

## COVID-19 Spread in Europe: The Soccer Connection

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### Abstract

**Introduction:** Mass gatherings such as sports events are potential causes for the rapid spread of COVID-19 infection. Millions of soccer fans travel across Europe every week. With the world's most popular leagues continuing play until the second week of March 2020, we hypothesize that a correlation exists between the number of people attending the soccer league games in Spain, Italy, France, Germany, and the UK and the increasing number of cases of COVID-19 in these countries during the ongoing epidemic.

**Methods:** We have calculated the total number of attendees in the five major soccer leagues from the popular sports websites and the official pages of the league. The total number of COVID-19 cases were taken from the Worldometer websites.

**Results:** The average attendees in the last game week of five major soccer leagues during the second week of March 2020 ranged from 189,545 to 511,524. The total number of COVID-19 cases was 350,000.

**Conclusion:** Mass movement of spectators among different cities in the European countries to attend major soccer league matches can be one of the reasons for sudden increase in the COVID-19 cases. Before resuming these games, proper planning, surveillance, communication, and necessary modifications are required to mitigate the spread of COVID-19.

### Introduction

On March 11, 2020, the World Health Organization (WHO) declared coronavirus disease 2019 (COVID-19) a public emergency of international concern. [1] The disease is caused by severe acute respiratory syndrome coronavirus 2 (SARS CoV-2) which spreads person-to-person among individuals who are in close contact (within about 6 feet) through respiratory droplets produced when an infected person coughs, sneezes or talks. [2] It is suggested that this virus is spreading more efficiently than influenza, but not as efficiently as measles, which is highly contagious. [3] Mass gatherings are potential for the rapid spread of infectious diseases. There is evidence that public gathering of people has amplified the spread of infectious diseases like influenza. [4] Sports events are one of the major gatherings all around the world. Soccer being the most popular sport in the world [5] has more chance of spreading the diseases if proper precautions are not taken from the beginning. According to the interim guidance released by the WHO on March 19, 2020, key planning is recommended for mass gatherings events. [6]

As of April 17, 2020, a total 3,566,201 laboratory confirmed cases had been documented worldwide, with the United States being the hardest hit of all the countries. [7] Following the USA, were the European countries: Spain, Italy, France, Germany, and the UK, which had more than 100,000 cases as of April 17. One commonality among these European countries is soccer league games, with millions of fans all around the world. Each of these five countries have their own league playing 10 games every week. The world's most popular leagues suspended their games in the second week of March 2020. We hypothesize that a correlation exists between the number of people attending the soccer league games in Spain, Italy, France, Germany, and the UK and the increasing number of cases of COVID-19 in these countries during the ongoing epidemic. The objective of

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**Table 1.** Match details of the five European countries during their last game week.

Country	League	Last game played	Date	Attendance in last game	Attendance in the last match week
Spain	La liga	Real Madrid vs Betis	03/08/2020	Benito 50,596	213,152
Italy	Serie A	Sassuolo vs Brescia	3/9/2020	Unknown	449,537
France	Ligue 1	St. Etienne vs Bordeaux; Rennes vs Montpellier; Lille vs Lyon	3/8/2020	ASSE-24,912; Rennes-24,818; Lille-40,164	189,545
Germany	Bundesliga	Gladbach vs Cologne	3/11/2020	21409	449,537
UK	Premier League	Leicester vs Aston Villa	3/9/2020	Leicester-32,125	511,524
UEFA	Champions League	Atlanta vs Valencia	02/19/2020	Milan-45,792	N/A

**Table 2.** Confirmed cases of COVID in different dates (every 15 days from Feb 25).

Country	February 24	March 9	March 24	Total cases at Present (April 17)
Spain	1	1169	35273	190,839
Italy	221	7985	54030	172,434
France	24	1412	22304	143,116
Germany	16	1224	32991	141,397
UK	13	321	8077	108,692

this report is to evaluate the relation between the number of people attending the soccer games in Spain, Italy, France, Germany, and the UK and the number of cases of COVID-19 in these countries.

## Methods

We searched PubMed and Google scholar using the keywords such as COVID-19, SARS-CoV-2, mass gathering, and sports events for the scientific articles. Games details of the all leagues were taken from the popular websites and the official pages of the league. [8-11] The total number of COVID-19 cases were taken from the Worldometer website, a data-gathering website that uses official reports directly from the governments' communication channels. [7]

## Results

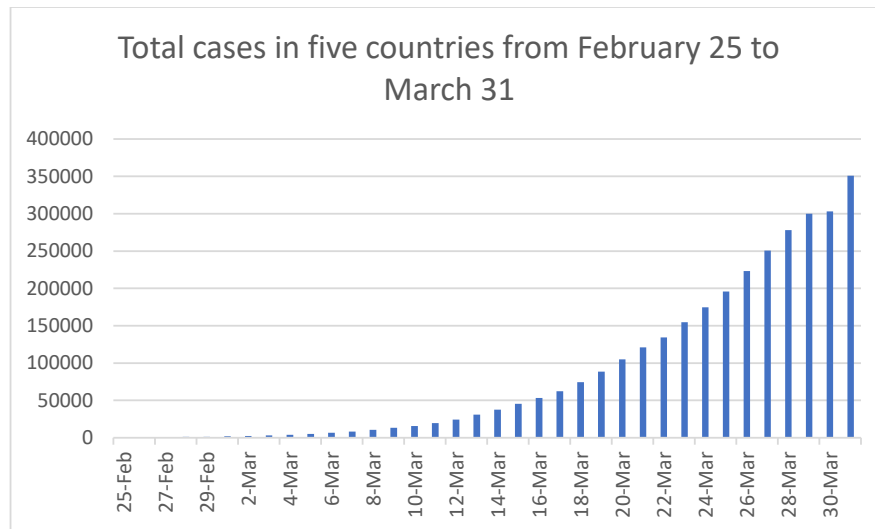
The total number of attendees in each major league in the last game week with their respective dates are given in the **Table 1.** **Table 2** shows the confirmed number of cases in five countries from February 25 every 15 days until April 17, 2020. **Figure 1** shows the total number cases in the five countries from February 25 to March 31.

## Discussion

Soccer leagues in Spain, Italy, France, Germany, and the UK are among the most popular sporting events in the world. Each tournament has 20 teams each, playing 10 games every week in 10 different cities with 200,000 to 500,000 spectators in each league attending every week. In only those five countries, one to 2.5 million people travel to the stadium every week to support their teams. The game played between Real Madrid and Betis on March 8 at Benito, Spain had an attendance of 50,596. The last game week (Game week 29) of English premier league, played between March 7 and March 9, attracted 511, 524 spectators in the stadiums across England and Wales, with hundreds of thousands gathering in other public places, such as bars and theatres. In all settings, shouting, hugging, shaking hands, and gestures are very common during matches, and as a part of celebration afterwards. The close proximity, contact, and vocalizations could serve as a vehicle for respiratory droplets carrying SARS-CoV-2, especially for asymptomatic carriers.

Majority of the football viewers are young people. Young people have been found to be asymptomatic for COVID-19. The disease presents itself in more severe form in older individuals especially with comorbidities. [12] Young people attending these sporting events can be infected with SARS-CoV2 and being asymptomatic carriers. These individuals can be a source of spreading the SARS-CoV2 in the community. [13] Asymptomatic individuals, "invisible spreaders", are spreading the disease, which has made the containment of the infection exceptionally difficult. [14]

On the 19<sup>th</sup> of February, 45,792 spectators attended the Champion's league match between Italy's Atlanta and Spain's Valencia held in Milan, Italy. More than 40,000 Bergamo residents (nearly one third of the city residents) supporting



**Figure 1.** Bar diagram showing total number of COVID-19 cases in five European countries from February 25 to March 31.

Atlanta travelled to Milan for this knockout round match of the world's most prestigious club competition. Thousands more in the home city celebrated the 4-1 victory of their home team in the bars and public gatherings. Bergamo became the hardest hit province of Italy weeks later this match, which named the event as "Biological bomb". [15,16] The Mayor of Bergamo mentioned that the match was a strong escalation of contagion among people. Days later Valencia confirmed more than a third of their players and coaching staff were tested positive implying the match was linked to the high number of positive cases in the Bergamo. [17]

Moving forward, when the lockdown ends, continuation of the recreational activities should be done in a gradual manner than the robust way to prevent the second wave of the pandemic. According to Radusin, the Spanish flu, which had the second and third wave in 1918 and 1919 during the World War I, took five times as many lives as the war. [18] To prevent such disastrous conditions, sporting events such as soccer leagues require comprehensive planning and surveillance before they resume the games. We suggest beginning with the season without spectators and minimal support staff, then gradually increasing the number of the spectators while maintaining social distancing through spaced seating. Temperature scanners capable of scanning several people quickly and efficiently should be used to screen spectators. Universal masking in and around the sporting event premises and access to hand sanitizers should be made mandatory to reduce transmission of the disease. If a point-of-care testing is developed in future with acceptable sensitivity, specificity, and readily available test results, a testing site before entering the stadium may be needed. Additionally, if a vaccine is developed and proven effective and safe, attendants may need to show a vaccination certificate in advance.

The organizers may need to follow the WHO's planning recommendations for mass gatherings. [6] WHO asks organizers of such mass gatherings, such as a soccer game, to consider the three phases in planning of appropriate preparedness measures, which include the Planning Phase, Operational Phase, and Post-event Phase. The planning phase emphasizes on the robust collaboration between event organizers with local and national public health authorities, risk assessment, creating specific action plans, assessing capacity and resources and establishing risk communication and community engagement. The guidelines for the operational phase underlines the importance of transparency and timely communication with all the participants of the event. During this phase, the organizers should broadcast key messages in a manner that is coordinated and consistent. They should also work with local public health authorities in the surveillance of all participants. Importantly, the organizers should emphasize the general principles of preventing transmission, such as self-isolation for persons who feel unwell, social distancing, and hand hygiene. The guideline for the post-event phase includes sharing of information about persons who fall sick with health authorities both local and the place from which they have travelled. It is important to notify the home countries on returning participants of any people who developed COVID-19 while attending the event. The organizers should publish lessons learnt from organizing the event so that future event organizers can benefit from.

More than a sporting event, soccer games in Europe have socio-cultural, economic and political significance. Therefore, it is prudent to resume the matches soon. Continuous measures are being taken to limit the public health risk of mass gatherings by the organizing committee. Despite the preventive measures, mass gathering undoubtedly puts

millions of lives at risk of COVID-19. Therefore, it is pivotal for any soccer organization to take in consideration all the aspects of the beautiful game and balance it out with the health and well-being of its fans.

In conclusion, mass movement of spectators among different cities in the European countries for the major soccer league matches could be one of the reasons for sudden increase in the COVID-19 cases. These games can reverse the gains many countries have made so far during this pandemic. A possibility of a second wave cannot be denied if the league matches are not modified following the measures suggested by the WHO, European CDC and other professional organizations. Proper planning, surveillance, communication, and modifications in the games are required to mitigate the spread of COVID-19, with a particular focus on popular games of the European Soccer League. Further research in the SARS CoV-2 transmission, development of effective treatment and/or vaccine may help provide new insights into the optimal timeline to resume sporting events during the evolving COVID-19 pandemic.

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