

Gender Gap in Bibliometric Indices of Academic and Non-Academic Italian ICU Physicians

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Summary

Hirsch-index, better known as H-index is an important bibliometric index for Italian critical care physicians.

Aim of our study was to collect the H-index of all Italian critical care academic physicians and compare it with the Italian Ministry of University and Research thresholds necessary to be eligible as Professor, and to investigate potential gender disparities in such bibliometric indices.

Materials and Methods. We collected all the names of academic ICU physicians on June 24th, 2023 from the official Italian Ministry of University and Research website. We added non-academic ICU physicians searching on Scopus or among academic physicians' collaborators. Minimum thresholds to be eligible as Professor were identified through the official Italian Ministry of University and Research website. Median H-index of men and women were compared.

Results. The total number of included physicians was 237 (46 Full Professors, 88 Associate Professors, 79 Researchers and 22 Non-academic physicians). Minimum threshold to be eligible as Associate Professor was 6 and to be eligible as Full Professor was 13. The median H-index in men versus women in every subgroup was: Full Professors (38 [27–49] vs 29 [21–34]), Associate Professors (25 [18–32] vs 22 [18–28]), Researchers (12 [7–21] vs 9 [6–16]) and Non-academic physicians (27 [25–37] vs 26 [25–29]).

Conclusion. Current median H-index of Italian academic ICU physicians is considerably greater than minimum thresholds released by the Italian Ministry of University and Research to be eligible as Professor. Gender gap in bibliometric indices of academic ICU physicians remains.

Keywords: *bibliometric indices; H-index; gender gap; ICU physicians*

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Introduction

Hirsch index, better known as H-index is an important quotation for Italian critical care physicians as it is one of the criteria to participate in grant applications, to compete for academic career and to be admitted as commissioner in public calls.

Aim of our study was to collect the H-index of all Italian critical care academic physicians and compare it with the median values identified by the Italian Ministry of University and Research back in the year 2018 to see whether these thresholds are still applicable nowadays, and to investigate potential gender disparities in such bibliometric indices.

Materials and Methods

We collected all the names of academic ICU physicians on the 24th of June 2023 from the official Italian Ministry of University and Research website [1]. To this list we added non-academic ICU

physicians A) searching between non-academic physicians who obtained National Scientific Qualification («Abilitazione Scientifica Nazionale») in the last 3 years; B) searching on Scopus, using the keywords «anesthesia», «intensive care» and «critical care» and limiting to authors with > 60 publications; C) looking for collaborators of the academic authors enlisted before.

We extracted sex and affiliation, and we calculated the median H-index from Scopus of Full Professors, Associate Professors, Researchers and Non-academic authors. Then, we compared it to the threshold defined by the Italian Ministry of University and Research to be eligible for the positions of Full Professor and Associated Professor.

In the analyses, we reported H-index as medians and interquartile ranges [IQR].

The total number of included physicians was 237 of which 46 were Full Professors, 88 Associate Professors, 79 Researchers and 22 Non-academic physicians (Supplemental Table).

Table. Median H-index in each subgroup, both for men and women.

Subgroup	Overall, N = 237		Men, N = 172		Women, N = 65	
	H-index	Total	H-index	Total	H-index	Total
Full Professors	37 [26–47]	46	38 [27–49]	40	29 [21–34]	6
Associate Professors	25 [21–31]	88	25 [18–32]	68	22 [18–28]	20
Researchers	21 [19–24]	79	12 [7–21]	46	9 [6–16]	33
Non-academic physicians	27 [25–36]	22	27 [25–37]	16	26 [25–29]	6

Results and Discussion

Full Professors had a median H-index of 37 (26–47), Associate Professors 25 (21–31), Researchers 21 (19–24) and Non-academic physicians 27 (25–36). Notably, men were overrepresented (172, 73%) overall and within every subgroup: Full Professors (40, 87%), Associate Professors (68, 77%), Researchers (46, 58%) and Non-academic physicians (16, 73%). The median H-index in men versus women in every subgroup is shown in the Table.

In our study, we found that median H-index of Italian academic ICU physicians ranges from 21 (for Researchers) to 37 (for Full Professors) with important discrepancies between men and women.

We found that current median H-index of Italian academic ICU physicians is considerably greater than minimum thresholds released by the Italian Ministry of University and Research to be eligible as Associate or Full Professor: in 2016 they required an H-index of 11 (in the previous 15 years) to become Full Professor and an H-index of 3 (in the previous 10 years) to become Associate Professor. These thresholds were updated in 2018 with an H-index of 13 for Full Professor and 6 for Associate Professor, keeping the same time ranges [2].

To the best of our knowledge, this is the first report of this kind regarding Italian academic physicians. Several reports of bibliometric analysis for anesthesia and critical care researchers have been published in the last 10–15 years, but none focused on the correlation between H-index and eligibility for academic positions.

Studies published in early 2010s reported a median H-index for UK researchers in the field of anesthesia of 13, while median H-index of editorial board members of anaesthesiology journals was 14 [3].

More recently, an analysis of most prolific authors worldwide in the field of critical care medicine reported a median h-index of 41, which is only slightly higher than median H-index of Italian full professors [4].

Our data therefore confirm that scientific productivity of highest-ranked Italian academic is in line with worldwide trends, and that H-index of top-ranked scientist is growing.

In the Italian academic system, in order to be eligible as Full or Associate Professor, clinicians must first obtain a certification of eligibility («Abilitazione Scientifica Nazionale», National Scientific Qualification) by the Italian Ministry of University and Research. Among the other parameters, a minimum H-index threshold is required to obtain the qualification. Certified clinicians are then allowed to participate in public calls for applications released by each individual Italian university. The threshold required by the Ministry were updated from 2016 to 2018, mostly for Associate Professor for which the H-index value doubled from 3 to 6. Consistent with data from other countries, the median H-index of Academic authors has increased further so the Ministry should consider a new update.

Interestingly, we found that median H-index of non-academic clinicians is higher than the H-index of Associate Professors and Researcher. This data suggests that also several non-academic clinicians actively and regularly participate in conduction and dissemination of high-impact research. However, it also implies that there are numerous colleagues with remarkable curricula who have no access to academic career.

Gender analties and disparities are increasingly investigated, and generally suggest presence of a gender gaps and differences in both access and response to treatments, as well as access to academic career [5–8]. We found that the number of women is enormously underrepresented (28%), with the bigger discrepancy observed inside the higher academic position, Full Professors (13%), and a decreasing discrepancy going towards lower positions: Associate Professors (23%), Researchers (42%). This data is in line with recent reports and bibliographic analyses [9].

Conclusion

H-index is important for academic career in Italy, and it has generally increased in recent years. Gender gap in bibliometric indices of academic and non-academic ICU physicians still remains.

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Supplement

Supplemental Table. Full Professors, Associate Professors, Researchers and Non-academic critical care physicians ordered by H-index.

#	Name	Gender	H-Index (June 2023)	Degree
1	Antonelli Massimo	M	91	Full Professor
2	Ranieri Vito Marco	M	91	Full professor
3	Zangrillo Alberto	M	70	Full professor
4	Landoni Giovanni	M	70	Full professor
5	Cecconi Maurizio	M	69	Full professor
6	Stocchetti Nino	M	67	Full professor
7	Mercadante Sebastiano	M	65	Non-Academic Physician
8	Citerio Giuseppe	M	62	Associate professor
9	Ranucci Marco	M	61	Non-Academic Physician
10	Conti Giorgio	M	56	Full professor
11	Chiumello Davide Alberto	M	53	Full professor
12	Casuccio Alessandra	F	51	Non-Academic Physician
13	Bellani Giacomo	M	49	Full professor
14	Girardis Massimo	M	49	Full professor
15	Navalesi Paolo	M	49	Full professor
16	Fumagalli Roberto	M	48	Full professor
17	Sandroni Claudio	M	48	Researcher
18	Guarracino Fabio	M	48	Non-Academic Physician
19	Latronico Nicola	M	46	Full professor
20	Patroniti Nicolò Antonino	M	46	Associate professor
21	Foti Giuseppe	M	45	Associate professor
22	Grasselli Giacomo	M	45	Full professor
23	Ricci Zaccaria	M	43	Associate professor
24	Mascia Luciana	F	42	Associate professor
25	Robba Chiara	F	42	Researcher
26	Bignami Elena Giovanna	F	41	Full professor
27	Mojoli Francesco	M	41	Associate professor
28	Morelli Andrea	M	41	Full professor
29	Scolletta Sabino	M	40	Full professor
30	Volta Carlo Alberto	M	40	Full professor
31	Beretta Luigi	M	39	Full professor
32	Cortegiani Andrea	M	39	Associate professor
33	Della Rocca Giorgio	M	39	Full professor
34	Maggiore Salvatore Maurizio	M	39	Full professor
35	Ristagno Giuseppe	M	39	Associate professor
36	Spadaro Savino	M	39	Associate professor
37	Della Corte Francesco	M	38	Full professor
38	Grasso Salvatore	M	38	Full professor
39	Pappalardo Federico	M	38	Non-Academic Physician
40	Bilotta Federico	M	37	Researcher
41	Cabrini Luca	M	37	Associate professor
42	Mauri Tommaso	M	37	Associate professor
43	Protti Alessandro	M	37	Associate professor
44	Zanier Roncati	M	37	Non-Academic Physician

#	Name	Gender	H-Index (June 2023)	Degree
45	Giarratano Antonino	M	36	Full professor
46	Gregoretti Cesare	M	36	Associate professor
47	Tritapepe Luigi	M	36	Associate professor
48	Caironi Pietro	M	35	Associate professor
49	Piastra Marco	M	35	Associate professor
50	Brazzi Luca	M	34	Full professor
51	De Pascale Gennaro	M	34	Associate professor
52	Lionetti Vincenzo	M	34	Associate professor
53	Pugliese Francesco	M	34	Full professor
54	Rocco Monica	F	34	Full professor
55	Cinnella Gilda	F	33	Full professor
56	Ball Lorenzo	M	32	Researcher
57	Monaco Fabrizio	M	32	Non-Academic Physician
58	Coluzzi Flaminia	F	31	Associate professor
59	Corradi Francesco	M	31	Associate professor
60	Donati Abele	M	31	Full professor
61	Mazzeo Anna	F	31	Associate professor
62	Vaschetto Rosanna	F	31	Associate professor
63	Zanella Alberto	M	31	Associate professor
64	Feltracco Paolo	M	30	Associate professor
65	Donadello Katia	F	29	Associate professor
66	Greco Massimiliano	M	29	Researcher
67	Monti Giacomo	M	29	Associate professor
68	Tonetti Tommaso	M	29	Associate professor
69	Valenza Franco	M	29	Full professor
70	Pasin Laura	F	29	Non-Academic Physician
71	Biancofiore Giandomenico Luigi	M	28	Associate professor
72	Bove Tiziana	F	28	Associate professor
73	Finco Gabriele	M	28	Full professor
74	Forfori Francesco	M	28	Associate professor
75	Lucangelo Umberto	M	28	Full professor
76	Scandroglia Anna Mara	F	28	Non-Academic Physician
77	Franchi Federico	M	27	Associate professor
78	Longhini Federico	M	27	Associate professor
79	Mistraletti Giovanni	M	27	Associate professor
80	Romagnoli Stefano	M	27	Full professor
81	Servillo Giuseppe	M	27	Full professor
82	Severgnini Paolo	M	27	Associate professor

Continuation Supplemental Table.

#	Name	Gender	H-Index (June 2023)	Degree
83	Belletti Alessandro	M	27	Non-Academic Physician
84	Covello Remo Daniel	M	27	Non-Academic Physician
85	Semeraro Federico	M	27	Non-Academic Physician
86	Berlot Giorgio	M	26	Full professor
87	De Robertis Edoardo	M	26	Full professor
88	Fanelli Vito	M	26	Associate professor
89	Montini Luca	M	26	Researcher
90	Pace Maria Caterina	F	26	Full professor
91	Paladini Antonella	F	26	Associate professor
92	Agnoletti Vanni	M	25	Researcher
93	Cammarota Gianmaria	M	25	Associate professor
94	Langer Thomas	M	25	Associate professor
95	Lorini Ferdinando Luca	M	25	Researcher
96	Pennisi Mariano Alberto	M	25	Associate professor
97	Raineri Santi Maurizio	M	25	Associate professor
98	Rasulo Francesco Antonio	M	25	Associate professor
99	Villa Gianluca	M	25	Associate professor
100	Grieco Domenico L	M	25	Non-Academic Physician
101	Gemma Marco	M	25	Non-Academic Physician
102	Calabrò Maria Grazia	F	25	Non-Academic Physician
103	Battaglini Denise	F	25	Non-Academic Physician
104	Disdma Nicola	M	25	Non-Academic Physician
105	Agro' Felice Eugenio	M	24	Full professor
106	De Blasi Roberto Alberto	M	24	Associate professor
107	Fodale Vincenzo	M	24	Associate professor
108	Marinangeli Franco	M	24	Full professor
109	Pasero Daniela	F	24	Associate professor
110	Ruberto Franco Gennaro Maria	M	24	Researcher
111	Sanfilippo Filippo	M	24	Researcher
112	Tavazzi Guido	M	24	Researcher
113	Lamperti Massimo	M	24	Non-Academic Physician
114	Busani Stefano	M	23	Associate professor
115	Garofalo Eugenio	M	23	Associate professor
116	Gottin Leonardo	M	23	Associate professor
117	Mattia Consalvo	M	23	Full professor
118	Mirabella Lucia	F	23	Associate professor
119	Pieri Marina Laura Grazia	F	23	Researcher
120	Vetrugno Luigi	M	23	Associate professor
121	Mirabella Lucia	F	23	Non-Academic Physician

#	Name	Gender	H-Index (June 2023)	Degree
122	Cascella Marco	M	23	Non-Academic Physician
123	Aceto Paola	F	22	Researcher
124	Adembri Chiara	F	22	Associate professor
125	Alessandri Francesco	M	22	Researcher
126	Dauri Mario	M	22	Associate professor
127	David Antonio	M	22	Full professor
128	Freo Ulderico	M	22	Associate professor
129	Polati Enrico	M	22	Full professor
130	Ragazzi Riccardo	M	22	Associate professor
131	Rezoagli Emanuele	M	22	Researcher
132	Terragni Pierpaolo	M	22	Full professor
133	Adrario Erica	F	21	Associate professor
134	Boscolo Bozza Annalisa	F	21	Researcher
135	Russotto Vincenzo	M	21	Researcher
136	Zoerle Tommaso	M	21	Researcher
137	Bruni Andrea	M	20	Associate professor
138	De Rosa Silvia	F	20	Researcher
139	Evangelista Maurizio	M	20	Researcher
140	Melotti Rita Maria	F	20	Full professor
141	Musu Mario	M	20	Associate professor
142	Noto Alberto	M	20	Associate professor
143	Piazza Ornella	F	20	Full professor
144	Piva Simone	M	20	Associate professor
145	Pota Vincenzo	M	20	Researcher
146	Vargas Maria	F	20	Associate professor
147	Siniscalco Antonio	M	20	Non-Academic Physician
148	Catena Emanuele	M	20	Non-Academic Physician
149	Magnoni Sandra	F	20	Associate professor
150	Baldini Gabriele	M	19	Associate professor
151	Cavaliere Franco	M	19	Associate professor
152	Cotoia Antonella	F	19	Researcher
153	Damiani Elisa	F	19	Researcher
154	Passavanti Maria Beatrice	F	19	Associate professor
155	Scaravilli Vittorio	M	19	Researcher
156	Biasucci Daniele Guerino	M	18	Researcher
157	Bufi Maurizio	M	18	Associate professor
158	Draisci Gaetano	M	18	Associate professor
159	Puntillo Filomena	F	18	Associate professor
160	Ragazzoni Luca	M	18	Associate professor
161	Sansone Pasquale	M	18	Associate professor
162	Scapigliati Andrea	M	18	Researcher
163	Sollazzi Liliana	F	18	Associate professor
164	Baciarello Marco	M	17	Associate professor

Continuation Supplemental Table.

#	Name	Gender	H-Index (June 2023)	Degree
165	Carassiti Massimiliano	M	17	Associate professor
166	Caricato Anselmo	M	17	Researcher
167	Cataldo Rita	F	17	Associate professor
168	Messina Antonio	M	17	Researcher
169	Natoli Silvia	F	17	Associate professor
170	Pasqualucci Alberto	M	17	Full professor
171	Carsetti Andrea	M	16	Associate professor
172	Di Filippo Alessandro	M	16	Associate professor
173	Di Marco Pierangelo	M	16	Associate professor
174	Giglio Maria Teresa	F	16	Researcher
175	Pulitano' Silvia Maria	F	16	Researcher
176	Tellan Guglielmo	M	16	Associate professor
177	Cardia Luigi	M	15	Researcher
178	Carron Michele	M	15	Associate professor
179	Chelazzi Cosimo	M	15	Associate professor
180	Rossi Marco	M	15	Associate professor
181	Schweiger Vittorio	M	15	Associate professor
182	Marra Annachiara	F	14	Associate professor
183	Mercieri Marco	M	14	Associate professor
184	Santini Alessandro	M	14	Researcher
185	Alampi Daniela	F	13	Researcher
186	Ciccozzi Alessandra	F	13	Researcher
187	Piroli Alba	F	13	Associate professor
188	Vergari Alessandro	M	13	Researcher
189	Gaspari Rita	F	13	Researcher
190	De Pasquale Maria	F	12	Researcher
191	Leonardis Francesca	F	12	Researcher
192	Montrucchio	F	12	Researcher
193	Sales Gabriele	M	12	Researcher
194	Ferraro Fausto	M	11	Associate professor
195	Martinelli Lorenzo	M	11	Researcher

#	Name	Gender	H-Index (June 2023)	Degree
196	Modesti Cristina	F	11	Researcher
197	Peluso Lorenzo	M	11	Researcher
198	Rauseo Michela	F	11	Researcher
199	Scaramuzzo Gaetano	M	11	Researcher
200	Barbieri Alberto	M	10	Associate professor
201	Buonanno Pasquale	M	10	Researcher
202	Iacovazzo Carmine	M	10	Researcher
203	Roman-Pognuz Erik	M	10	Researcher
204	Samolsky Dekel Boaz Gedaliahu	M	10	Associate professor
205	Coniglione Filadelfo	M	9	Researcher
206	Sardo Salvatore	M	9	Researcher
207	Adducci Enrica	F	8	Researcher
208	Bellini Valentina	F	8	Researcher
209	Collino Francesca	F	8	Researcher
210	De Vico Pasquale	M	8	Researcher
211	Amato Arianna	F	7	Researcher
212	Coppolino Francesco	M	7	Researcher
213	Costamagna Andrea	M	7	Researcher
214	Fiorelli Silvia	F	7	Researcher
215	Mascia Antonio	M	7	Researcher
216	Pusateri Angela	F	7	Researcher
217	Vagnoni Salvatore	M	7	Researcher
218	Crea Maria Antonietta	F	6	Researcher
219	Falsini Silvia	F	6	Researcher
220	Guarneri Sergio	M	6	Researcher
221	Cannelli Giorgio	M	5	Researcher
222	Caviglia Marta	F	5	Researcher
223	Fattorini Fabrizio	M	5	Researcher
224	La Camera Giuseppa	F	5	Researcher
225	Pistidda Laura	F	5	Researcher
226	Corrado Michele	M	4	Researcher
227	Fegiz Alessandra	F	4	Researcher
228	Galletti Claudio	M	4	Researcher
229	Mangoni Giuseppe Salvatore	M	4	Researcher
230	Perotti Valerio	M	4	Researcher
231	Sparacia Benedetta	F	4	Researcher
232	Borgia Maria Luisa	F	3	Researcher
233	Leonardis Carlo	M	3	Researcher
234	Valenti Mario	M	3	Researcher
235	Palmeri Di Villalba Cesira	F	1	Researcher
236	Pedulla' Eugenia	F	1	Researcher
237	Stancanelli Vito	M	1	Researcher

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