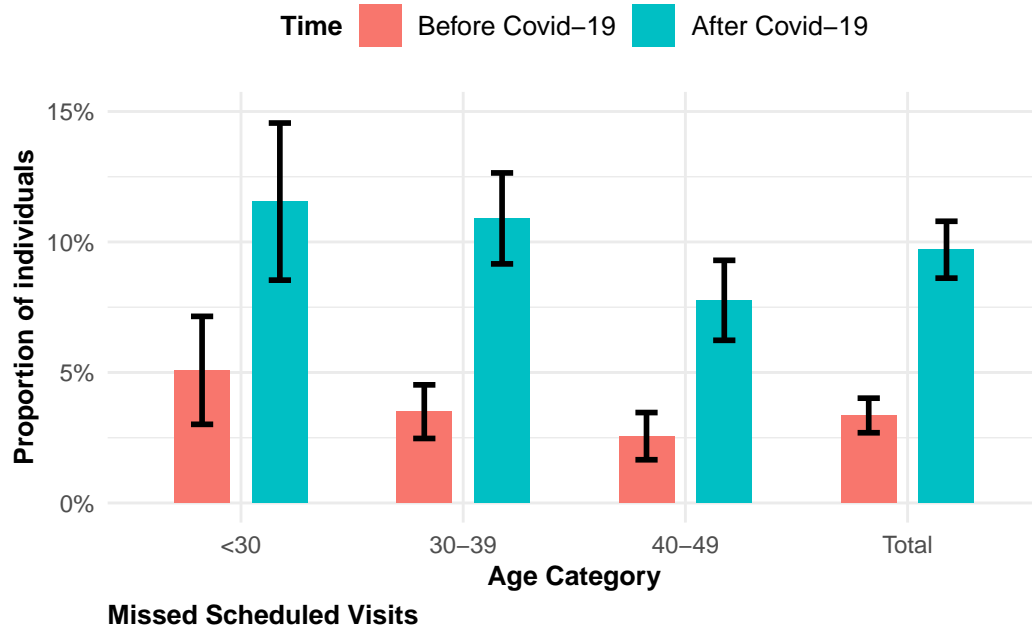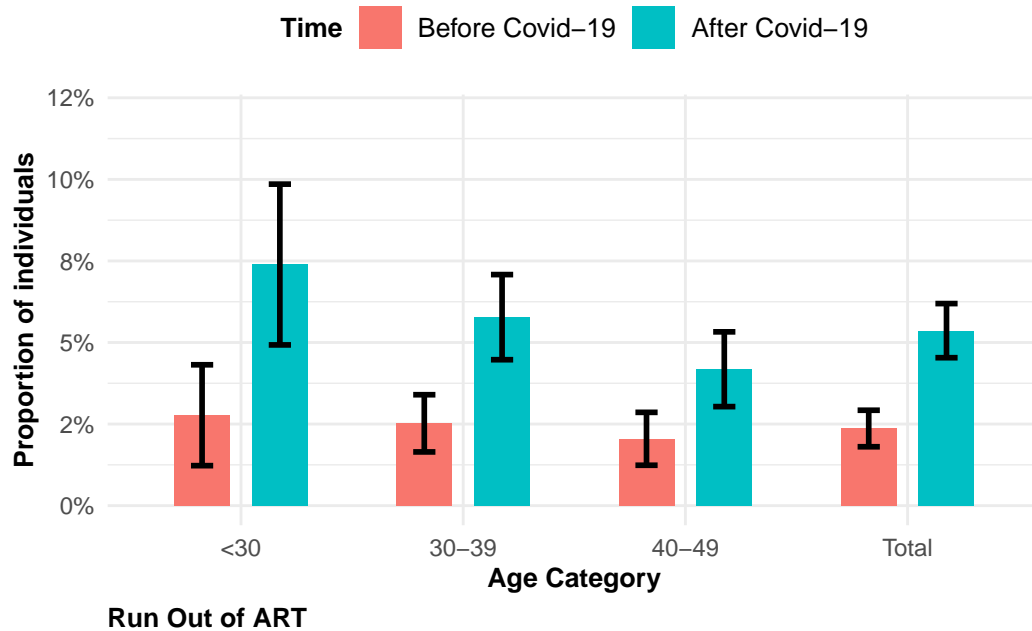
Reduced ART Intake

```
pa2 <- ggplot(df_age_hiv_summary, aes(x = age_cat, y = proportion, fill = time)) +
  geom_col(position = position_dodge(width = 0.7), width = 0.5) +
  geom_errorbar(
    aes(ymin = lower, ymax = upper),
    position = position_dodge(width = 0.7),
    width = 0.2,
    size = 1
  ) +
  scale_y_continuous(labels = scales::percent_format(accuracy = 1), limits = c(0, 0.15)) +
  labs(
    caption = "Missed Scheduled Visits",
    x = "Age Category",
    y = "Proportion of individuals",
    fill = "Time"
  ) +
  theme_minimal() +
  theme(
    plot.caption = element_text(hjust = 0, face = "bold", size = 10),
    axis.title.x = element_text(face = "bold", size = 10),
    axis.title.y = element_text(face = "bold", size = 10),
    legend.title = element_text(face = "bold", size = 10),
    legend.text = element_text(size = 10),
    legend.position = "top"
```

```
)

pa2
```


Missed Scheduled Visits

```
pa3 <- ggplot(df_age_artrun_summary, aes(x = age_cat, y = proportion, fill = time)) +
  geom_col(position = position_dodge(width = 0.7), width = 0.5) +
  geom_errorbar(
    aes(ymin = lower, ymax = upper),
    position = position_dodge(width = 0.7),
    width = 0.2,
    size = 1
  ) +
  scale_y_continuous(labels = scales::percent_format(accuracy = 1), limits = c(0, 0.12)) +
  labs(
    caption = "Run Out of ART",
    x = "Age Category",
    y = "Proportion of individuals",
    fill = "Time"
  ) +
  theme_minimal() +
  theme(
    plot.caption = element_text(hjust = 0, face = "bold", size = 10),
```

```
    axis.title.x = element_text(face = "bold", size = 10),
    axis.title.y = element_text(face = "bold", size = 10),
    legend.title = element_text(face = "bold", size = 10),
    legend.text = element_text(size = 10),
    legend.position = "top"
  )

pa3
```


Run Out of ART

```
### Combined plot
(pa1 + pa2)/pa3
```

Reduced ART Intake

Missed Scheduled Visits

Run Out of ART
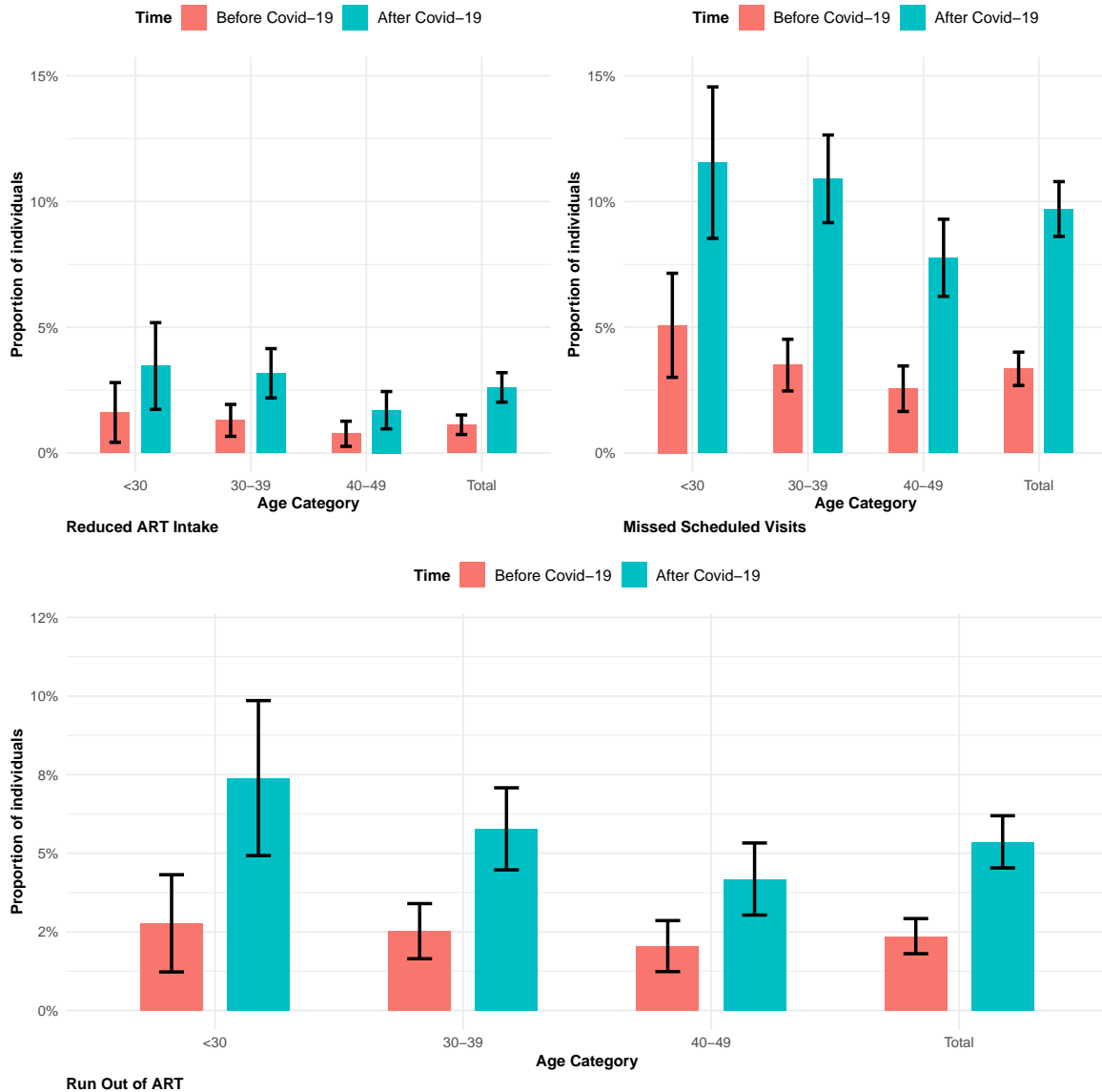
ART Duration

```
df_dur <- rakai %>%
  select(artyrs,artrunbc,artrunac,
         hivac,hivbc,copies,new_copies,artstrac,artstrbc) %>%
  filter(hivac !=8, hivbc!=8,artrunbc!=8,artstrac!=8,artstrbc!=8,artrunac!=8) %>%
```

```
mutate(
 art_duration = case_when(
    artyrs >= 2 &  artyrs <= 5 ~ "2-5 years",
   artyrs > 5 ~ ">5 years",
   .default =  "<2 years"
 ) %>%
   fct_relevel("<2 years","2-5 years") %>%
   ff_label("Time on ART"),

   hivac = if_else(hivac ==1, "Yes","No") %>%
   ff_label("Missed scheduled visit for HIV care") %>%
    as_factor(),

   hivbc = if_else(hivbc ==1,"Yes","No") %>%
   ff_label("Missed scheduled visit for HIV care") %>%
   as_factor(),

   artrunac = if_else(artrunac ==1,"Yes","No") %>%
   as_factor() %>%
   ff_label("Run out of ART before next refill"),

  artrunbc = if_else(artrunbc ==1,"Yes","No") %>%
   as_factor() %>%
   ff_label("Run out of ART before next refill"),

  artstrac = if_else(artstrac ==1,"Yes","No") %>%
   as_factor() %>%
   ff_label("Taken ART pills less frequently / in smaller
amounts to conserve supply"),

  artstrbc = if_else(artstrbc ==1,"Yes","No") %>%
   as_factor() %>%
   ff_label("Taken ART pills less frequently / in smaller
amounts to conserve supply")
 ) %>%
 select(-artyrs)
```

```
# df_dur
```

```
df_dur %>% group_by(art_duration,artstrbc) %>%
 count()
```

art_duration	artstrbc	n
<2 years	No	166
<2 years	Yes	1
2-5 years	No	868
2-5 years	Yes	12
>5 years	No	1768
>5 years	Yes	19

```
df_dur %>% group_by(art_duration,artstrac) %>%
  count()
```

art_duration	artstrac	n
<2 years	No	163
<2 years	Yes	4
2-5 years	No	852
2-5 years	Yes	28
>5 years	No	1745
>5 years	Yes	42

Reduced ART intake by ART duration

```
df_dur_artstr <- df_dur %>%
  pivot_longer(
    cols = c(artstrbc, artstrac),
    names_to = "variable",
    values_to = "response"
  ) %>%
  mutate(
    time = if_else(grepl("bc$", variable), "Before Covid-19", "After Covid-19")
  )

df_dur_artstr_summary <- df_dur_artstr %>%
  group_by(time, art_duration) %>%
  summarise(
    n_yes = sum(response == "Yes", na.rm = TRUE),
    n = n(),
    .groups = "drop"
  )
```

```
df_dur_artstr_totals <- df_dur_artstr %>%
  group_by(time) %>%
  summarise(
    n_yes = sum(response == "Yes", na.rm = TRUE),
    n = n(),
    .groups = "drop"
  )

df_dur_artstr_summary <- bind_rows(df_dur_artstr_summary, df_dur_artstr_totals) %>%
  mutate(
    proportion = n_yes / n,
    se = sqrt(proportion * (1 - proportion) / n),
    lower = proportion - 1.96 * se,
    upper = proportion + 1.96 * se
  ) %>%
  mutate(
    time = as_factor(time) %>%
      fct_relevel("Before Covid-19"),

    art_duration = if_else(is.na(art_duration), "Total", art_duration) %>%
      fct_relevel("<2 years","2-5 years"),
    lower = if_else(lower < 0,0,lower)
  )

df_dur_artstr_summary
```

| time	art_duration	n_yes	n	proportion	se	lower	upper
After Covid-19	<2 years	4	167	0.0239521	0.0118318	0.0007619	0.0471423
After Covid-19	2-5 years	28	880	0.0318182	0.0059166	0.0202216	0.0434148
After Covid-19	>5 years	42	1787	0.0235031	0.0035837	0.0164790	0.0305272
Before Covid-19	<2 years	1	167	0.0059880	0.0059701	0.0000000	0.0176894
Before Covid-19	2-5 years	12	880	0.0136364	0.0039095	0.0059737	0.0212991
Before Covid-19	>5 years	19	1787	0.0106323	0.0024262	0.0058769	0.0153877
After Covid-19	Total	74	2834	0.0261115	0.0029955	0.0202403	0.0319827
Before Covid-19	Total	32	2834	0.0112915	0.0019848	0.0074013	0.0151816

```
reduced_art_intake_by_duration_plot <- ggplot(df_dur_artstr_summary, aes(x = art_duration, y
  geom_col(position = position_dodge(width = 0.7), width = 0.5) +
  geom_errorbar(
    aes(ymin = lower, ymax = upper),
    position = position_dodge(width = 0.7),
    width = 0.2,
    size = 1
  ) +
  scale_y_continuous(labels = scales::percent_format(accuracy = 1), limits = c(0, 0.20)) +
  labs(
    title = "Reduced ART Intake",
    x = "ART Duration",
    y = "Proportion of Individuals",
    fill = "Time"
  ) +
  theme_minimal() +
  theme(
    plot.title = element_text(hjust = 0.5, face = "bold", size = 14),
    axis.title.x = element_text(face = "bold", size = 12),
    axis.title.y = element_text(face = "bold", size = 12),
    legend.title = element_text(face = "bold", size = 12),
    legend.text = element_text(size = 10),
    legend.position = "top"
  )

reduced_art_intake_by_duration_plot
```

Reduced ART Intake
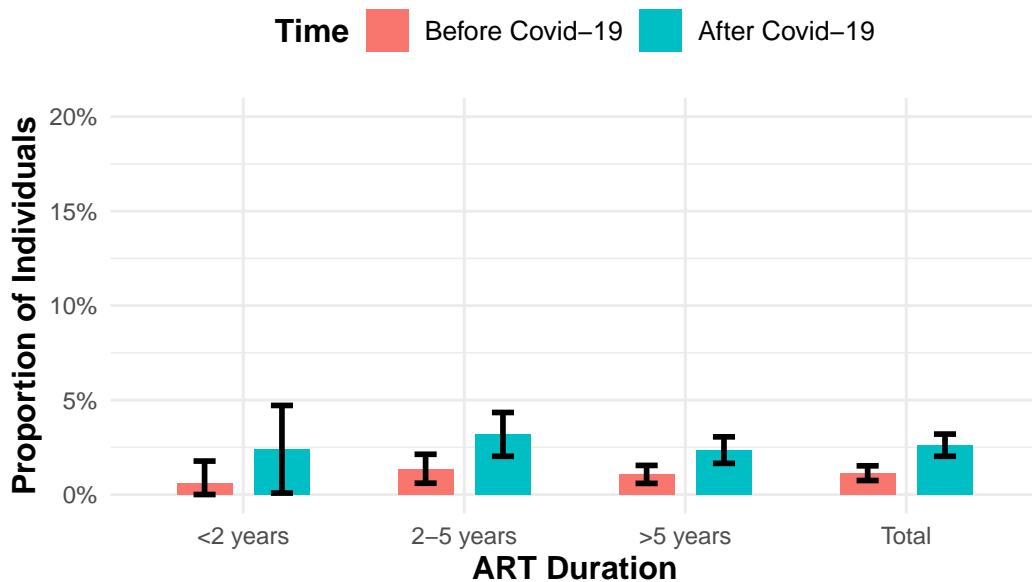
Run out of ART by ART Duration

```r
df_dur %>% group_by(art_duration,artrunbc) %>%
  count()
```

art_duration	artrunbc	n
<2 years	No	165
<2 years	Yes	2
2-5 years	No	864
2-5 years	Yes	16
>5 years	No	1738
>5 years	Yes	49

```r
df_dur %>% group_by(art_duration,artrunac) %>%
  count()
```

art_duration	artrunac	n
<2 years	No	157

art_duration	artrunac	n
<2 years	Yes	10
2-5 years	No	826
2-5 years	Yes	54
>5 years	No	1699
>5 years	Yes	88

```r
df_dur_artrun <- df_dur %>%
  mutate(
    artrunbc = as.character(artrunbc),
    artrunac = as.character(artrunac)
  ) %>%
  pivot_longer(
    cols = c(artrunbc, artrunac),
    names_to = "variable",
    values_to = "response"
  ) %>%
  mutate(
    time = if_else(grepl("bc$", variable), "Before Covid-19", "After Covid-19")
  )

df_dur_artrun_summary <- df_dur_artrun %>%
  group_by(time, art_duration) %>%
  summarise(
    n_yes = sum(response == "Yes", na.rm = TRUE),
    n = n(),
    .groups = "drop"
  )

df_dur_artrun_totals <- df_dur_artrun %>%
  group_by(time) %>%
  summarise(
    n_yes = sum(response == "Yes", na.rm = TRUE),
    n = n(),
    .groups = "drop"
  )

df_dur_artrun_summary <- bind_rows(df_dur_artrun_summary, df_dur_artrun_totals) %>%
  mutate(
    proportion = n_yes / n,
    se = sqrt(proportion * (1 - proportion) / n),
```

```
    lower = proportion - 1.96 * se,
    upper = proportion + 1.96 * se
) %>%
mutate(
  time = as_factor(time) %>%
    fct_relevel("Before Covid-19"),
  art_duration = if_else(is.na(art_duration), "Total", art_duration)%>%
    fct_relevel("<2 years","2-5 years"),
  lower = if_else(lower < 0,0,lower)
)

df_dur_artrun_summary
```

time	art_duration	n_yes	n	proportion	se	lower	upper
After Covid-19	<2 years	10	167	0.0598802	0.0183601	0.0238944	0.0958660
After Covid-19	2-5 years	54	880	0.0613636	0.0080903	0.0455067	0.0772206
After Covid-19	>5 years	88	1787	0.0492445	0.0051186	0.0392121	0.0592770
Before Covid-19	<2 years	2	167	0.0119760	0.0084175	0.0000000	0.0284743
Before Covid-19	2-5 years	16	880	0.0181818	0.0045039	0.0093541	0.0270095
Before Covid-19	>5 years	49	1787	0.0274203	0.0038631	0.0198486	0.0349919
After Covid-19	Total	152	2834	0.0536344	0.0042321	0.0453396	0.0619293
Before Covid-19	Total	67	2834	0.0236415	0.0028539	0.0180478	0.0292352

```
run_out_of_art_by_duration_plot <- ggplot(df_dur_artrun_summary, aes(x = art_duration, y = p
  geom_col(position = position_dodge(width = 0.7), width = 0.5) +
  geom_errorbar(
    aes(ymin = lower, ymax = upper),
    position = position_dodge(width = 0.7),
    width = 0.2,
    size = 1
  ) +
  scale_y_continuous(labels = scales::percent_format(accuracy = 1), limits = c(0, 0.20)) +
  labs(
    title = "Run Out of ART",
    x = "ART Duration",
    y = "Proportion of individuals",
```
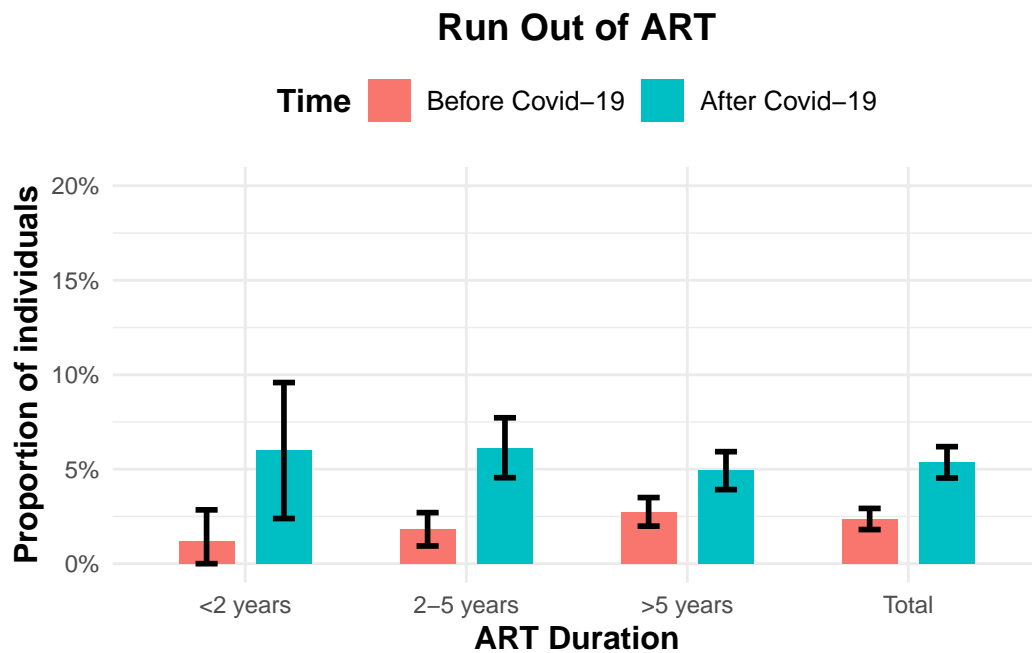
```
    fill = "Time"
  ) +
  theme_minimal() +
  theme(
    plot.title = element_text(hjust = 0.5, face = "bold", size = 14),
    axis.title.x = element_text(face = "bold", size = 12),
    axis.title.y = element_text(face = "bold", size = 12),
    legend.title = element_text(face = "bold", size = 12),
    legend.text = element_text(size = 10),
    legend.position = "top"
  )

run_out_of_art_by_duration_plot
```


Run Out of ART

Missed Scheduled visit by ART Duration

```
df_dur %>% group_by(art_duration,hivbc) %>%
  count()
```

art_duration	hivbc	n
<2 years	No	164
<2 years	Yes	3
2-5 years	No	849
2-5 years	Yes	31
>5 years	No	1726
>5 years	Yes	61

```
df_dur %>% group_by(art_duration,hivac) %>%
  count()
```

art_duration	hivac	n
<2 years	No	149
<2 years	Yes	18
2-5 years	No	788
2-5 years	Yes	92
>5 years	No	1622
>5 years	Yes	165

```
df_dur_hiv <- df_dur %>%
  mutate(
    hivbc = as.character(hivbc),
    hivac = as.character(hivac)
  ) %>%
  pivot_longer(
    cols = c(hivbc, hivac),
    names_to = "variable",
    values_to = "response"
  ) %>%
  mutate(
    time = if_else(grepl("bc$", variable), "Before Covid-19", "After Covid-19")
  )

df_dur_hiv_summary <- df_dur_hiv %>%
  group_by(time, art_duration) %>%
  summarise(
    n_yes = sum(response == "Yes", na.rm = TRUE),
    n = n(),
    .groups = "drop"
```

```
  )

df_dur_hiv_totals <- df_dur_hiv %>%
  group_by(time) %>%
  summarise(
    n_yes = sum(response == "Yes", na.rm = TRUE),
    n = n(),
    .groups = "drop"
  )

df_dur_hiv_summary <- bind_rows(df_dur_hiv_summary, df_dur_hiv_totals) %>%
  mutate(
    proportion = n_yes / n,
    se = sqrt(proportion * (1 - proportion) / n),
    lower = proportion - 1.96 * se,
    upper = proportion + 1.96 * se
  ) %>%
  mutate(
    time = as_factor(time) %>%
      fct_relevel("Before Covid-19"),
    art_duration = if_else(is.na(art_duration), "Total", art_duration)%>%
      fct_relevel("<2 years","2-5 years"),
    lower = if_else(lower < 0,0,lower)
  )

df_dur_hiv_summary
```

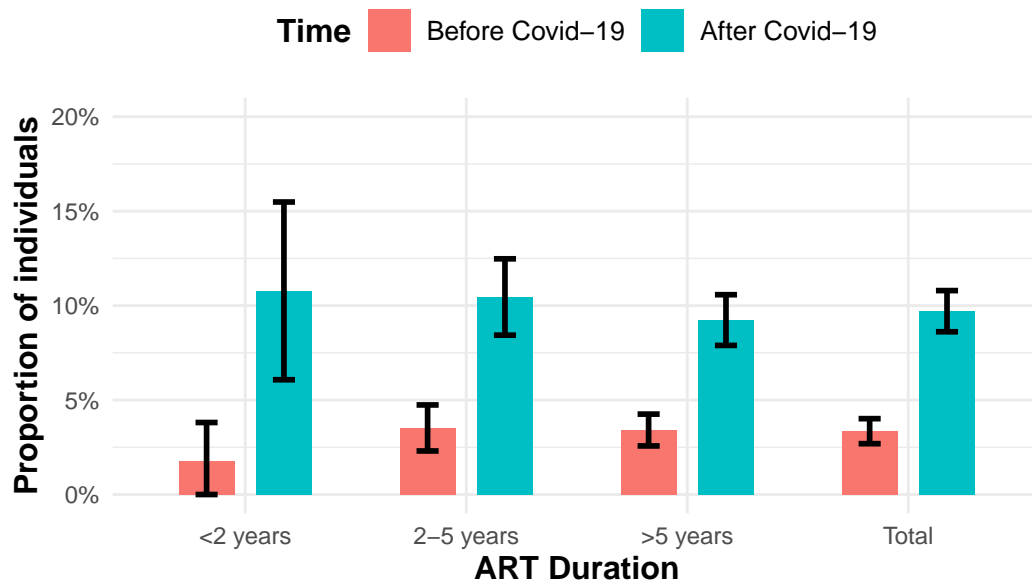| time	art_duration	n_yes	n	proportion	se	lower	upper
After Covid-19	<2 years	18	167	0.1077844	0.0239969	0.0607506	0.1548183
After Covid-19	2-5 years	92	880	0.1045455	0.0103141	0.0843297	0.1247612
After Covid-19	>5 years	165	1787	0.0923335	0.0068483	0.0789109	0.1057561
Before Covid-19	<2 years	3	167	0.0179641	0.0102780	0.0000000	0.0381089
Before Covid-19	2-5 years	31	880	0.0352273	0.0062146	0.0230467	0.0474078
Before Covid-19	>5 years	61	1787	0.0341354	0.0042953	0.0257165	0.0425543
After Covid-19	Total	275	2834	0.0970360	0.0055603	0.0861377	0.1079343
Before Covid-19	Total	95	2834	0.0335215	0.0033811	0.0268946	0.0401485

```
missed_scheduled_visit_by_duration_plot <- ggplot(df_dur_hiv_summary, aes(x = art_duration,
  geom_col(position = position_dodge(width = 0.7), width = 0.5) +
  geom_errorbar(
    aes(ymin = lower, ymax = upper),
    position = position_dodge(width = 0.7),
    width = 0.2,
    size = 1
  ) +
  scale_y_continuous(labels = scales::percent_format(accuracy = 1), limits = c(0, 0.20)) +
  labs(
    title = "Missed Scheduled Visits",
    x = "ART Duration",
    y = "Proportion of individuals",
    fill = "Time"
  ) +
  theme_minimal() +
  theme(
    plot.title = element_text(hjust = 0.5, face = "bold", size = 14),
    axis.title.x = element_text(face = "bold", size = 12),
    axis.title.y = element_text(face = "bold", size = 12),
    legend.title = element_text(face = "bold", size = 12),
    legend.text = element_text(size = 10),
    legend.position = "top"
  )

missed_scheduled_visit_by_duration_plot
```
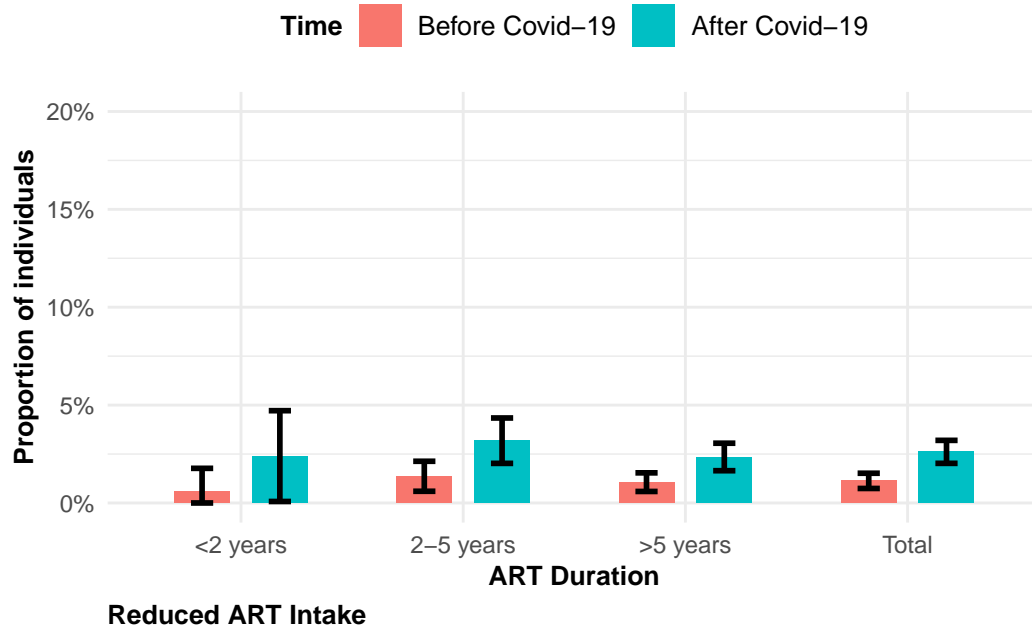
Missed Scheduled Visits


```
pd1 <- ggplot(df_dur_artstr_summary, aes(x = art_duration, y = proportion, fill = time)) +
  geom_col(position = position_dodge(width = 0.7), width = 0.5) +
  geom_errorbar(
    aes(ymin = lower, ymax = upper),
    position = position_dodge(width = 0.7),
    width = 0.2,
    size = 1
  ) +
  scale_y_continuous(labels = scales::percent_format(accuracy = 1), limits = c(0, 0.20)) +
  labs(
    caption = "Reduced ART Intake",
    x = "ART Duration",
    y = "Proportion of individuals",
    fill = "Time"
  ) +
  theme_minimal() +
  theme(
    plot.caption = element_text(hjust = 0, face = "bold", size = 10),
    axis.title.x = element_text(face = "bold", size = 10),
    axis.title.y = element_text(face = "bold", size = 10),
    legend.title = element_text(face = "bold", size = 10),
    legend.text = element_text(size = 10),
    legend.position = "top"
```
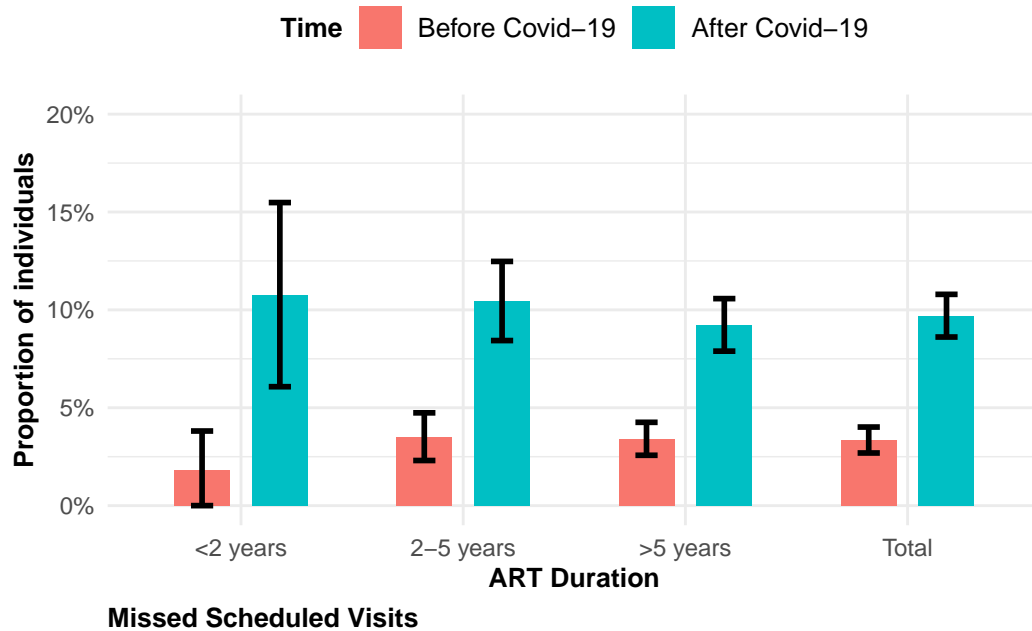
```
)

pd1
```



```
pd2 <- ggplot(df_dur_hiv_summary, aes(x = art_duration, y = proportion, fill = time)) +
  geom_col(position = position_dodge(width = 0.7), width = 0.5) +
  geom_errorbar(
    aes(ymin = lower, ymax = upper),
    position = position_dodge(width = 0.7),
    width = 0.2,
    size = 1
  ) +
  scale_y_continuous(labels = scales::percent_format(accuracy = 1), limits = c(0, 0.20)) +
  labs(
    caption = "Missed Scheduled Visits",
    x = "ART Duration",
    y = "Proportion of individuals",
    fill = "Time"
  ) +
  theme_minimal() +
  theme(
    plot.caption = element_text(hjust = 0, face = "bold", size = 10),
```

```
    axis.title.x = element_text(face = "bold", size = 10),
    axis.title.y = element_text(face = "bold", size = 10),
    legend.title = element_text(face = "bold", size = 10),
    legend.text = element_text(size = 10),
    legend.position = "top"
  )

pd2
```
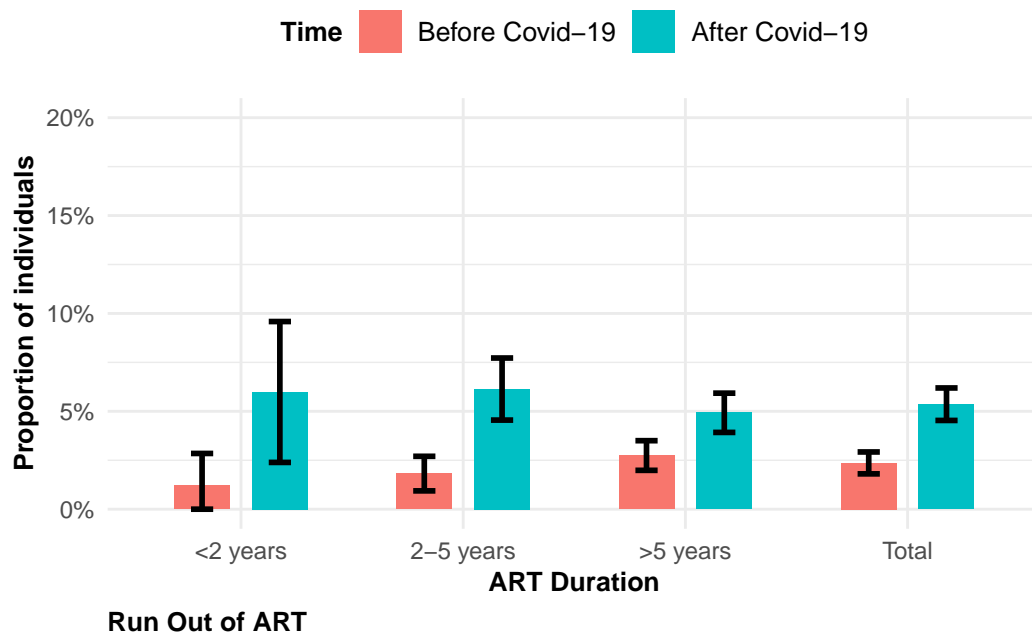


```
pd3 <- ggplot(df_dur_artrun_summary, aes(x = art_duration, y = proportion, fill = time)) +
  geom_col(position = position_dodge(width = 0.7), width = 0.5) +
  geom_errorbar(
    aes(ymin = lower, ymax = upper),
    position = position_dodge(width = 0.7),
    width = 0.2,
    size = 1
  ) +
  scale_y_continuous(labels = scales::percent_format(accuracy = 1), limits = c(0, 0.20)) +
  labs(
    caption = "Run Out of ART",
    x = "ART Duration",
    y = "Proportion of individuals",
```

```
    fill = "Time"
  ) +
  theme_minimal() +
  theme(
    plot.caption = element_text(hjust = 0, face = "bold", size = 10),
    axis.title.x = element_text(face = "bold", size = 10),
    axis.title.y = element_text(face = "bold", size = 10),
    legend.title = element_text(face = "bold", size = 10),
    legend.text = element_text(size = 10),
    legend.position = "top"
  )

pd3
```



```
### Combined plot
(pd1 + pd2)/pd3
```

Reduced ART Intake

Missed Scheduled Visits

Run Out of ART