

```

library(tidyverse)

## -- Attaching core tidyverse packages ----- tidyverse 2.0.0 --
## v dplyr     1.1.4     v readr     2.1.5
## vforcats   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 Incidence.csv")

```

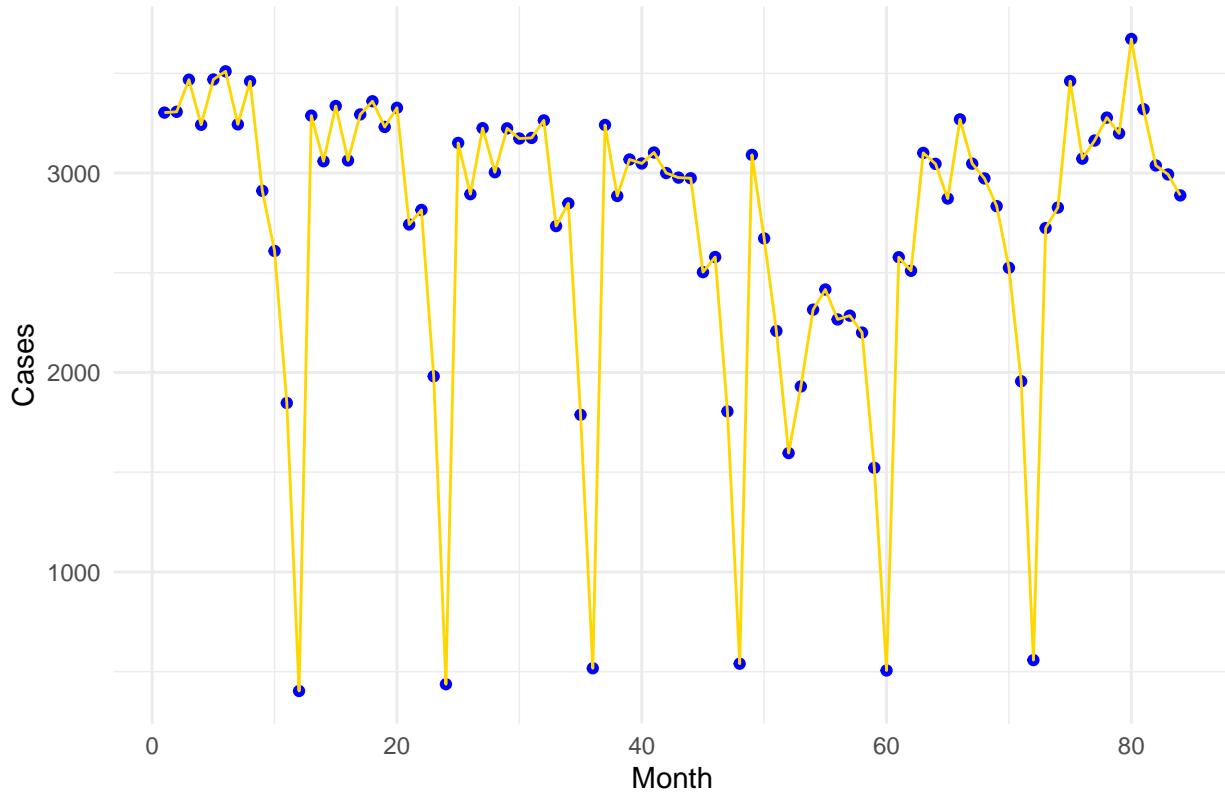
Initial plot:

```

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

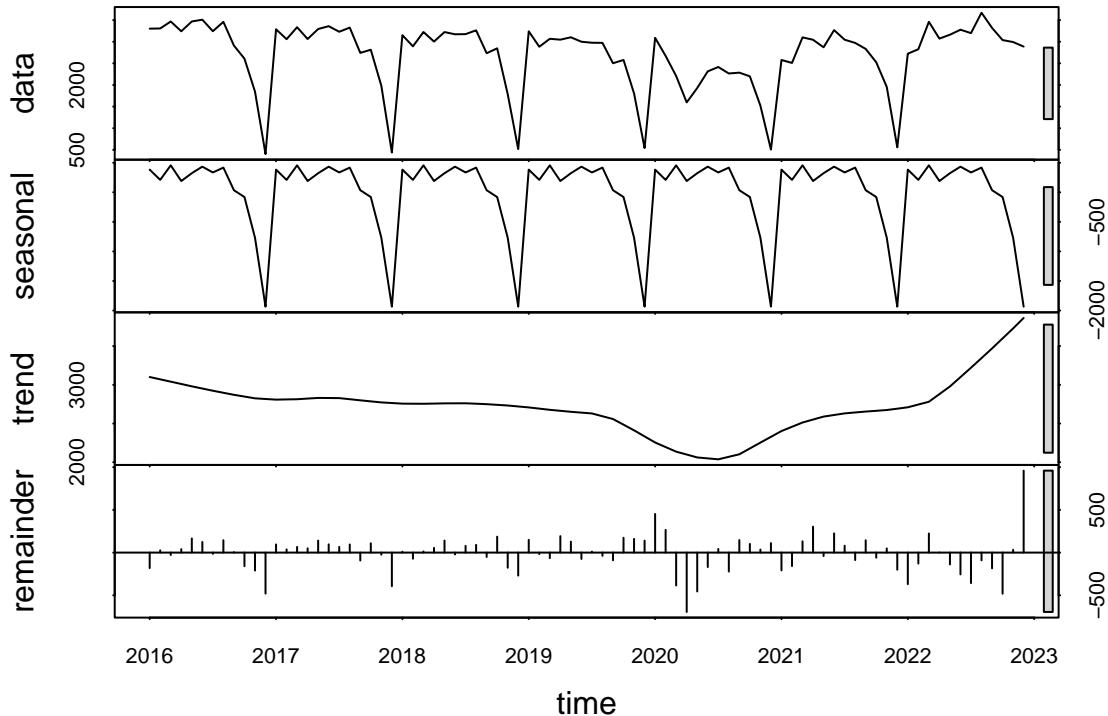


```
#clear reporting dips in final months of the year, seasonal trends in reporting
```

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 <- decomps$time.series[, "trend"]
hiv_inc$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.

```

HIV Monthly Reported Cases – Trends from 2016–2022

