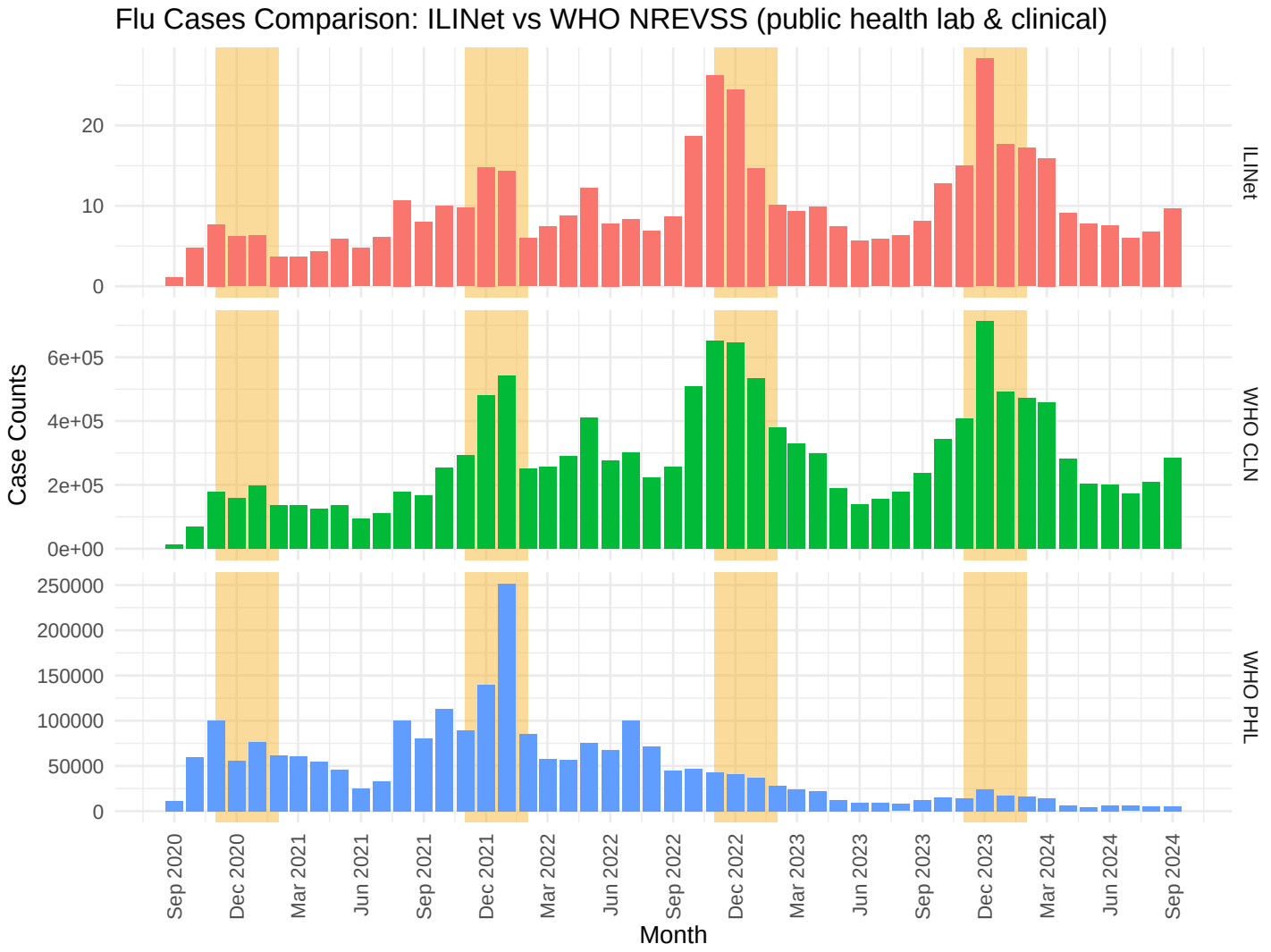
When is the influenza peak season?

CDC provides weekly influenza surveillance data through FluView and the R package cdcfluview. Since the package seems to be dropped from CRAN, pull from the github site. ILINet (Influenza-like Illness Surveillance Network) data contains weekly levels across the US and can be summarized by region (e.g. "national" or specific state names). WHO NREVSS(National Respiratory and Enteric Virus Surveillance System) provides more detailed data including counts of types and subtypes and splitting the data out into public health lab and clinical datasets.

```
# Install and load required packages
#devtools::install_github("hrbrmstr/cdcfluview")
library(cdcfluview)
library(tidyverse)
library(magrittr)
```

```
# Fetch Data
ilinet_data <- ilinet(region = "national", years = 2020:2024)
who_data_phl <- who_nrevss(region = "national", years = 2020:2024)$public_health_labs
who_data_cln <- who_nrevss(region = "national", years = 2020:2024)$clinical_labs

# Process ILINet data
ili_processed <- ilinet_data %>%
  mutate(month = lubridate::floor_date(week_start, "month")) %>%
  group_by(month) %>%
  summarize(
    case_counts = sum(weighted_ili, na.rm = TRUE),
    dataset = "ILINet"
    )

# Process WHO NREVSS data
who_phl_processed <- who_data_phl %>%
  mutate(month = lubridate::floor_date(wk_date, "month")) %>%
  group_by(month) %>%
  summarize(
    case_counts = sum(total_specimens, na.rm = TRUE),
    dataset = "WHO PHL"
    )

who_cln_processed <- who_data_cln %>%
  mutate(month = lubridate::floor_date(wk_date, "month")) %>%
  group_by(month) %>%
  summarize(
    case_counts = sum(total_specimens, na.rm = TRUE),
    dataset = "WHO CLN"
    )

# Combine datasets
combined_data <- bind_rows(ili_processed, who_phl_processed, who_cln_processed)

# Function to create rectangles for Nov-Feb periods
create_winter_rects <- function(start_date, end_date) {
  winters <- data.frame(
    start = seq(floor_date(start_date, "year") %m+% months(10), end_date, by = "1 year"),
    end = seq(floor_date(start_date, "year") %m+% months(10), end_date, by = "1 year") %m+% months(3)
  )
  winters <- winters[winters$start <= end_date & winters$end >= start_date, ]
  winters$start <- pmax(winters$start, start_date)
  winters$end <- pmin(winters$end, end_date)
  return(winters)
}

# Create winter rectangles
winter_rects <- create_winter_rects(min(combined_data$month), max(combined_data$month))

ggplot(combined_data, aes(x = month, y = case_counts, fill = dataset)) +
  geom_rect(data = winter_rects, inherit.aes = FALSE,
            aes(xmin = start, xmax = end, ymin = -Inf, ymax = Inf),
            #fill = "#F9E79F", alpha = 0.5) +
```

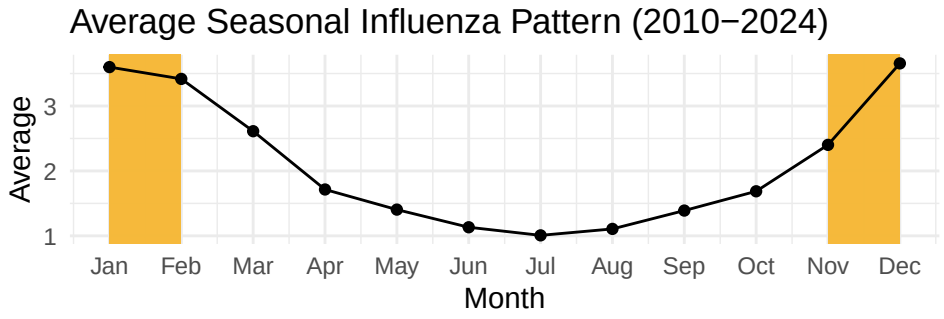
```
          fill = "#F6B93B", alpha = 0.5) +
  geom_col(position = "dodge") +
  scale_x_date(date_breaks = "3 months", date_labels = "%b %Y") +
  labs(title = "Flu Cases Comparison: ILINet vs WHO NREVSS (public health lab & clinical)",
       x = "Month",
       y = "Case Counts",
       fill = "Dataset") +
  theme_minimal() +
  theme(
    axis.text.x = element_text(angle = 90, hjust = 1, vjust=0.5),
    legend.position = "none"
    ) +
  facet_grid(dataset ~., scale="free")
```



Seems mostly consistent with "influenza activity typically begins to increase in early November and peaks between December and February". To dig further, using only ILINet data, aggregate monthly case counts and calculate an average case count across 2010 to 2024:

```
# Fetch national flu data for multiple years
flu_data <- ilinet(region = "national", years = 2010:2024)

# Aggregate to monthly data
monthly_flu <- flu_data %>%
  mutate(month = floor_date(week_start, "month")) %>%
  group_by(month) %>%
  summarize(avg_ili = mean(weighted_ili, na.rm = TRUE))
```

```r
# Calculate average ILI for each month across years
seasonal_pattern <- monthly_flu %>%
  mutate(month_only = month(month)) %>%
  group_by(month_only) %>%
  summarize(avg_ili = mean(avg_ili, na.rm = TRUE))

# Plot seasonal pattern
ggplot(seasonal_pattern, aes(x = month_only, y = avg_ili)) +
  geom_rect(
    inherit.aes = FALSE,
    aes(xmin = 1, xmax = 2, ymin = -Inf, ymax = Inf),
    fill = "#F6B93B", alpha = 0.5) +
  geom_rect(
    inherit.aes = FALSE,
    aes(xmin = 11, xmax = 12, ymin = -Inf, ymax = Inf),
    fill = "#F6B93B", alpha = 0.5) +
  geom_line() +
  geom_point() +
  scale_x_continuous(breaks = 1:12, labels = month.abb) +
  labs(title = "Average Seasonal Influenza Pattern (2010-2024)",
       x = "Month",
       y = "Average") +
  theme_minimal()
```



When to get vaccinated?

General guidance is before the season: September to October. Looking into Vaccine Effectiveness studies
* https://www.cdc.gov/flu-vaccines-work/php/effectiveness-studies/index.html
Peak immunity and waning immunity.