

# One more unsolved problem

“Impact of the COVID-19 pandemic on publishing in astronomy in the initial two years”

Unsolved Problems in Astrophysics and Cosmology, December 7, 2022

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**18%**

**Female  
Participants**

**37%**

**Invited  
Female  
Participants**

**1,207,197** All publications in astro (Jan. 1950 -- Feb. 2022)

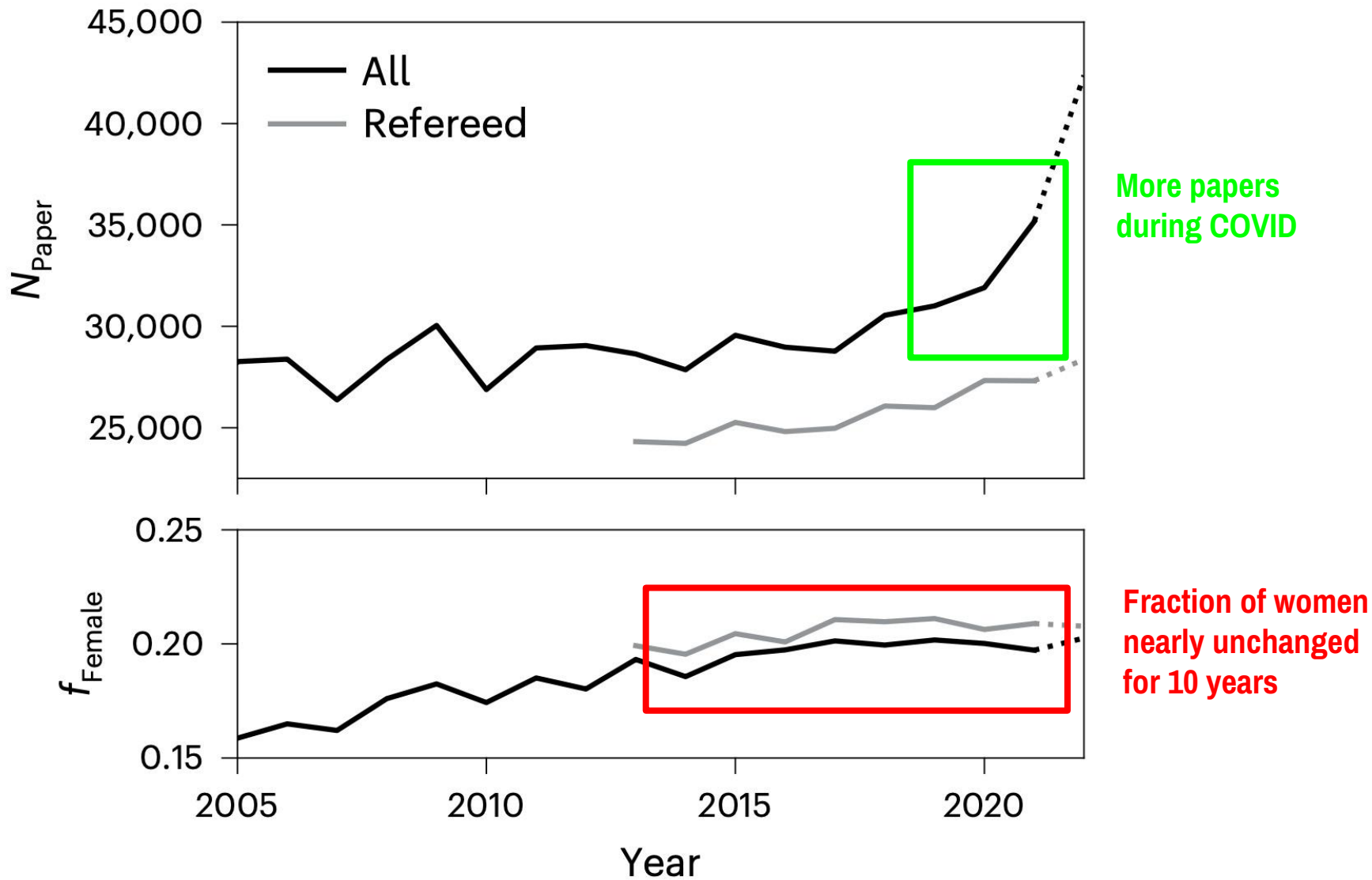
**516,304** Authors

**258,889** Authors with 1st author paper(s)

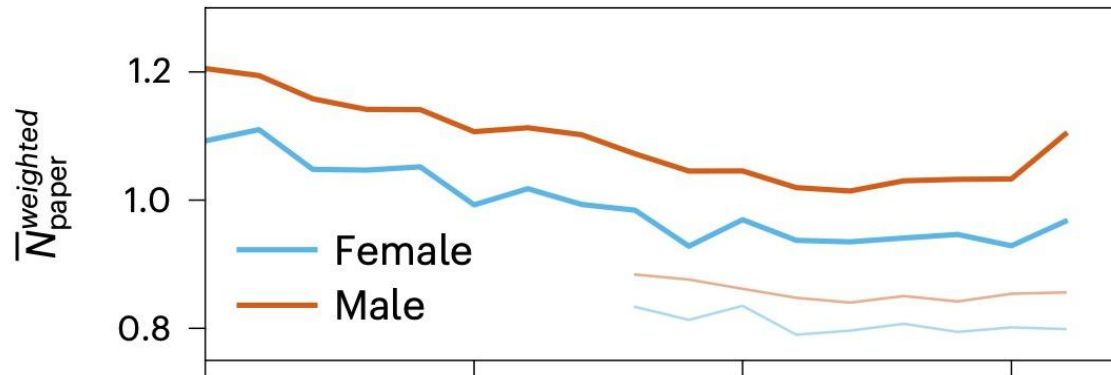
**157,459** Authors with 1st author paper(s) with gender

<b>126,529</b>	<b>Male (80%)</b>
<b>30,930</b>	<b>Female (20%)</b>

**Num. of papers in astro & cosmology**

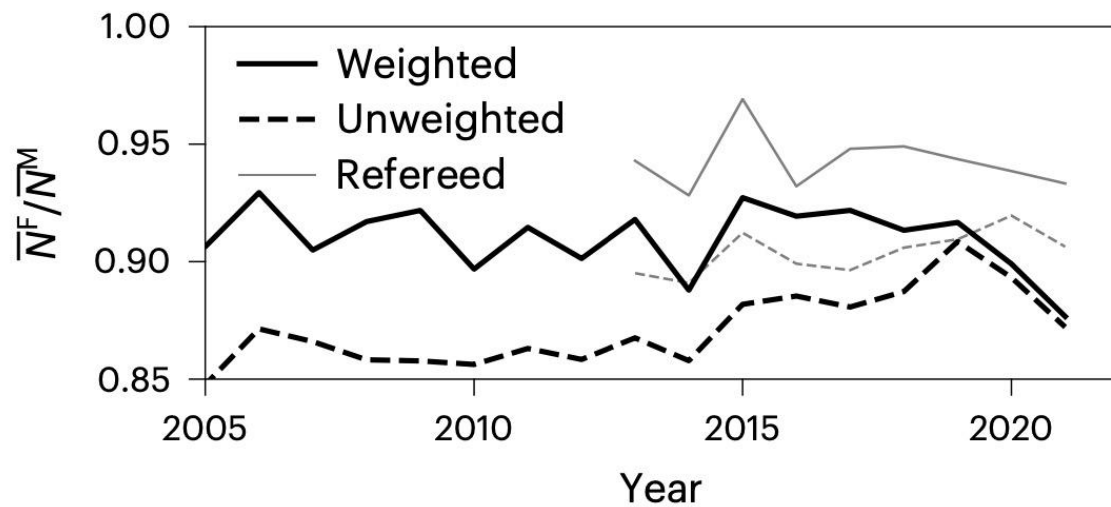
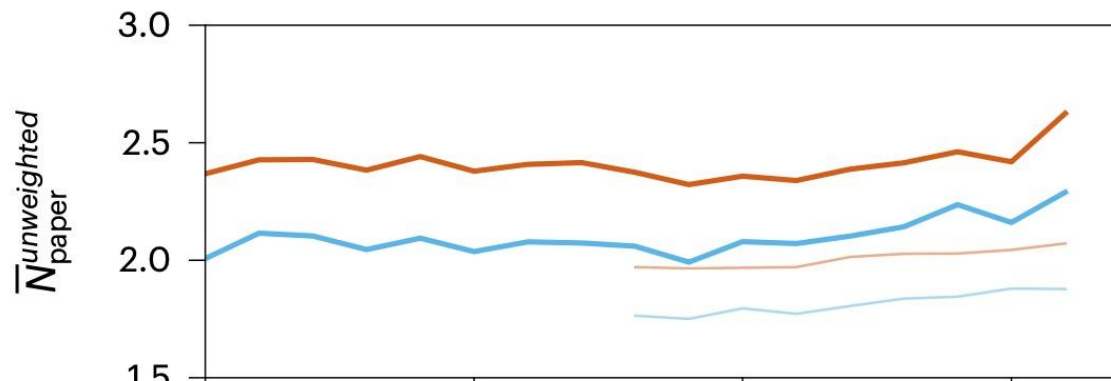


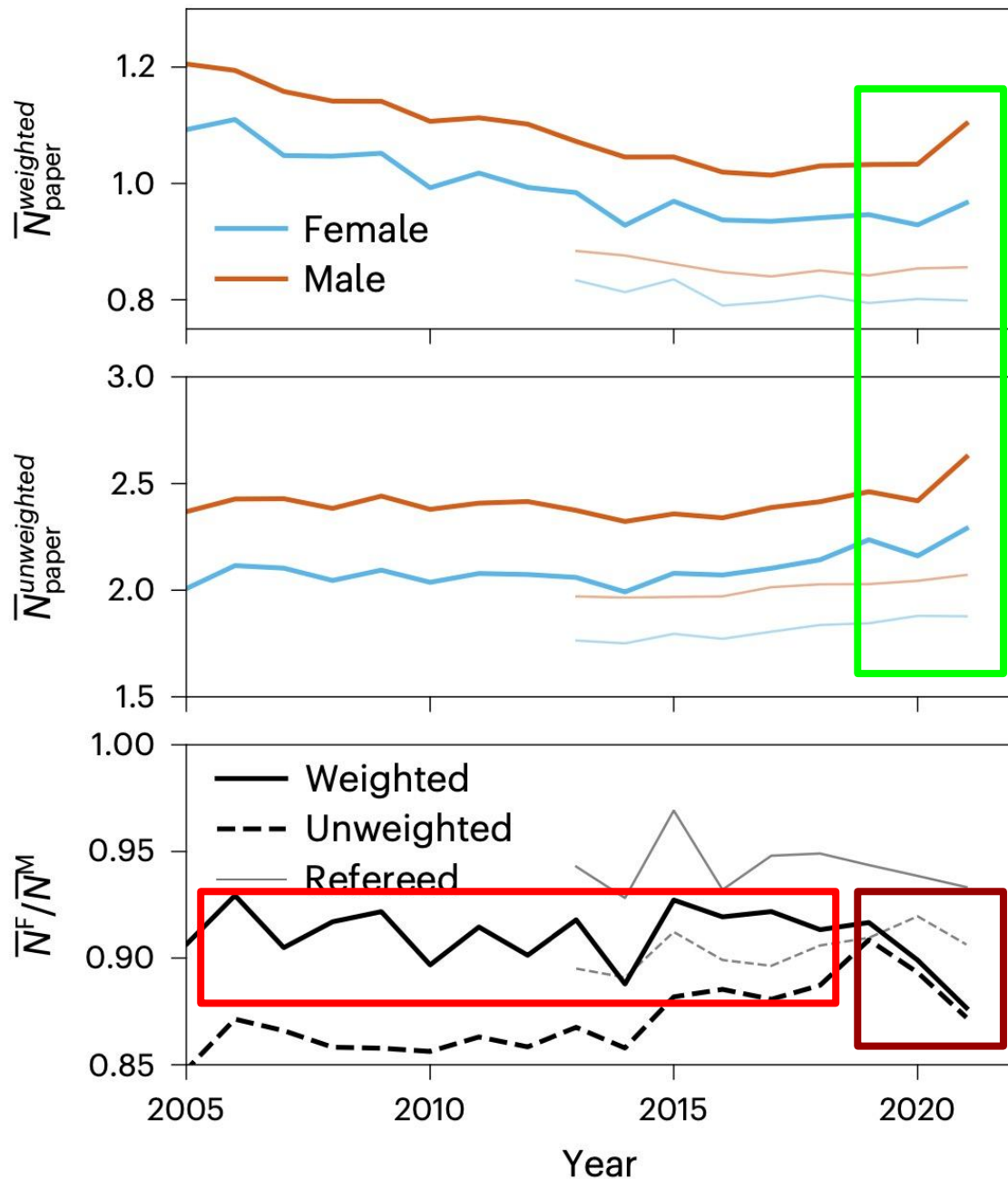
# **Individual productivity**



$$N_{\text{paper}}^{\text{weighted}} = \sum_i \left(\frac{1}{2}\right)^{(N_p^i - 1)}$$

$N_p^i$ : author order  
 i: all papers one wrote each yr





Improved productivity during COVID

Women's productivity at 90% of men for many years, and dropped further during COVID



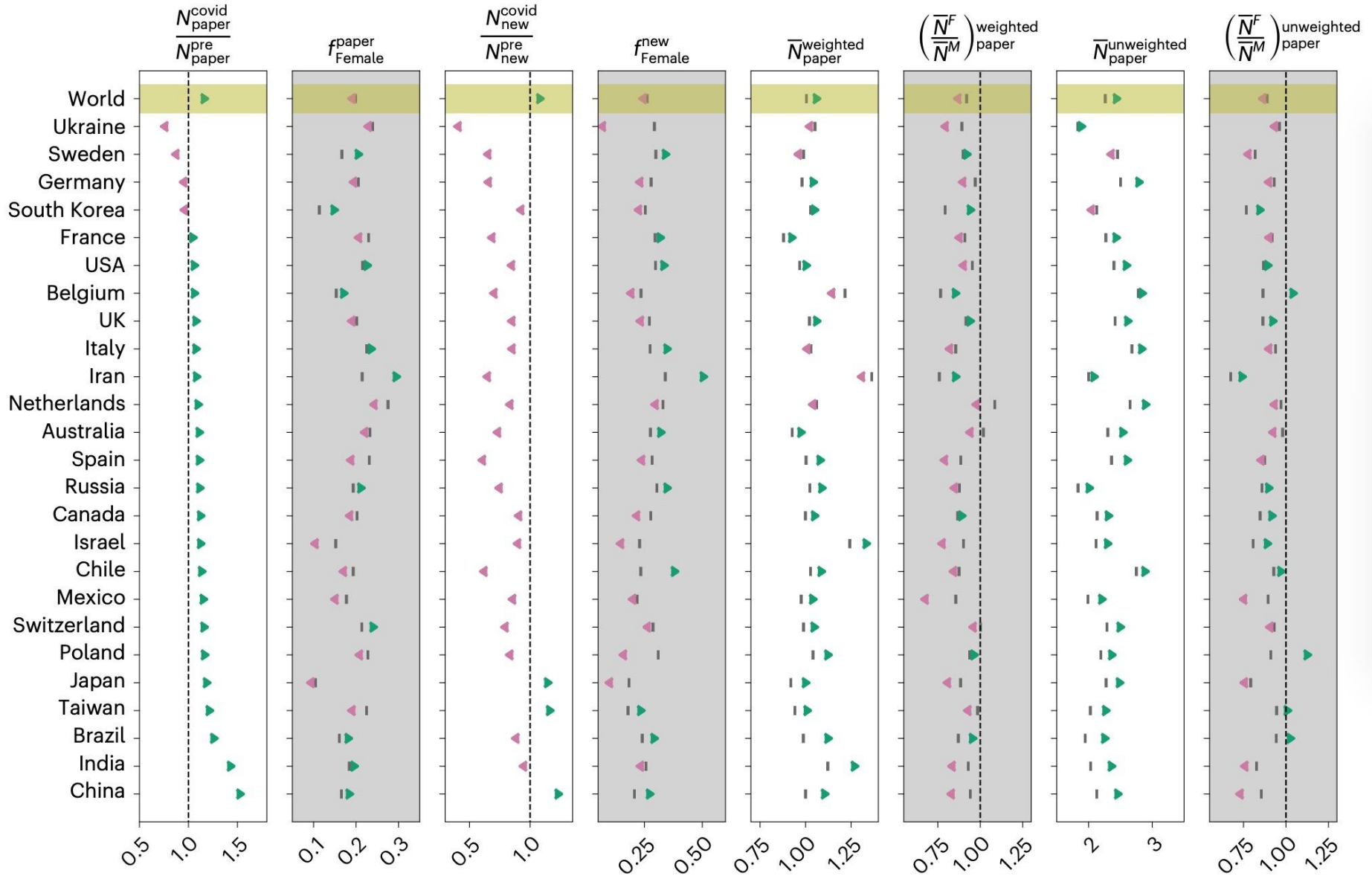
**By country**

### # of Papers

### # of new researchers

### Productivity

### Collab. work



### # of Papers

### # of new researchers

### Productivity

### Collab. work

$$\frac{N_{\text{covid paper}}}{N_{\text{pre paper}}}$$

$$f_{\text{paper}}^{\text{Female}}$$

$$\frac{N_{\text{covid new}}}{N_{\text{pre new}}}$$

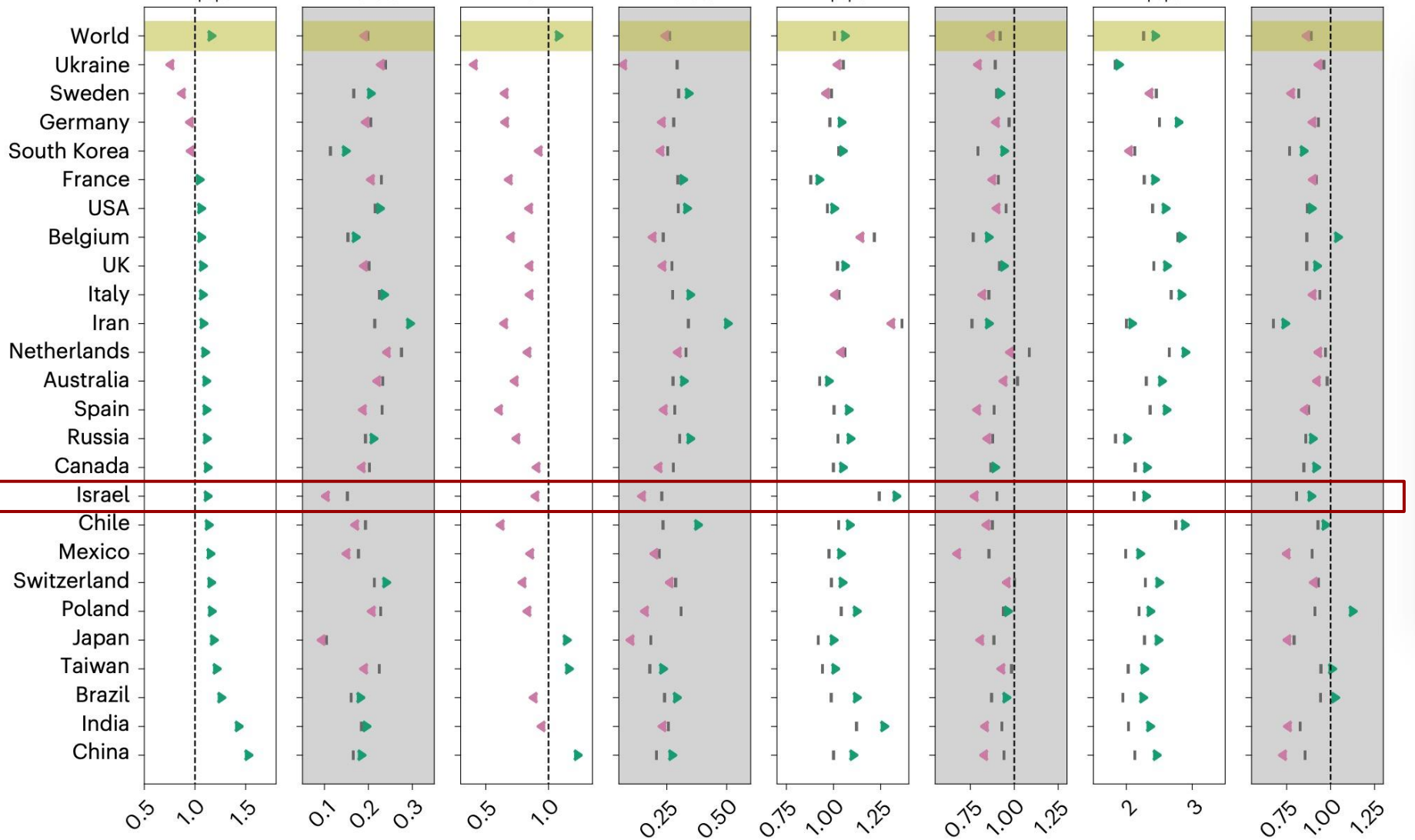
$$f_{\text{new}}^{\text{Female}}$$

$$\bar{N}^{\text{weighted paper}}$$

$$\left(\frac{\bar{N}^F}{\bar{N}^M}\right)^{\text{weighted paper}}$$

$$\bar{N}^{\text{unweighted paper}}$$

$$\left(\frac{\bar{N}^F}{\bar{N}^M}\right)^{\text{unweighted paper}}$$

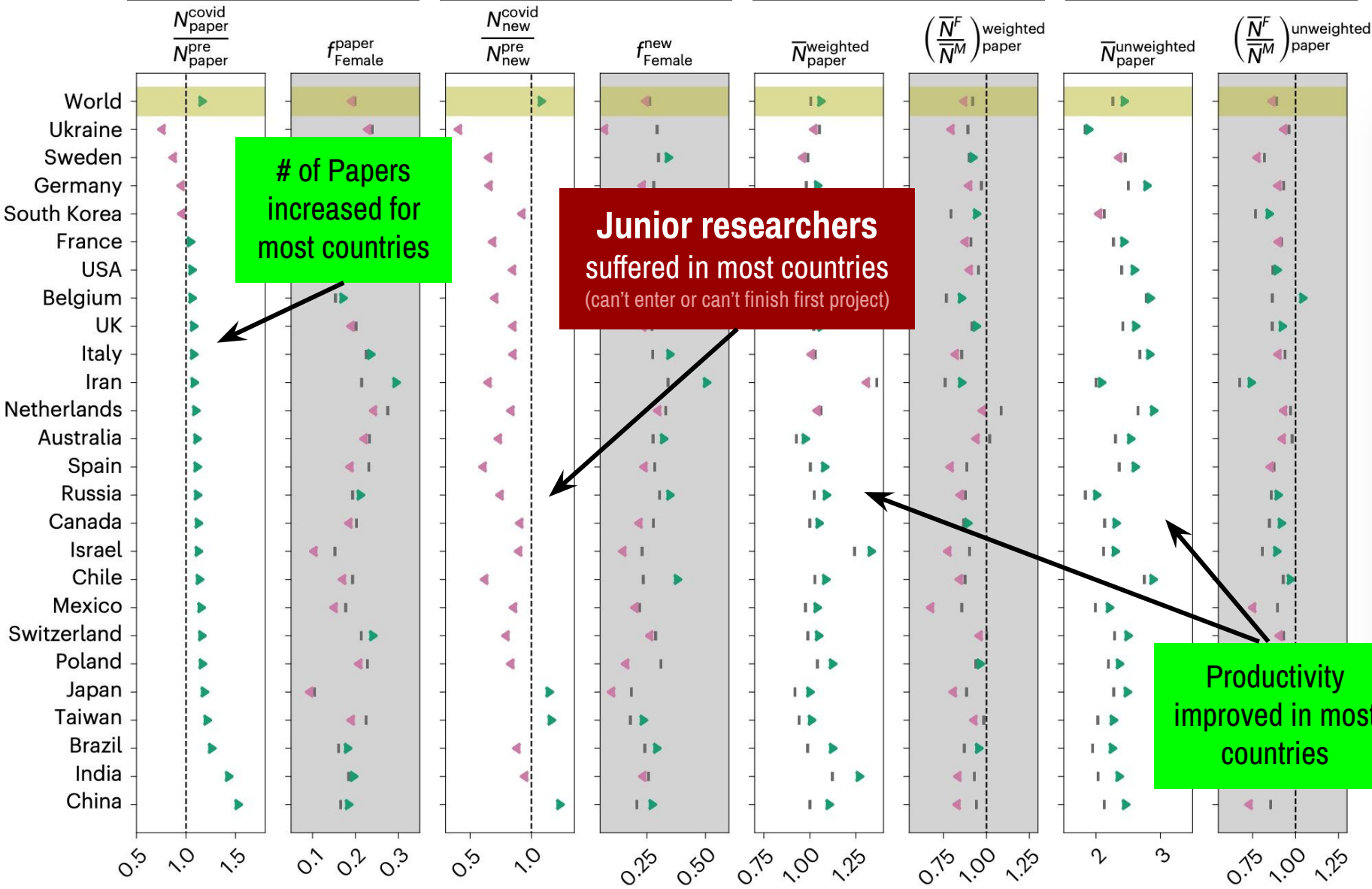


# of Papers

# of new researchers

Productivity

Collab. work

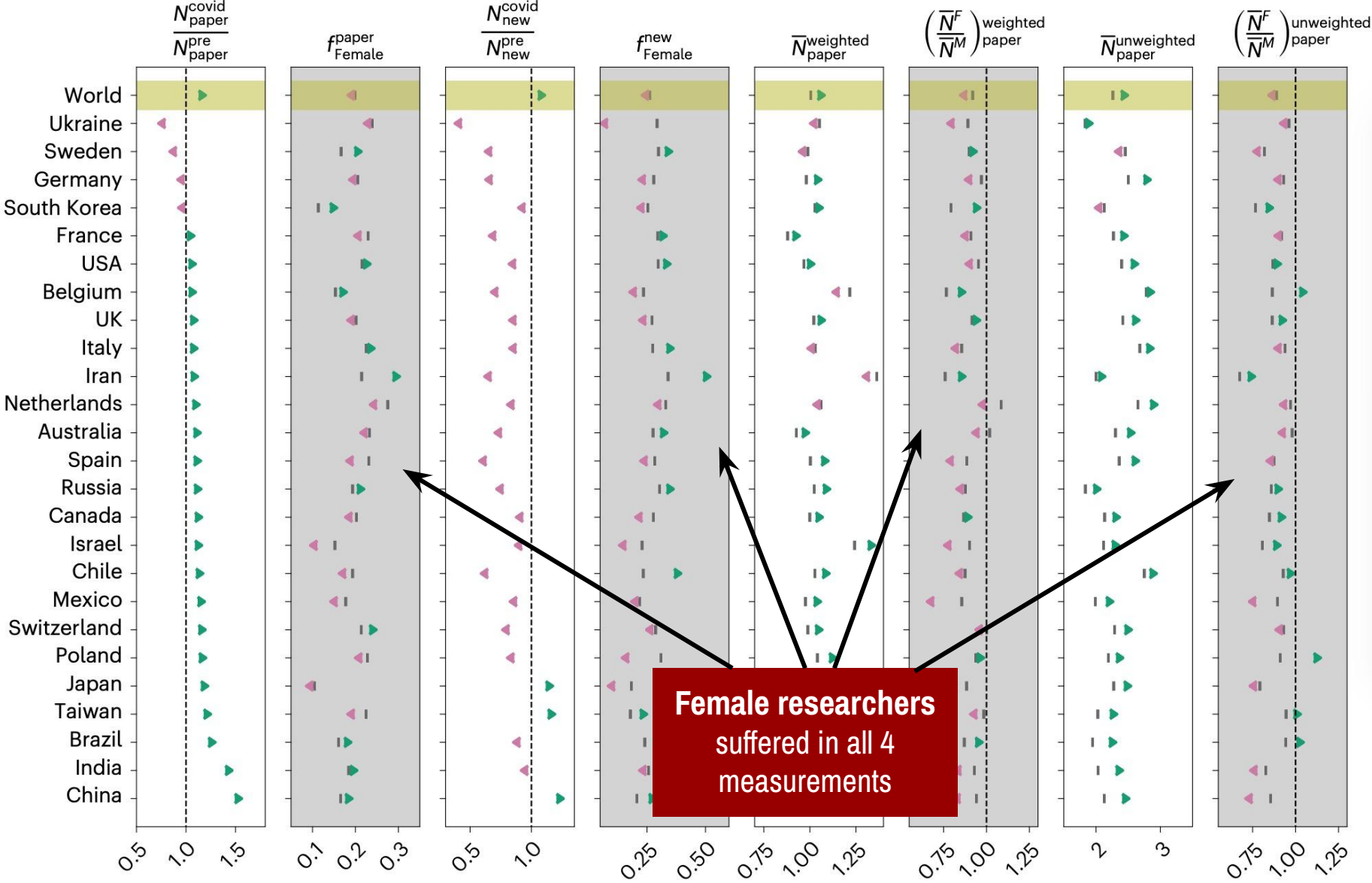


# of Papers

# of new researchers

Productivity

Collab. work



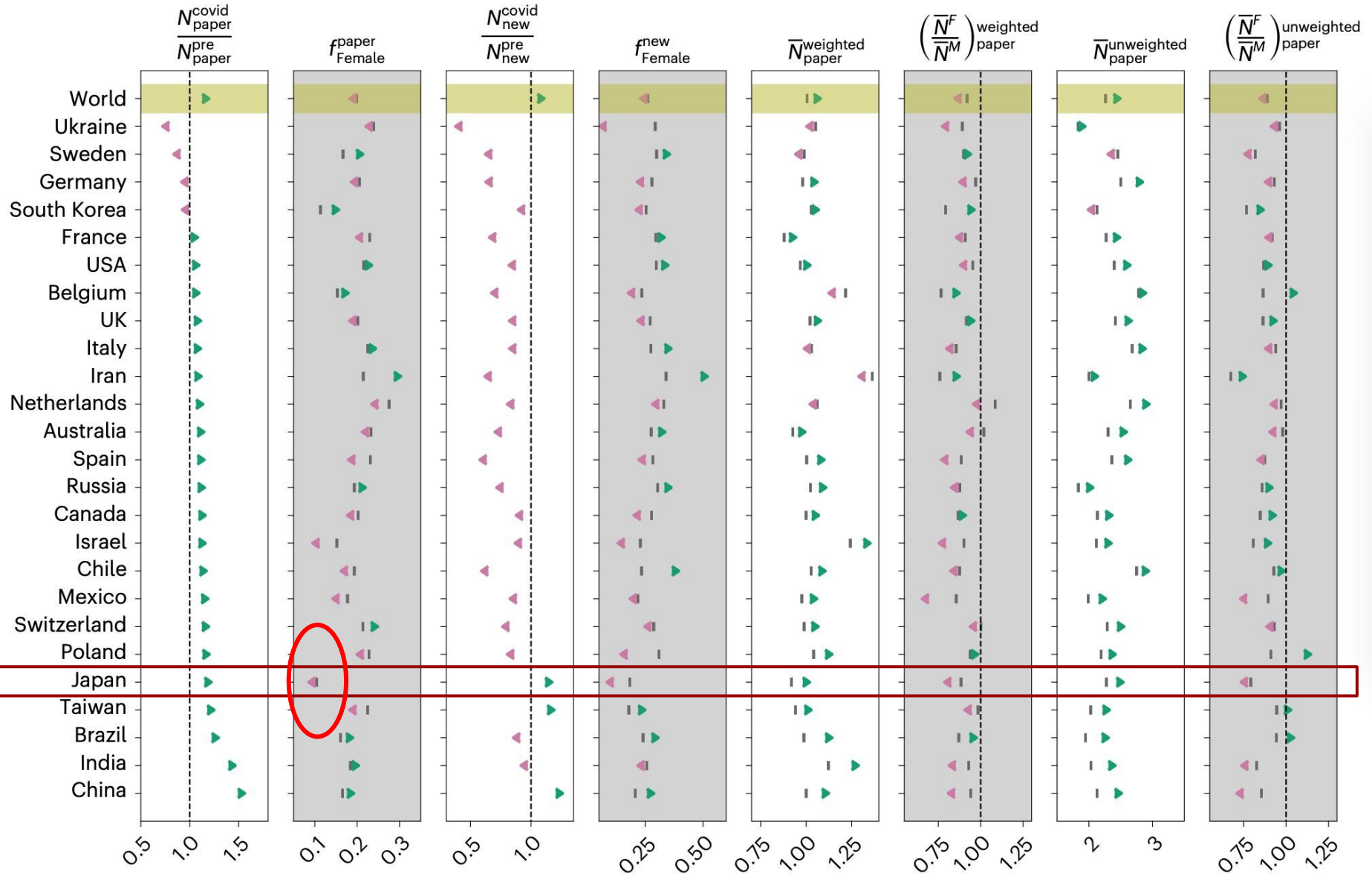
**Female researchers  
suffered in all 4  
measurements**

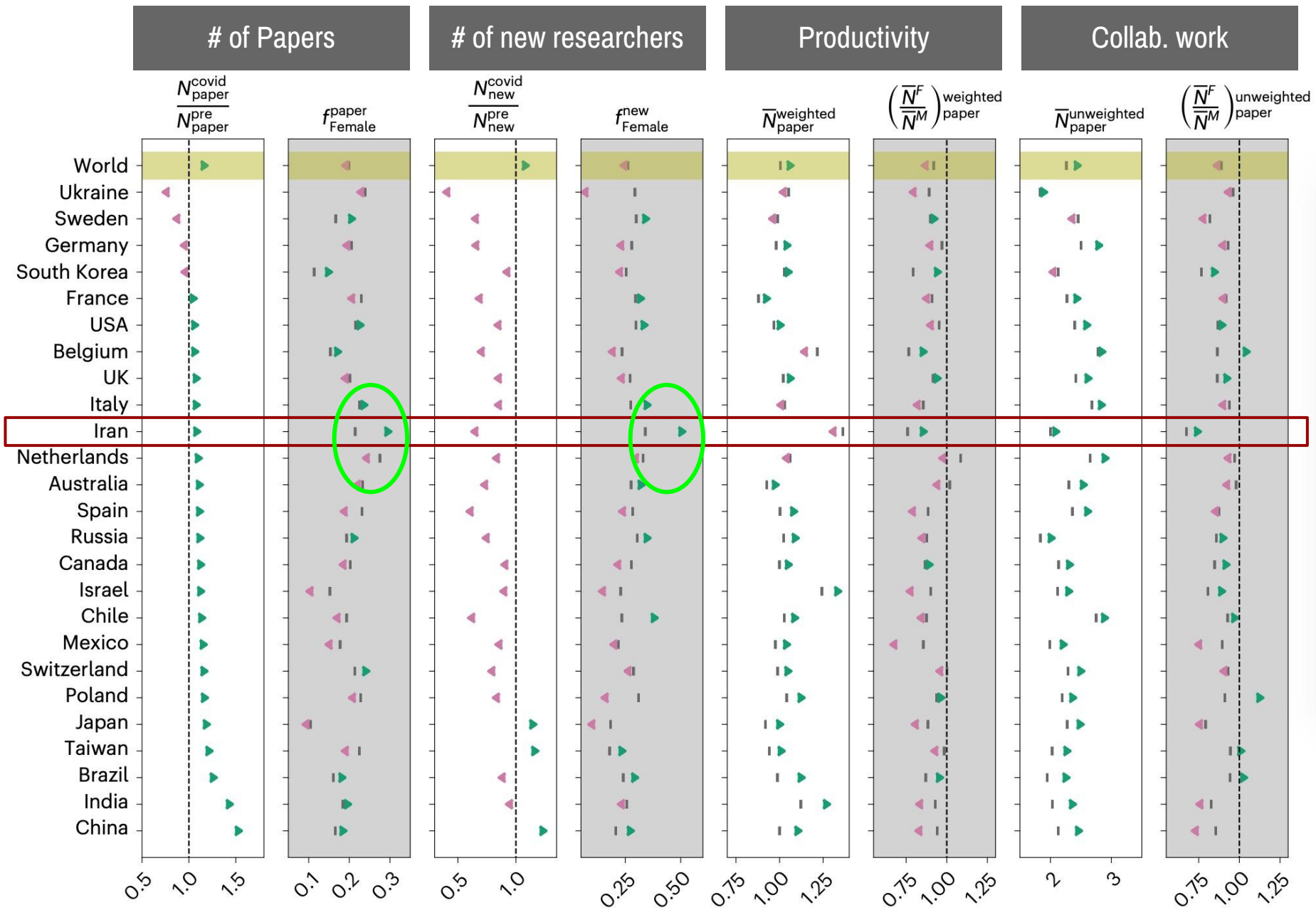
### # of Papers

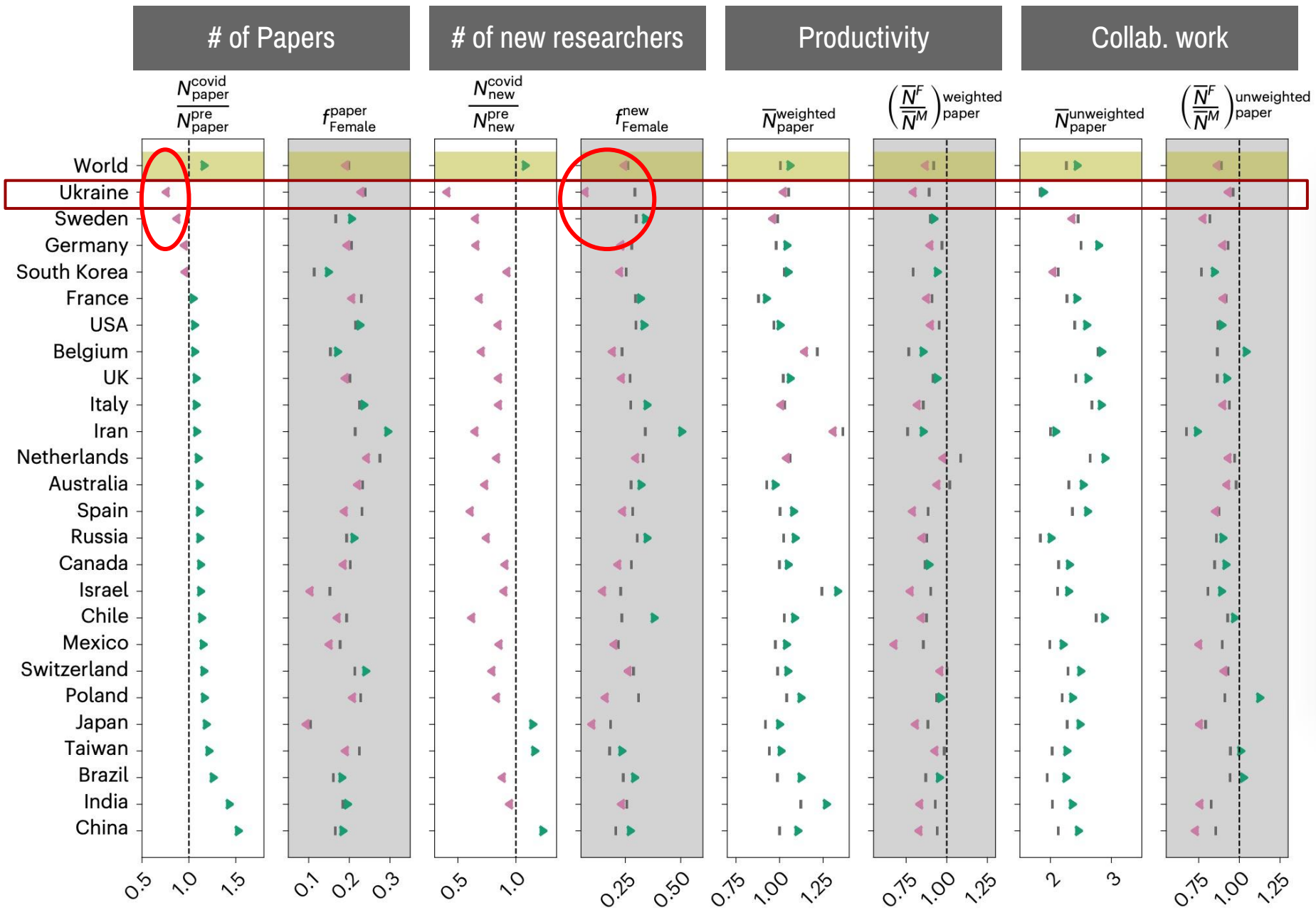
### # of new researchers

### Productivity

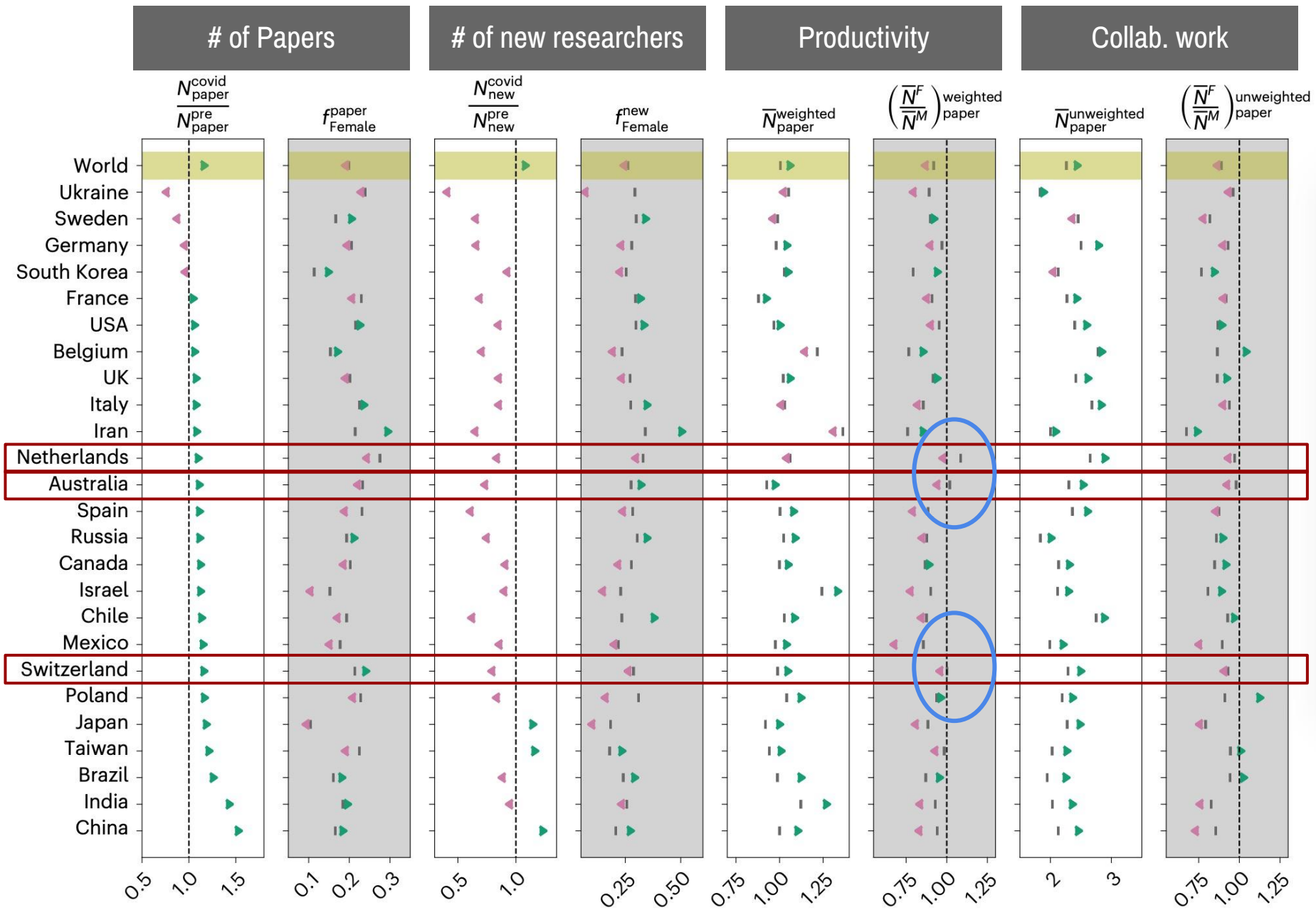
### Collab. work















# Impact of the COVID-19 pandemic on publishing in astronomy in the initial two years

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 Check for updates

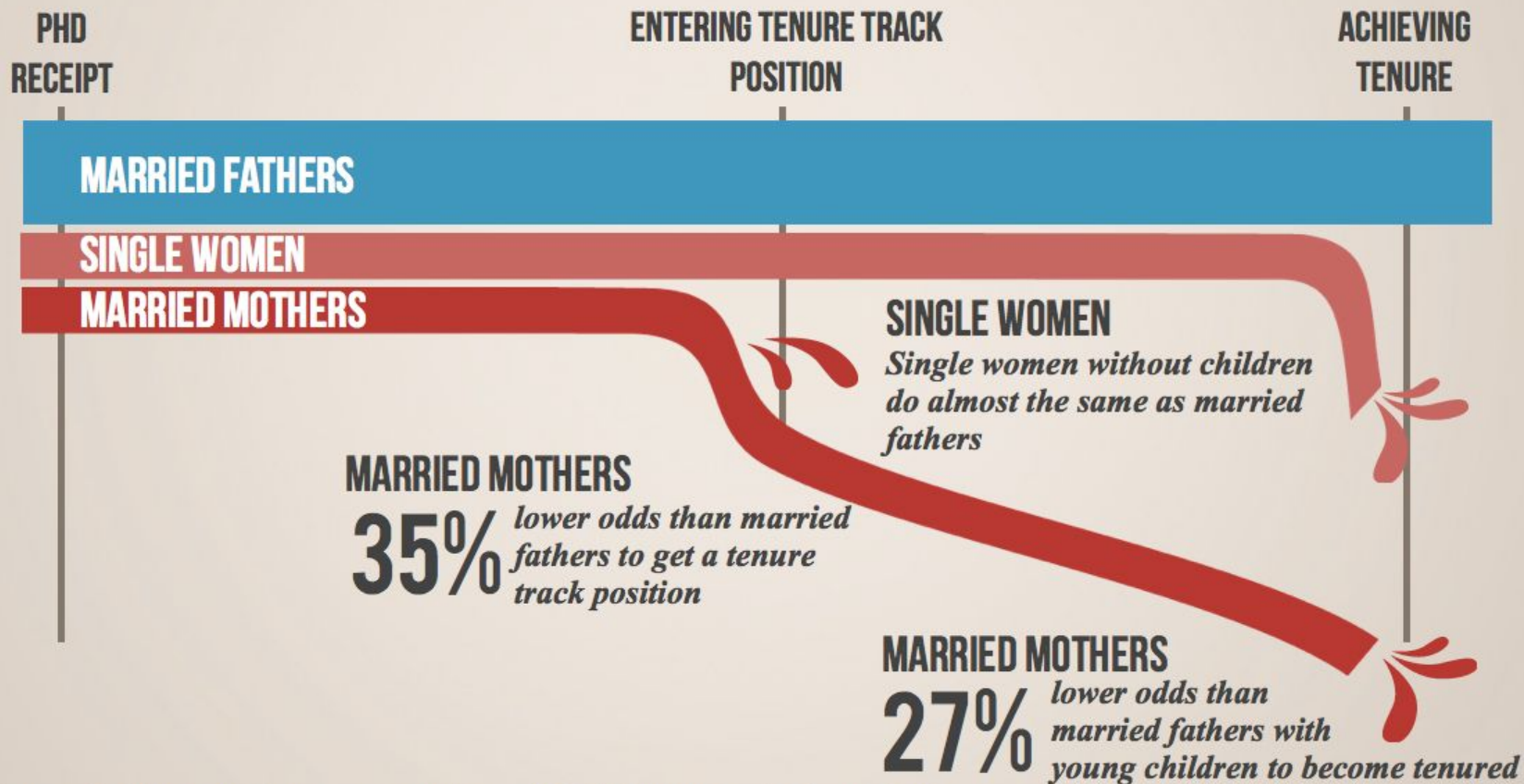
Vanessa Böhm <sup>1,2,4</sup>  & Jia Liu <sup>3,4</sup> 

The COVID-19 pandemic and associated lockdowns changed working conditions for many researchers worldwide. While there exists initial evidence that these conditions have had a measurable impact on the field of astronomy, a comprehensive quantitative analysis is still outstanding. We study the effects of the pandemic on the astronomy community worldwide, with a special focus on early-career and underrepresented female scientists, using public records of publications. We find that the overall output of the field, measured by the yearly paper count, has increased. This is mainly driven by boosted individual productivity in most countries. However, a decreasing number of incoming new researchers is seen in most countries we studied, indicating higher barriers for new researchers to enter the field or complete their first project during COVID. The overall improvement in productivity is not equally shared by women. A smaller fraction of papers are written by female astronomers and fewer women are among incoming new researchers as compared to pre-pandemic trends, in 14 out of 25 countries we studied. Even though female astronomers became more productive during COVID, the level of improvement is smaller than for men. Pre-COVID, female astronomers in countries such as the Netherlands, Australia and Switzerland were equally as or even more productive than their male colleagues. During COVID, on average, no single country's female astronomers were able to be equally productive as their male colleagues.



Vanessa Böhm & myself

# LEAKS IN THE PIPELINE FOR WOMEN PHDS IN THE SCIENCES



Source: [http://www.americanprogress.org/issues/2009/11/women\\_and\\_sciences.html](http://www.americanprogress.org/issues/2009/11/women_and_sciences.html)

# THE UNDERREPRESENTATION OF WOMEN THROUGHOUT THE SCIENTIFIC CAREER

