World Athletics Data - An Analysis

Effects of the Global COVID-19 Pandemic and Carbon-Plated Shoe Technology on Annual Performance Lists 2015-2021

World Athletics Data Analysis - Synopsis

Introduction

The past decade has seen two major impacts on the global performance of athletes:

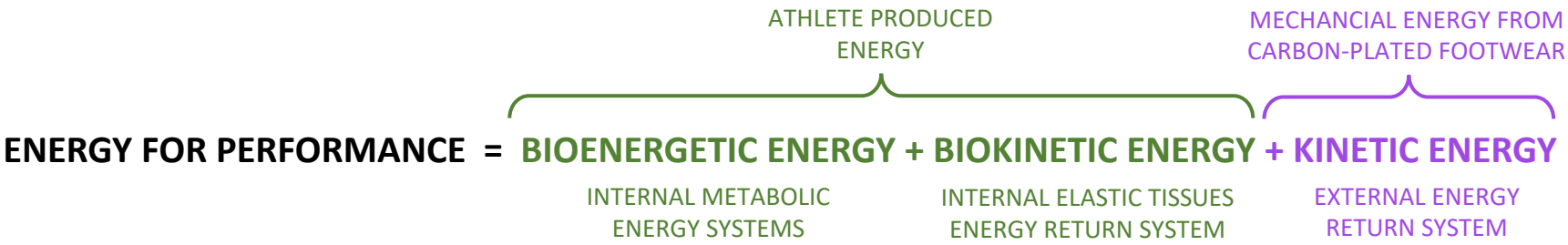
1. The COVID-19 Pandemic
2. The introduction and availability of Carbon-plated Footwear Technology

How can we identify and evaluate this impact of both COVID-19 and Carbon-plated Footwear Technology?

Performance Criteria

Examining performance criteria over time is one way of evaluating an impact. Normally, the number of athletes globally who exceed a certain performance criterion is relatively stable from year-to-year, with slight fluctuations in Olympic and pre-Olympic years. Also, it is expected to see a gradual increase in the number of athletes exceeding the criterion over time, through natural 'event development'. The years from 2015-2021 are analysed here.

Since the Carbon-plated footwear provides an added and external mechanical kinetic unit to the body's internal kinetic chain we can simply and accurately compare the differences in performance from when Carbon-plated shoes and spikes became globally available to the previous period, when athletes wore 'conventional' shoes and spikes.



Fatigue-Resistant Performance Enhancement

Carbon-plated track & field spikes specifically provide a fatigue-resistant performance enhancement to athletes through two potential sources:

1. An external, metabolic-sparing kinetic energy return
   - most relevant to improving Running Economy in Endurance: 800m - Marathon
2. Power amplification through the timing of an external kinetic energy return
   - most relevant in the force production phase of the 'Power' events: Sprints, Hurdles, Jumps, Throws and Combined Events.

What the Graphs Reveal by Event Group

Fatigue-Resistant Performance Enhancement

Carbon-plated track & field spikes specifically provide a fatigue-resistant performance enhancement to athletes through two potential sources:

1. An external, metabolic-sparing kinetic energy return
   - most relevant to improving Running Economy in Endurance: 800m - Marathon
2. Power amplification through the timing of an external kinetic energy return
   - most relevant in the force production phase of the 'Power' events: Sprints, Hurdles, Jumps, Throws and Combined Events

Endurance

800m - 10,000m	All events show the significant impact of Carbon-plated spikes on improving performance for both men and women Note: from late 2016 some athletes have worn Carbon-plated 'Road' shoes in 5000m and 10,000m track races and continue to do so in 2022 but are WA-restricted since 2020. (from Aug 2020, World Athletics (WA) restricted carbon-plated racing flats for the track by midsole thickness of ≤25mm)

Sprints & Hurdles

100m - 400m	No apparent impact on performance for Men but Women show significant improvement at 100m and 400m
Hurdles	Men 110mH shows significant improvement as do both the Women's 100mH and 400mH

Jumps - Horizontal and Vertical

Jumps	In all Jumps, Men appear to still be in the process of recovering from the impact of COVID In all Jumps, Women show significant improvement

Throws - Linear and Rotational

Throws	In all Throws, Men appear to still be in the process of recovering from the impact of COVID Women show significant improvements in the Shot and Hammer and slight improvement in Javelin and Discus

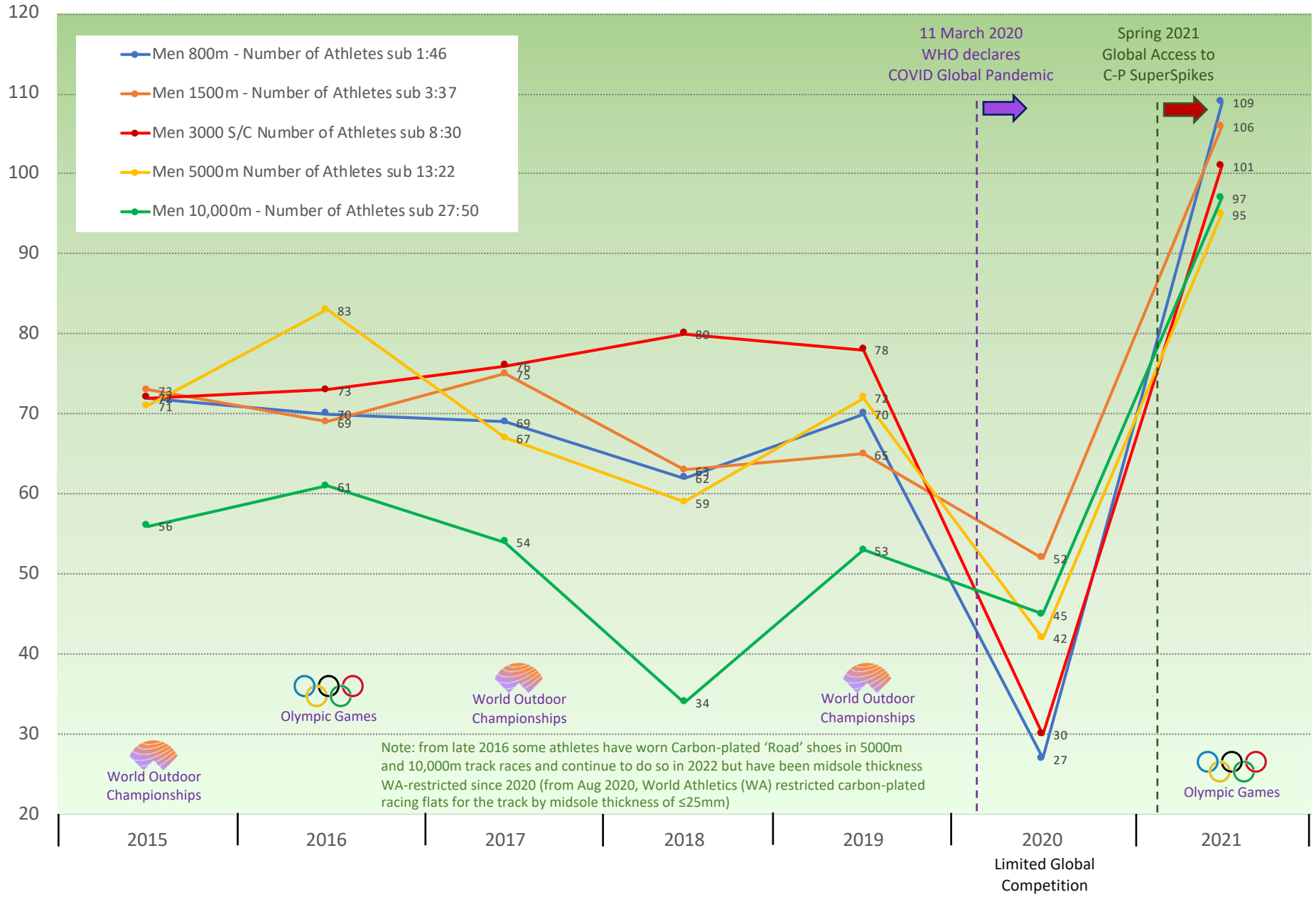
Combined Events

Decathlon	The number of athletes exceeding 8,000 pts shows improvement but no change at 7,750 pts
Heptathlon	The number of athletes exceeding 6,250 pts shows improvement but no change at 5,750 pts

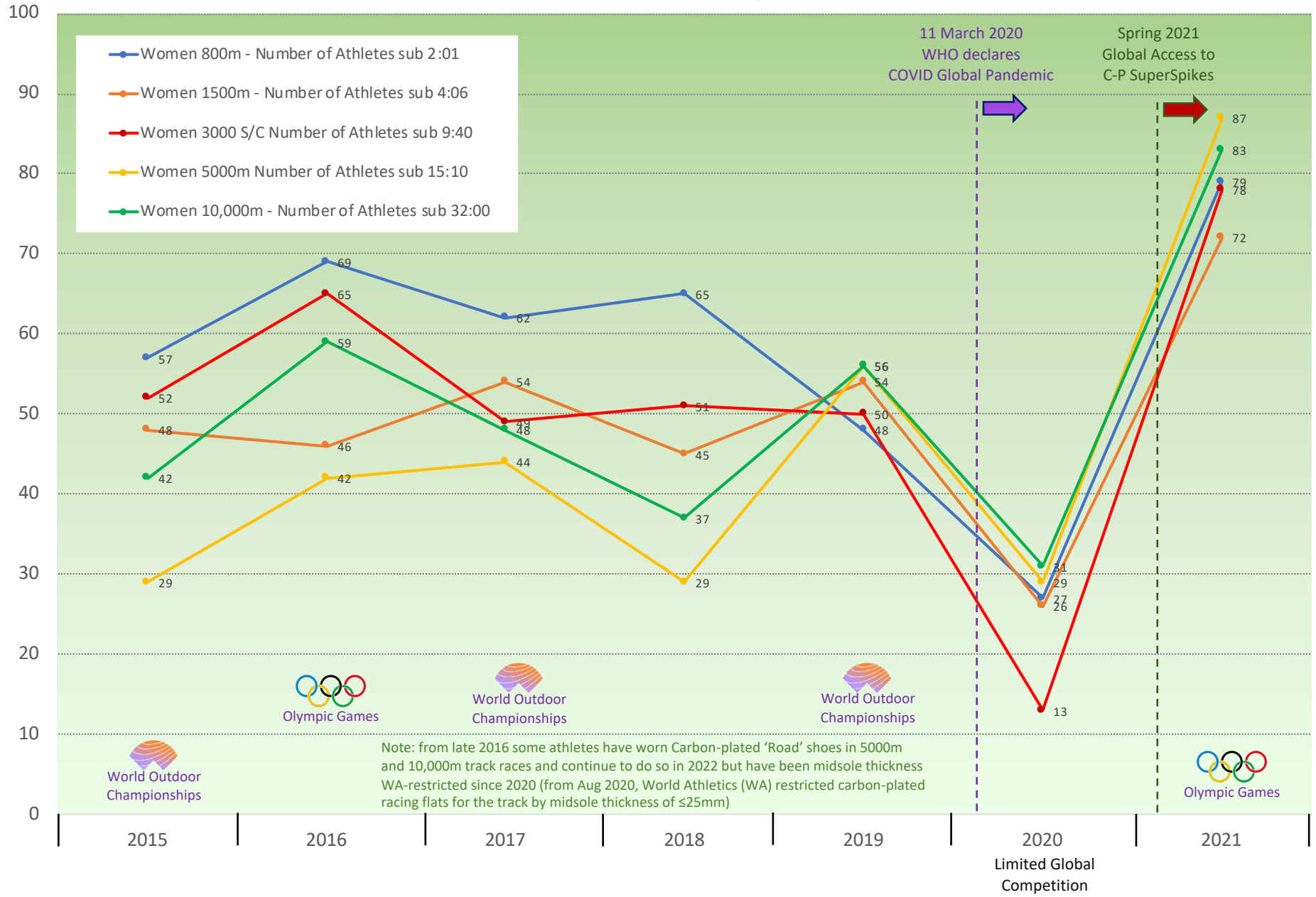
Conclusion

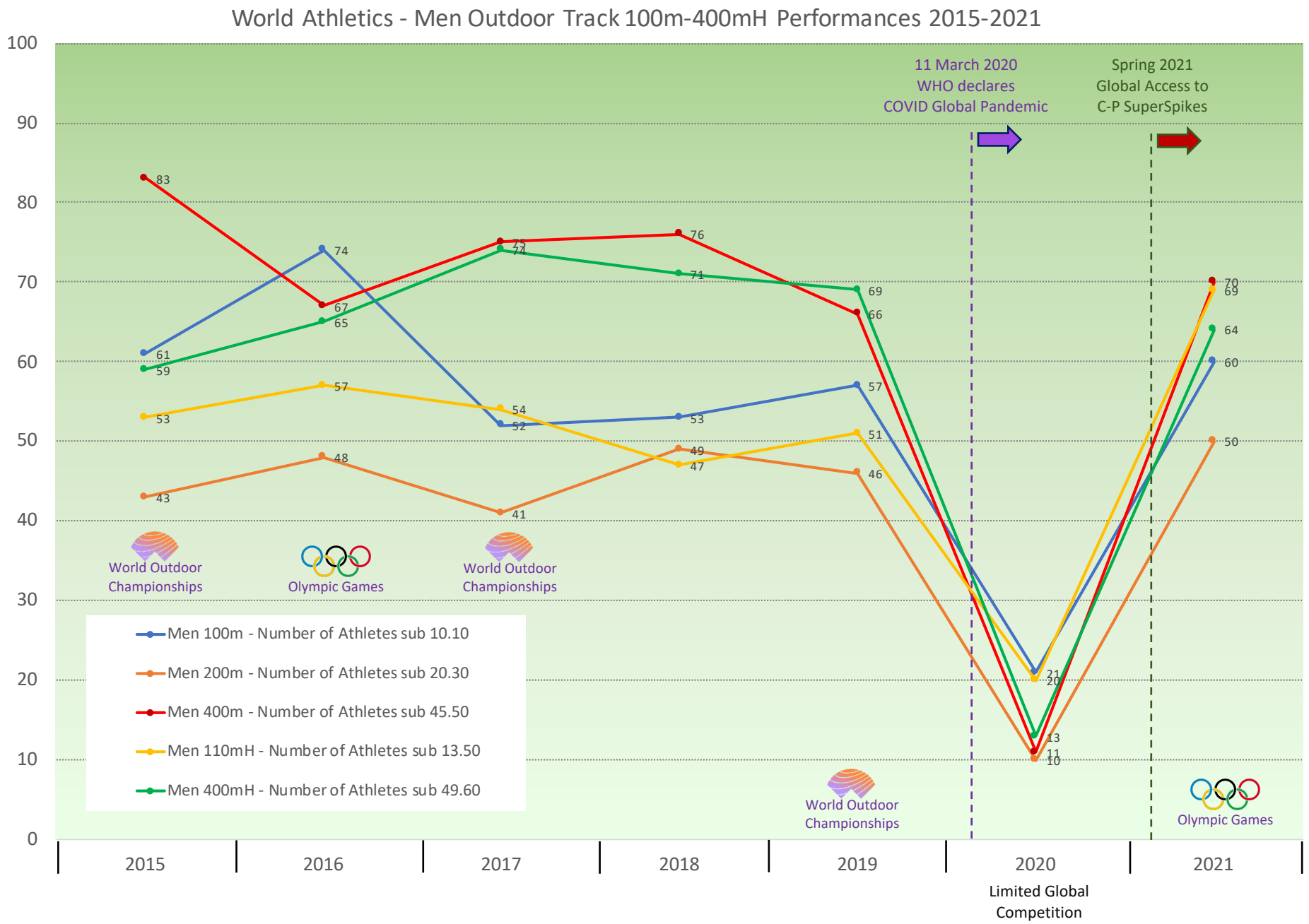
There is no disputing the significant impact of Carbon-plated spike technology on the running events. The other event groups show some impact but not such a consistent picture. This could be because the Carbon-plated footwear for the 'power' events was developed later, is not as widely available yet, or only available to the very elite athletes as indicated in the Combined Events.

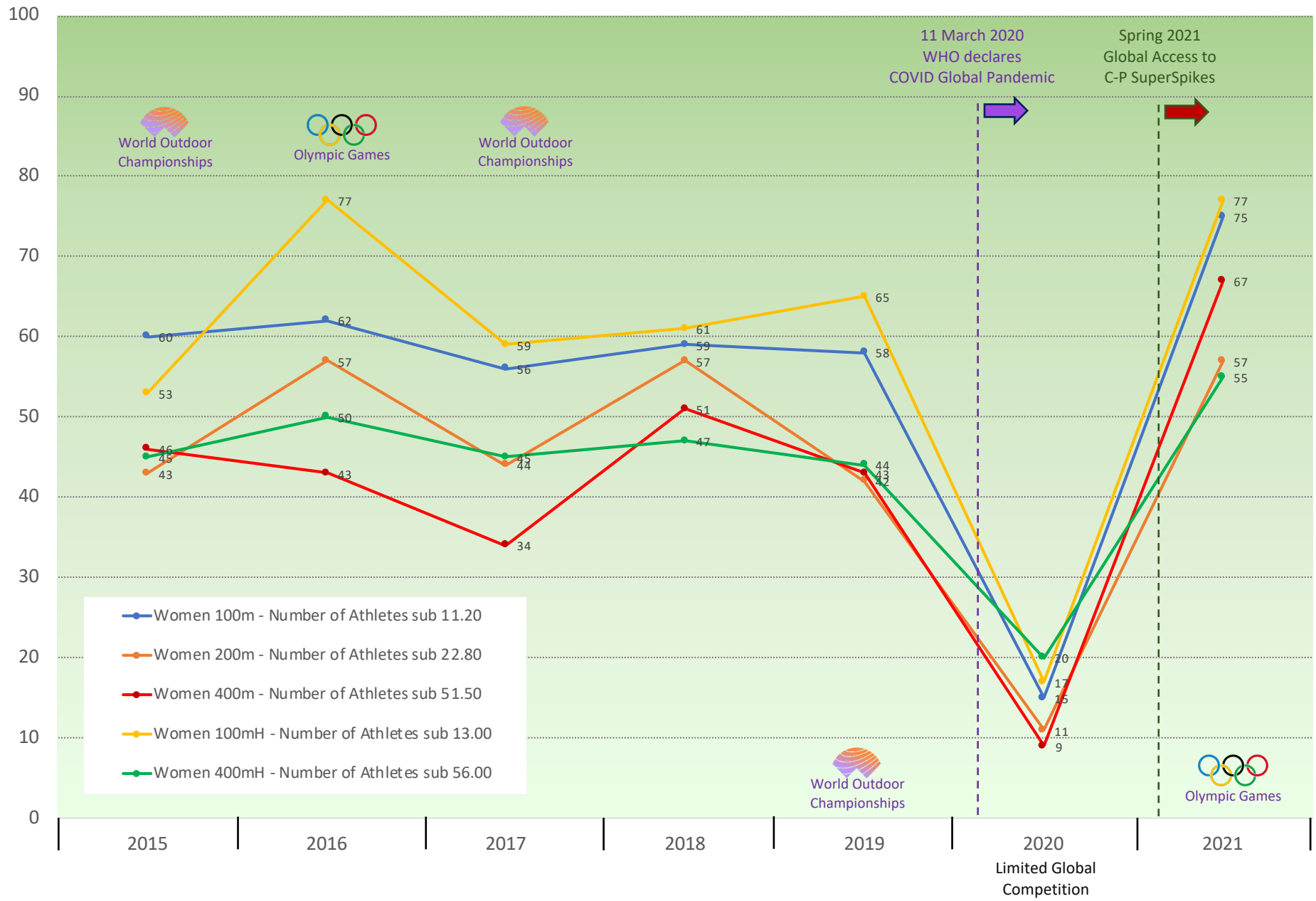
World Athletics - Men Outdoor Track 800m-10,000m Performances 2015-2021



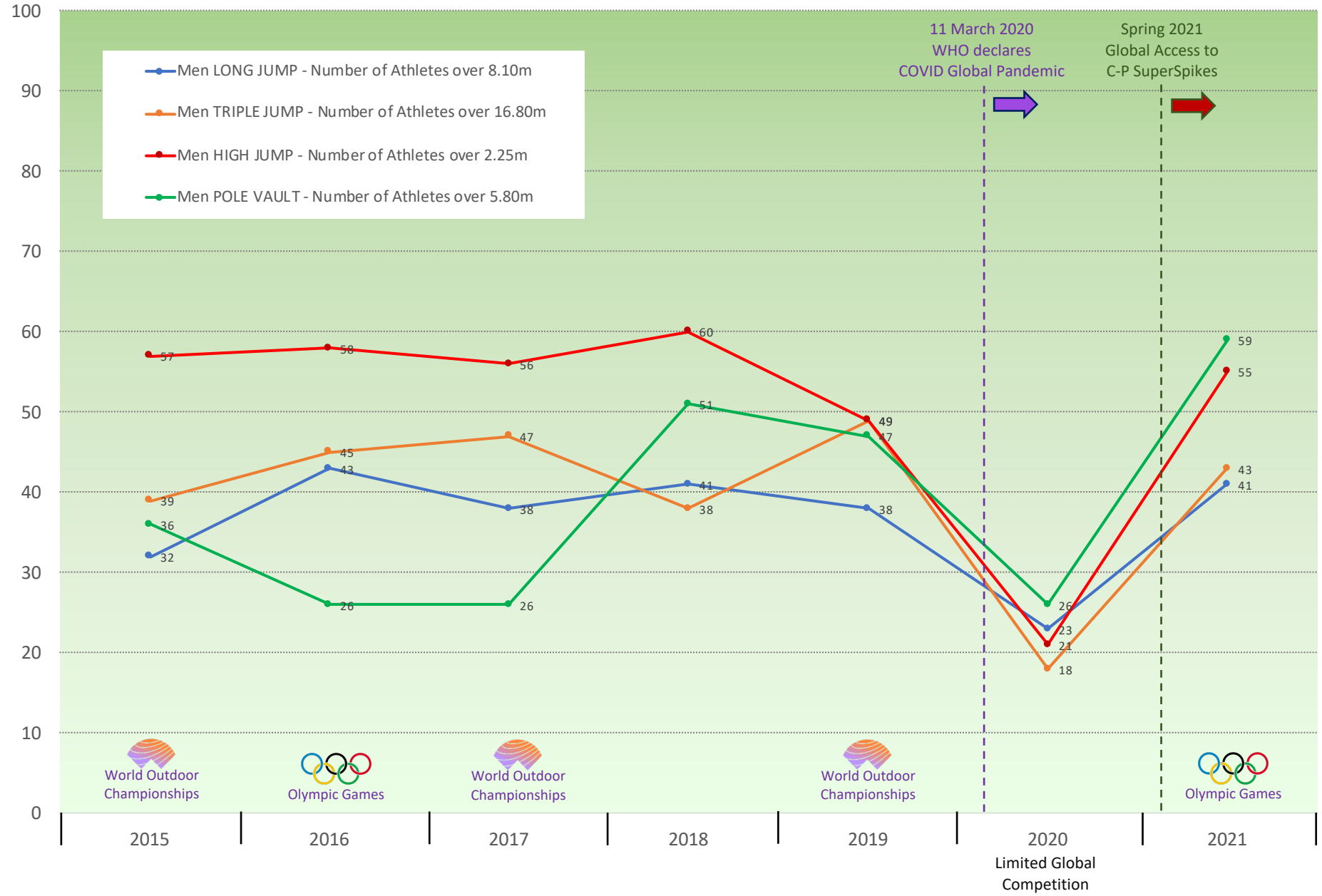
World Athletics - Women Outdoor Track 800m-10,000m Performances 2015-2021



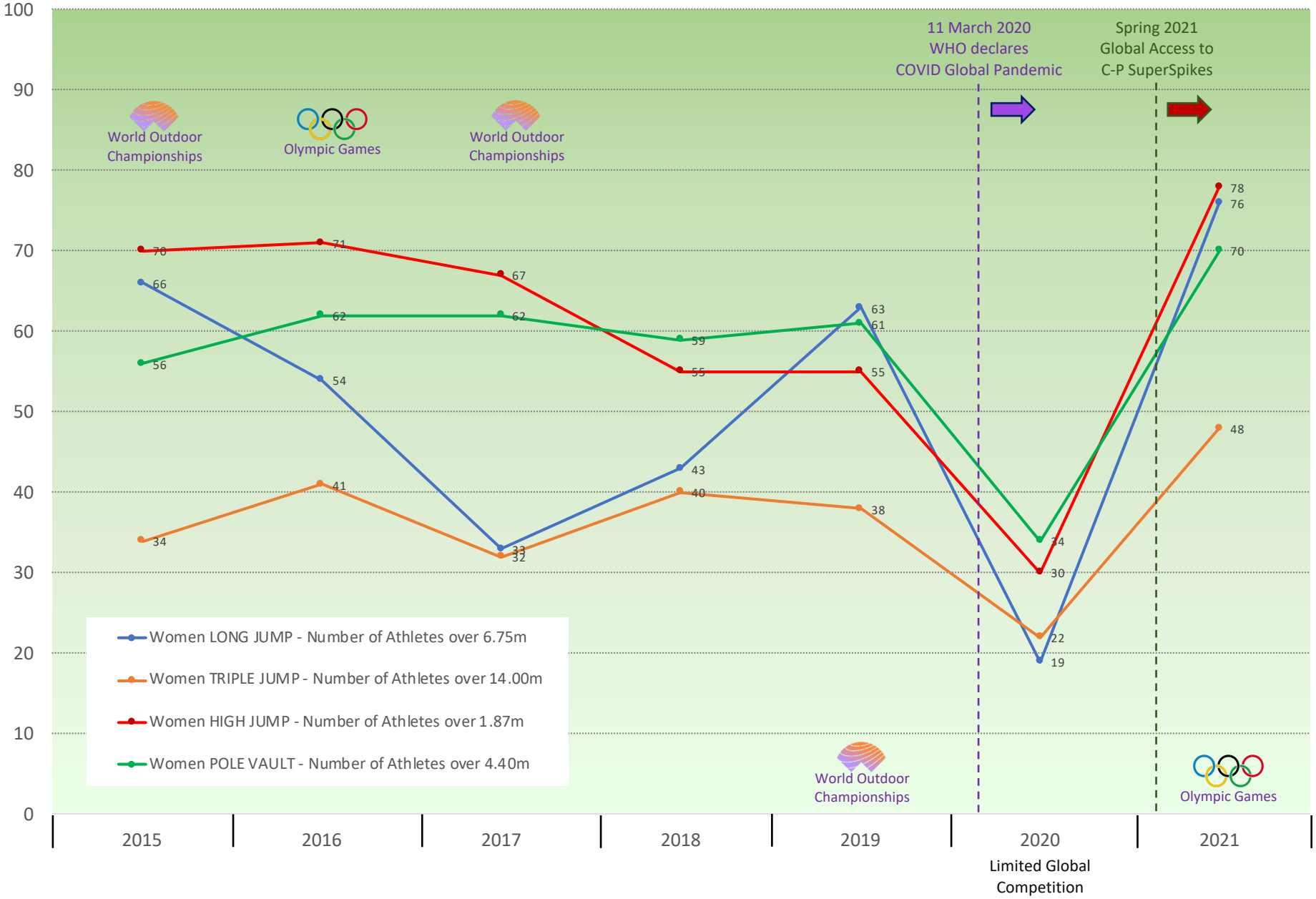


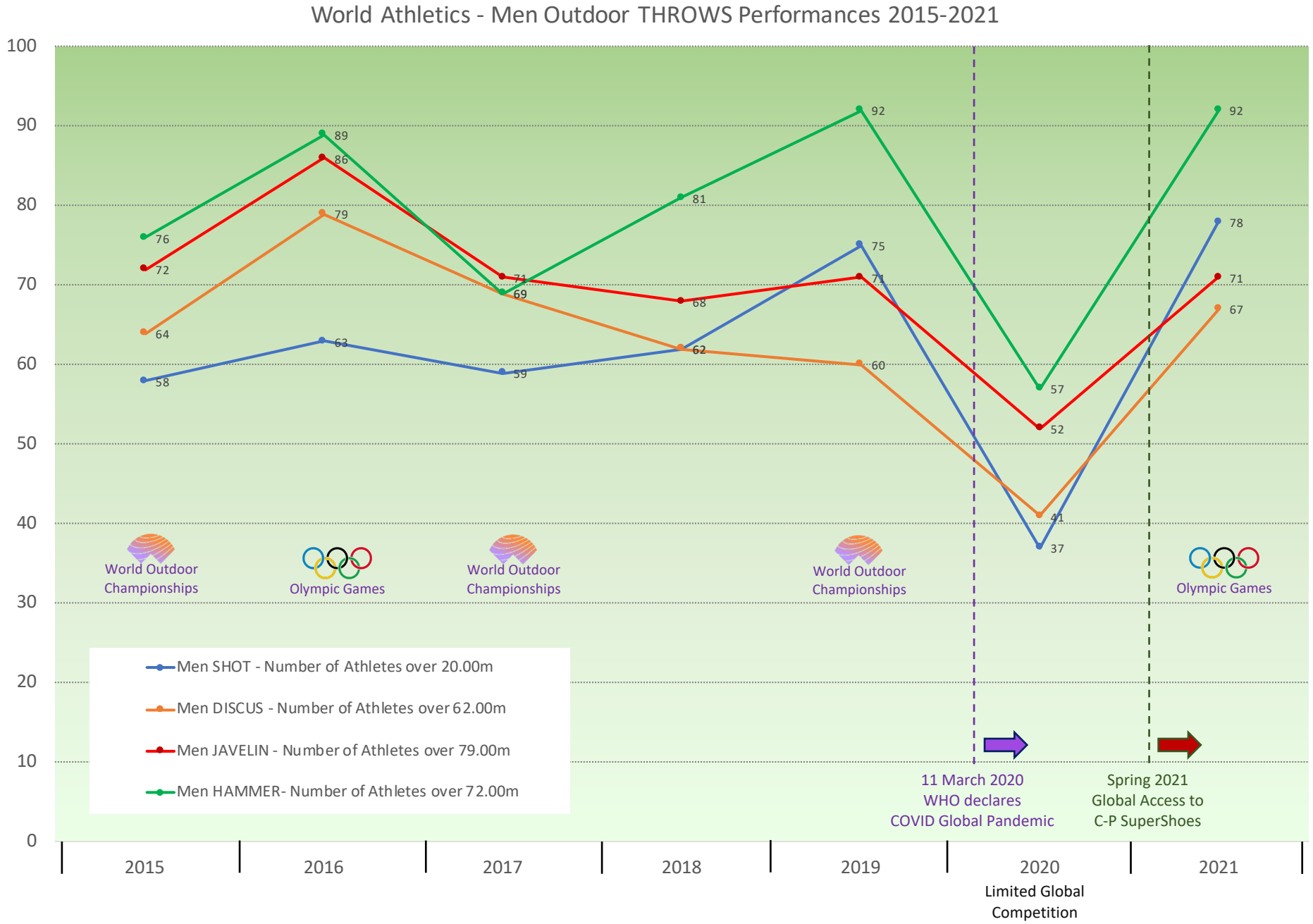


World Athletics - Men Outdoor JUMPS Performances 2015-2021

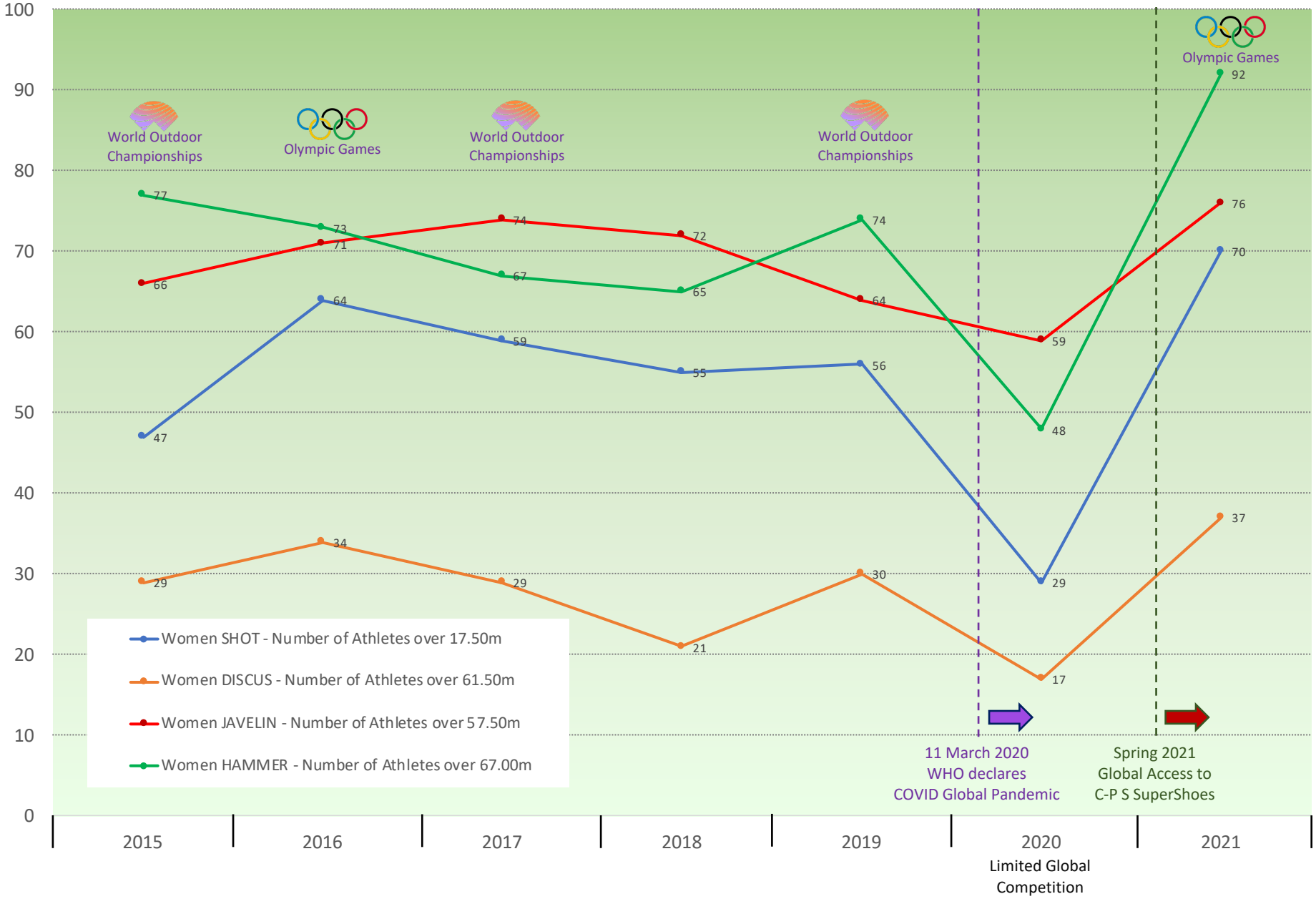


World Athletics - Women Outdoor JUMPS Performances 2015-2021

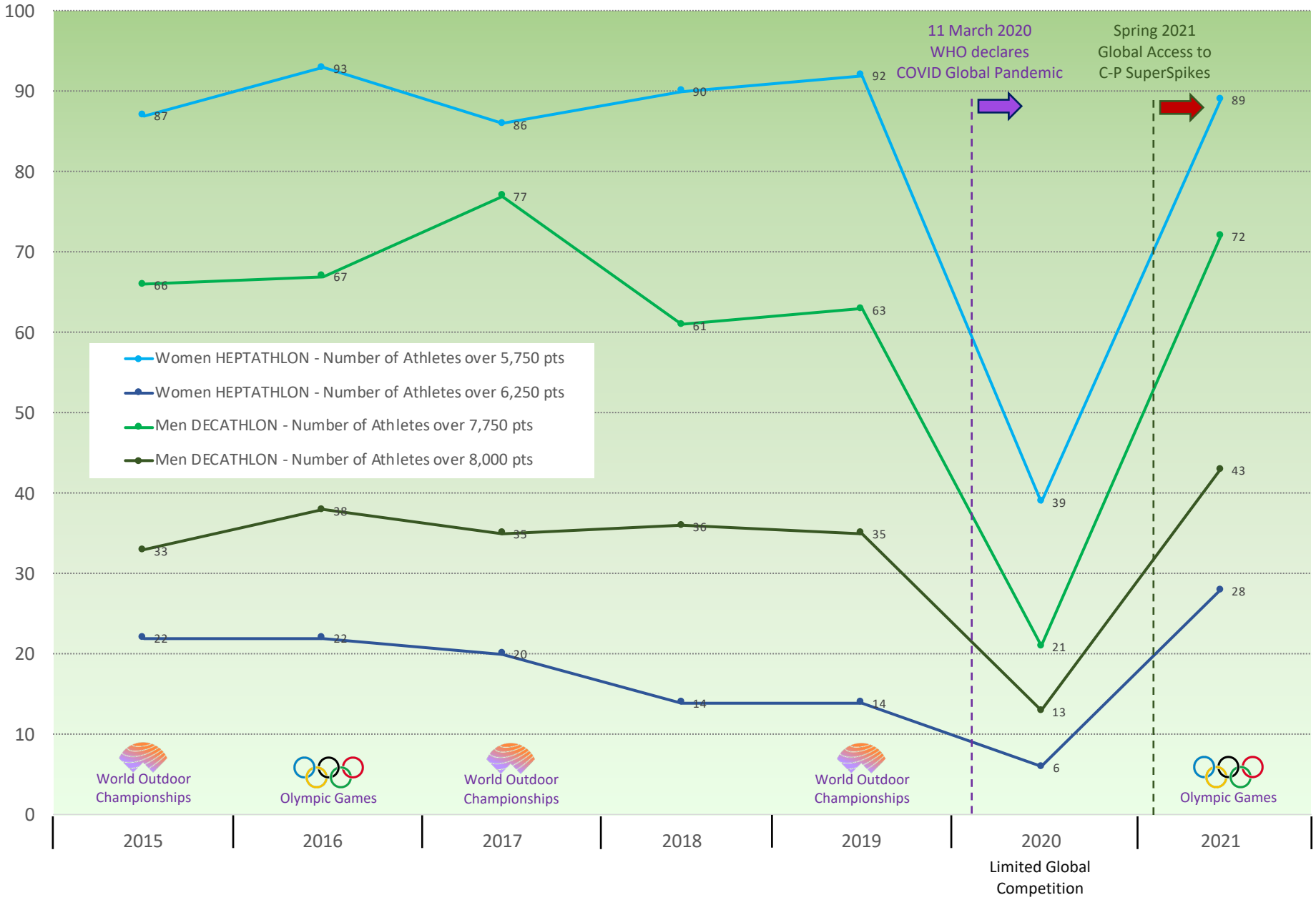




World Athletics - Women Outdoor THROWS Performances 2015-2021



World Athletics - Men & Women COMBINED EVENTS Performances 2015-2021



World Athletics Data

World Athletics Data was used in the preparation of this Report

Sourced from the Public Website

https://worldathletics.org/stats-zone