

```
library(tidyverse)
```

```
## -- Attaching core tidyverse packages ----- tidyverse 2.0.0 --
## v dplyr      1.1.4      v readr      2.1.5
## v forcats    1.0.0      v stringr   1.5.2
## v ggplot2    3.5.2      v tibble    3.3.0
## v lubridate  1.9.3      v tidyr     1.3.1
## v purrr      1.0.2
```

```
## -- Conflicts ----- tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()     masks stats::lag()
## i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to become errors
```

```
library(readr)
```

```
library(zoo)
```

```
##
## Attaching package: 'zoo'
##
## The following objects are masked from 'package:base':
##
##      as.Date, as.Date.numeric
```

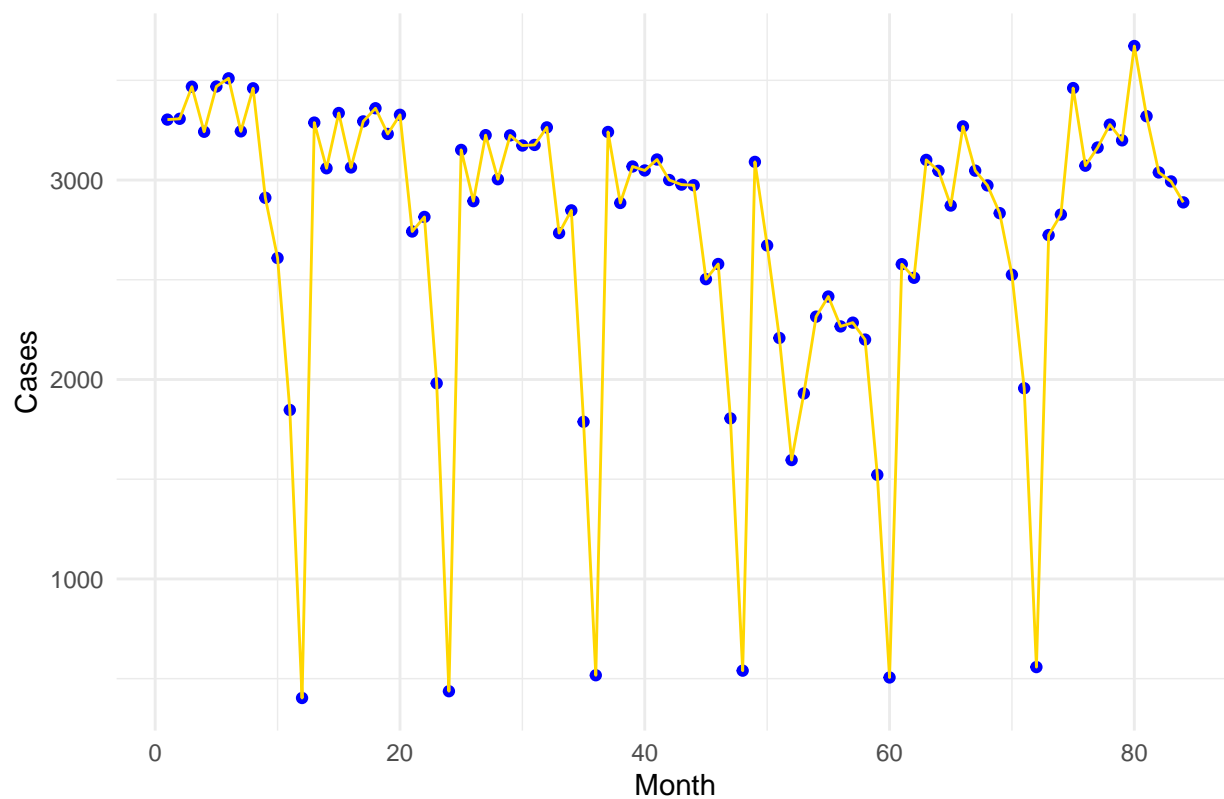
```
# read in monthly HIV incidence CSV
```

```
hiv_inc <- read.csv("/Users/miraterdiman/Desktop/My Folder Folder/MPH Year 1/PBHLTH 252/FINAL PROJECT_HIV.csv")
```

Initial plot:

```
hiv_inc %>%
  ggplot(aes(x = Months..num., y = Cases)) +
  geom_point(color = "blue") +
  geom_line(color = "gold") +
  labs(x = "Month") +
  ggtitle("Monthly HIV Incidence, 2016-2022") +
  theme_minimal()
```

Monthly HIV Incidence, 2016–2022

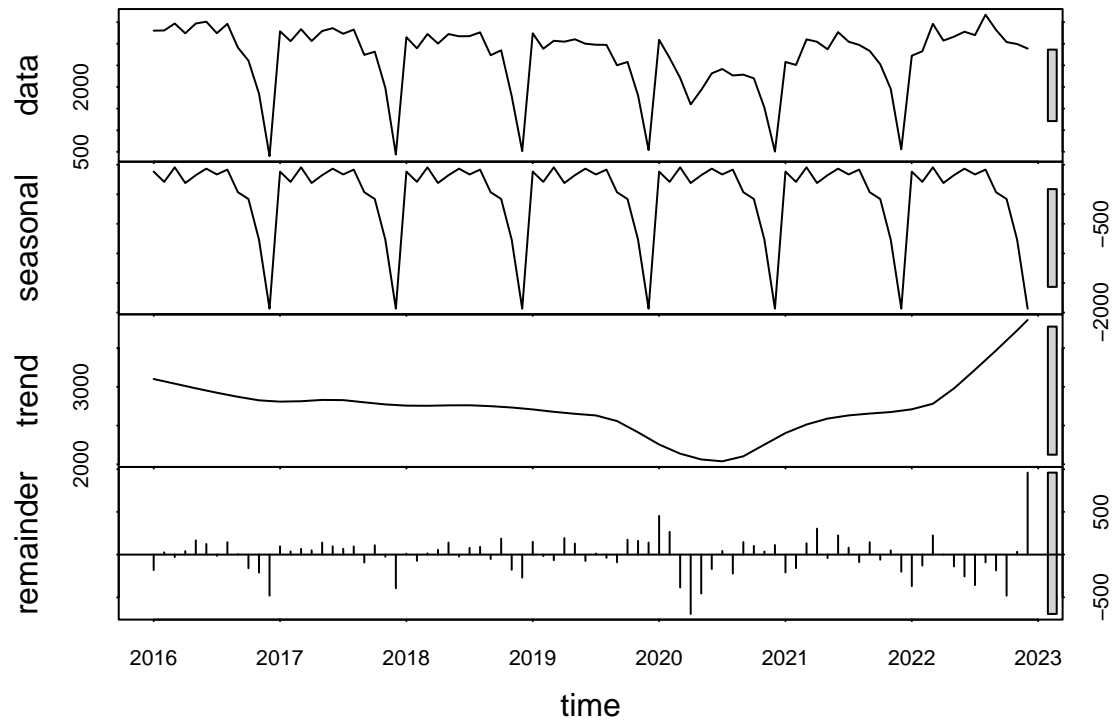


#clear reporting dips in final months of the year, seasonal trends in reporting

Smoothing seasonal trends:

```
hiv_inc_ts <- ts(hiv_inc$Cases, start = c(2016,1), frequency = 12)
decomp <- stl(hiv_inc_ts, s.window = "periodic")
plot(decomp, main = "HIV Monthly Cases: Trend, Seasonality, and Noise")
```

HIV Monthly Cases: Trend, Seasonality, and Noise



```
trend <- decomp$time.series[, "trend"]
hiv_inc$trend <- as.numeric(trend)
hiv_inc$month_num <- 1:nrow(hiv_inc)

time_vals <- time(hiv_inc_ts)
hiv_inc$year <- floor(time_vals)
hiv_inc$month_in_year <- round((time_vals - hiv_inc$year) * 12 + 1)
hiv_inc$year_month <- as.Date(as.yearmon(time_vals))

ggplot(hiv_inc, aes(x = month_num)) +
  geom_line(aes(y = Cases), color = "gold") +
  geom_line(aes(y = trend), color = "blue", size = 1.2) +
  labs(
    title = "HIV Monthly Reported Cases - Trends from 2016-2022",
    x = "Month",
    y = "Cases"
  ) +
  theme_minimal()
```

```
## Warning: Using `size` aesthetic for lines was deprecated in ggplot2 3.4.0.
## i Please use `linewidth` instead.
## This warning is displayed once every 8 hours.
## Call `lifecycle::last_lifecycle_warnings()` to see where this warning was
## generated.
```

