Publication of Abstracts with Peruvian Affiliation Presented to the Annual Meeting of the American Society of Tropical Medicine and Hygiene 2006–2010

Renato Beas,^{1*} Alexander Anduaga-Beramendi,¹ Alex Rojas-Ortega,^{1,2} Abraham Cisneros-Montoya,³ Renéé Pereyra-Elías,^{1,4} and Percy Mayta-Tristán^{3,5}

¹Escuela de Medicina, Universidad Peruana de Ciencias Aplicadas, Lima, Perú; ²Sociedad Científica de Estudiantes de Medicina de la Universidad Peruana de Ciencias Aplicadas (SOCIEMUPC), Lima, Perú; ³Escuela de Medicina, Universidad Científica del Sur, Lima, Perú; ⁴Department of Epidemiology and Public Health, University College London, London, United Kingdom; ⁵Dirección General de Investigación, Desarrollo e Innovación, Universidad Científica del Sur, Lima, Perú

Abstract. Peruvian research output is one of the lowest in South America and is limited to the work of a small group of institutions and related to few subjects, such as infectious diseases. We determined the proportion of subsequent publication and its associated factors of the abstracts with Peruvian affiliation presented to the American Society of Tropical Medicine and Hygiene annual meetings between 2006 and 2010. Approximately 27% (79/296) of abstracts were published within 6 years of presentation, with a median time to publication of 16 months (interquartile range: 9–28). In the adjusted analysis, abstracts with a higher proportion of authors from Peruvian institutions were less likely to be published (risk ratio: 0.5; 95% CI: 0.3–0.8). In conclusion, one of four of the analyzed abstracts was published. Even though this proportion is higher than that in other meetings in Peru and South America, publication rates—especially among Peruvian-only collaborations—still need to be improved.

Scientific research is a critical tool in medical practice. One way of quantifying this activity is by measuring scientific publications, which are an indispensable output to evaluate scientific production of an author, institution, or country.¹ In this context, presentation of scientific studies to international meetings also serves to rapidly disseminate results, while publications are processed.² Some of these presentations lead to subsequent publications in scientific journals. However, more than a half of them never get published or take several years until publication.^{3,4} In Peru, a broad number of scientific publications in medicine are related to infectious diseases, mainly due to the existing collaborating networks.^{5–7} Despite the great advance of research centers in noncommunicable diseases such as “CRONICAS”, dissemination of scientific content in other areas remains as one of the lowest in South America.^{5,8,9}

To the best of the authors' knowledge, there are no studies in Latin America that evaluate publication of abstracts presented to scientific meetings of infectious and tropical diseases. This issue has not been assessed despite the substantial Peruvian contribution to the meetings of the American Society of Tropical Medicine and Hygiene (ASTMH), the main international organization in charge of development of programs to reduce the prevalence of tropical diseases and improving global health.¹⁰ In that sense, the aim of this report was to evaluate the proportion and associated factors to subsequent publication of the abstracts submitted to the ASTMH meetings by authors from Peruvian institutions.

We conducted an observational, analytical, longitudinal, retrospective study reviewing the total of abstracts submitted to the ASTMH meetings between 2006 and 2010, with at least one author from a Peruvian institution (defined as geographically located in Peru). For every abstract, we assessed all listed affiliations of all listed authors. We also evaluated the

main institutional affiliation of the corresponding author. Abstract books were downloaded from the ASTMH website (<http://www.astmh.org/annual-meeting/past-meetings>). To allow enough time for publication in journals, we set a 6-year follow-up period.^{3,11} Previous research shows that almost no abstracts are published beyond that period of time.³

Publication was verified through an advanced search strategy performed twice, in both English and Spanish (software Google translate was used for translation), through the Google Scholar search engine—which allows to explore various databases.^{12,13} Disagreements were analyzed and resolved by the authors. Title, place of the study, study population, main result, and three authors (surname of the first, second, and last author) were used as keywords. A published article was defined as the one in which study population, time, main result, and at least one author matched with the presented abstract. The search was performed during October 2016.

Information gathered from the abstracts included the following: year of the meeting, number of authors, number of authors from a Peruvian institution (any institution geographically located in Peru and managed by Peruvian authorities), proportion of authors from a Peruvian institution in relation to the total, institutional affiliation of the authors and corresponding author (if the corresponding author had multiple affiliations, the first one was considered as the main affiliation), corresponding author from a Peruvian institution (yes versus no), area of study (categorized into vector-borne diseases, non-metaxenic bacteria, non-metaxenic viruses, worms and other enteroparasites, surveillance, and “others”), study design (observational, experimental/clinical trials, and “in vitro and other studies”), and publication of the article in a peer-reviewed journal (yes versus no). In addition, the following information was collected for identified publications: time to publication in months (date was considered using the last month of the periodicity of that journal's issue), journal of publication, corresponding author institutional affiliation, area of study (same categories), language of the published article, number of authors, concordance of authors between abstract

* Address correspondence to Renato Beas, Escuela de Medicina, Universidad Peruana de Ciencias Aplicadas, Av. Alameda San Marcos, Cuadra 2, Villa, Chorrillos, Lima 15023, Perú. E-mail: renatobeas@gmail.com

and publication (percentage was calculated dividing the total of concordant authors by the number of concordant authors plus the different ones), concordance of title, first author, order of authors, corresponding author, objectives, results, and if the previous presentation to the ASTMH meeting was mentioned.

Descriptive analyses were performed for all abstracts using absolute and relative frequencies for categorical variables, and mean and SD (or median and interquartile range [IQR]) for numerical variables. For further analyses, numerical variables were categorized into tertiles. Association between the outcome and potential predictors was evaluated using the χ^2 test. Results are presented using cumulative incidences of publication (%), 3 and 6 years after the meeting year. Using the

6-year publication rates, we calculated risk ratios (RRs) using a robust-error-variance Poisson regression. We also calculated hazard ratios using Cox regression (shown in Supplemental Table 1). All analyses were performed using Stata 14.0 (Stata Corp, College Station, TX).

A total of 5,927 abstracts were submitted to the ASTMH annual meetings from 2006 to 2010. From these, 296 (5.0%) had at least one author with Peruvian affiliation. Characteristics of these abstracts are shown in Table 1. The average number of authors of abstracts submitted to the meetings was 7.4 (SD 3.7; min 1 and max 25). The median of Peruvian authors was 4 (IQR: 2–7; min 1 and max 16). The most frequent affiliation was the U.S. Naval Medical Research Unit No. 6, with 44.3% of abstracts with at least one author from this center. The highest percentage of studies presented addressed the topic of vector-borne diseases (39.9%).

We found that 79 (26.7%) abstracts were published (using a 6-year follow-up period). The 3-year publication rate was 24.4%. Most abstracts were published in the *American Journal of Tropical Medicine and Hygiene* (19%). All studies were published in English. When evaluating concordance between the abstract presented to the meeting and the final publication, the first author, corresponding author, objectives, and results were the same in most cases (Table 2).

TABLE 1

Characteristics of abstracts submitted to the American Society of Tropical Medicine and Hygiene annual meetings by authors from Peruvian institutions, 2006–2010 ($n = 296$)

Characteristics	n (%)
Year of the meeting	
2006	61 (20.6)
2007	41 (13.9)
2008	60 (20.3)
2009	64 (21.6)
2010	70 (23.7)
Number of authors*	
1–5	100 (33.8)
6–9	118 (39.9)
10–25	78 (26.4)
Proportion of authors from a Peruvian institution (tertiles)	
0% to 50%	104 (35.1)
< 50% to < 87.5%	98 (33.1)
87.5% to 100%	94 (31.7)
Corresponding author from a Peruvian institution	187 (63.2)
Institution of the author†	
U.S. Naval Medical Research Unit	131 (44.3)
U.S. Universities	118 (40.0)
Universidad Peruana Cayetano Heredia	104 (35.1)
Peruvian Ministry of Health	34 (11.5)
Instituto Nacional de Salud (Perú)	31 (10.5)
Dirección Regional de Salud	28 (9.5)
Centers for Disease Control and Prevention	41 (13.9)
Universidad Nacional Mayor de San Marcos	30 (10.1)
Other Peruvian universities	13 (4.4)
Peruvian hospital	28 (9.5)
Other U.S. affiliation	97 (32.8)
Any foreign affiliation (not the United States)	59 (19.9)
Institution of the corresponding author	
U.S. Naval Medical Research Unit	96 (32.4)
Universidad Peruana Cayetano Heredia	54 (18.2)
Any foreign affiliation (not the United States)	29 (9.8)
The Centers for Disease Control and Prevention	18 (6.1)
Others	88 (29.7)
Study design	
Cross-sectional	125 (42.4)
Cohort	42 (14.2)
Case control	17 (5.8)
Clinical trial	17 (5.8)
Case series	8 (2.7)
Others	86 (29.2)
Area of study	
Vector-borne diseases	118 (39.9)
Worms and other enteroparasites	54 (18.2)
Non-metaxenic viruses	40 (13.5)
Surveillance	40 (13.5)
Non-metaxenic bacteria	27 (9.1)
Others	17 (5.7)
Published	79 (26.7)

* Tertiles.

† Institution of each author in the abstracts.

TABLE 2

Characteristics of published abstracts submitted to the ASTMH annual meeting by authors from Peruvian institutions, 2006–2010 ($n = 79$)

Characteristics	n (%)
Journal of publication	
<i>The American Journal of Tropical Medicine and Hygiene</i>	15 (19.0)
<i>PLoS Neglected Tropical Diseases</i>	11 (13.9)
<i>Malaria Journal</i>	7 (9.9)
<i>Emerging Infectious Diseases</i>	4 (5.1)
<i>PLoS One</i>	4 (5.1)
Others	38 (48.1)
Institution of corresponding author	
U.S. Naval Medical Research Unit	25 (31.7)
Universidad Peruana Cayetano Heredia	16 (20.3)
The Centers for Disease Control and Prevention	10 (12.7)
Others	28 (35.4)
Number of authors from a Peruvian institution*	
0–3	34 (43.0)
4–7	20 (25.3)
8–17	25 (31.7)
Corresponding author from a Peruvian institution	43 (54.4)
Concordance of authors	
≤ 25%	8 (10.1)
> 25% to 50%	15 (19.0)
> 50% to 75%	20 (25.3)
> 75% to < 100%	13 (16.5)
100%	23 (29.1)
Concordance of title	12 (15.2)
Concordance of first author	59 (74.7)
Concordance of authors' order	22 (27.9)
Concordance of corresponding author	41 (51.9)
Concordance of study aim	77 (97.5)
Concordance of results	60 (80.0)
Mention of previous presentation to the ASTMH meeting	4 (5.1)

ASTMH = American Society of Tropical Medicine and Hygiene.

* Tertiles.

FIGURE 1. Time to publication of the abstracts submitted to the American Society of Tropical Medicine and Hygiene annual meeting by authors from Peruvian institutions, 2006–2010 ($n = 296$).

The median time to publication, estimated only among published abstracts, was 16 months (IQR: 9–28). Likewise, no study was published after 5 years of presentation to the annual meeting until the last search (Figure 1). In bivariate analyses, there were no statistically significant differences between the proportion of published abstracts according to the year of the meeting or number of authors. The higher the proportion of authors from a Peruvian institution, the lower the probability of publication. Abstracts in which the corresponding author was affiliated to a Peruvian institution were also less likely to be published. In adjusted analysis, only those abstracts in which with all or nearly all authors were from Peruvian institutions were less likely to be finally published (RR: 0.5; 95% CI: 0.3–0.8) (Table 3).

In the present study, 26.7% of abstracts with Peruvian affiliation presented to ASTMH annual meeting from 2006 to 2010 reached its publication in a scientific journal, considering

a 6-year follow-up period. In other societies' meetings held in North America and Europe, a higher percentage of publication (between 40% and 45%) has been found.^{2,3,14} On the other hand, when comparing with closer latitudes, the proportion we have found seems to be higher. For instance, a pediatrics meeting held in Argentina in 2003 found that only 11.3% of abstracts presented reached publication.¹⁵ Likewise, a lower publication rate in the meeting of a Peruvian gastroenterology association has been found.¹² It is possible that as knowledge generation tends to be poor in some Latin American countries, the selection criteria might be lower than international standards, which may lead to a lower chance of publication afterward.^{12,16}

We also found that the proportion of publication among abstracts authored by most or all authors from Peruvian institutions was half of the proportion of publication among abstracts authored by a higher percentage of international collaborators. This result is in accordance with that of previous research, which describes an increase in Peruvian scientific production from 2000 to 2009, probably related to the existence of international collaborating networks and foreign authors dealing with publication processes.⁵ Most Peruvian medical professionals do not have funding, technical support, or appropriate training for publication process—because of the low importance given to research in Peru even at academic environments.¹⁷ In this scenario, a higher proportion of foreign authors may balance these deficiencies. Another possible explanation could be Peruvian authors' belief in editorial bias against studies from developing countries because of the assumption of poor quality of research.¹⁸ However, this last hypothesis needs to be explored.

We did not find substantial difference between time to publication compared with other meetings held in Latin America and Europe. Average time to publication ranged from 17 to 21 months after presentation of the abstract.^{2,3,12–14} Vector-borne diseases were the topic most addressed by the

TABLE 3

Factors associated with publication of abstracts submitted to the American Society of Tropical Medicine and Hygiene annual meeting by authors from Peruvian institutions, 2006–2010: crude and adjusted analysis ($n = 296$)

Characteristics of the abstracts	Published <i>n</i> (%)	<i>P</i> -value*	Crude model		Adjusted model	
			Risk ratio (RR)	95% CI	RR	95% CI
Year of the meeting						
2006	20 (32.8)	0.222	Ref.	—	—	—
2007	12 (29.3)		0.9	0.5–1.6	—	—
2008	40 (33.3)		1.0	0.6–1.7	—	—
2009	12 (18.8)		0.6	0.3–1.1	—	—
2010	15 (21.4)		0.7	0.4–1.2	—	—
Number of authors†						
1–5	29 (29.0)	0.482	Ref.	—	—	—
6–9	27 (22.9)		0.8	0.5–1.2	—	—
10–25	23 (29.5)		1.0	0.6–1.6	—	—
Corresponding author from a Peruvian institution						
No	37 (33.9)	0.031	Ref.	—	—	—
Yes	42 (22.5)		0.7	0.5–1.0	—	—
Proportion of authors from a Peruvian institution†						
0% to < 50%	34 (32.7)	0.007	Ref.	—	Ref.	—
50% to < 87.5%	31 (31.6)		1.0	0.6–1.4	1.0	0.7–1.5
87.5% to 100%	14 (14.9)		0.5	0.3–0.8	0.5	0.3–0.8
Study design						
Observational	43 (22.4)	0.034	Ref.	—	Ref.	—
Experimental (clinical trials)	4 (23.5)		1.1	0.4–2.6	1.0	0.4–2.3
In vitro and other	32 (37.2)		1.7	1.1–2.4	1.6	1.1–2.3

* χ^2 test.

† Tertiles.

‡ In vitro studies, and others: surveillance, ecological, and otherwise classified.

abstracts presented. It is well known that worldwide vector-borne diseases are increasing as a consequence of climate change and migration.¹⁹ In this context, among the countries that contribute the most to vector-borne diseases research, Peru represents one of the largest centers of collaboration for the investigation of these diseases, which is consistent with the results.²⁰

In conclusion, one of four abstracts submitted to the ASTMH meetings by authors from Peruvian institutions was finally published within 6 years of presentation. In that sense, some potentially interesting results may still be part of the so-called gray literature.” However, the publication rate found in this study is higher than the rates reported from other meetings in Peru and South America. In addition, if all (or most of) the authors of the abstract were Peruvians, it was less likely to be published. This report leaves some unresolved issues that could be analyzed in future studies, such as considering the impact factor of the journals where the abstracts were published and evaluating characteristics of all abstracts with Latin American affiliation presented to the ASTMH meetings, to compare with the present results. According to our results, there is still the need to improve publication rates. This may potentially be achieved by designating advisors who follow up on the work of novel researchers and establishing training programs in writing and scientific publication in universities (undergraduate and postgraduate levels) and medical institutions/societies.

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Authors' addresses: Renato Beas and Alexander Anduaga-Beramendi, Escuela de Medicina, Universidad Peruana de Ciencias Aplicadas, Lima, Perú, E-mails: renatobeas@gmail.com and luisantonioanduaga@gmail.com. Alex Rojas-Ortega, Escuela de Medicina, Universidad Peruana de Ciencias Aplicadas, Lima, Perú, and Sociedad Científica de Estudiantes de Medicina de la Universidad Peruana de Ciencias Aplicadas (SOCIEMUPC), Lima, Perú, E-mail: xaeial19@gmail.com. Abraham Cisneros-Montoya, Medicina, Universidad Científica del Sur, Lima, Perú, E-mail: abra.cisneros@gmail.com. Reneé Pereyra-Elías, Escuela de Medicina, Universidad Peruana de Ciencias Aplicadas, Lima, Perú, and Department of Epidemiology and Public Health, University College London, London, United Kingdom, E-mail: renee.pereyra.elias@gmail.com. Percy Mayta-Tristán, Universidad Científica del Sur, Lima, Perú, and Dirección de Gestión de Proyectos y Promoción de la Investigación, Lima, Perú, E-mail: p.mayta@gmail.com.

REFERENCES

- Piedra Y, Martínez A, 2007. Producción científica. *Cienc Inf* 38: 33–38.
- Meral UM, Alakus U, Urkan M, Ureyen O, Oren NC, Ozturk Meral A, 2016. Publication rate of abstracts presented at the annual congress of the European Society for Surgical Research during 2008–2011. *Eur Surg Res* 56: 132–140.
- Scherer RW, Langenberg P, von Elm E, 2007. Full publication of results initially presented in abstracts. *Cochrane Database Syst Rev* 2: MR000005.
- Fosbøl EL, Fosbøl PL, Harrington RA, Eapen ZJ, Peterson ED, 2012. Conversion of cardiovascular conference abstracts to publications. *Circulation* 126: 2819–2825.
- Huamani C, Mayta-Tristán P, 2010. Producción científica peruana en medicina y redes de colaboración, análisis del Science Citation Index 2000–2009. *Rev Peru Med Exp Salud Publica* 27: 315–325.
- Scimago Journal & Country Rank (SJRI) [Internet]*, 2016. Madrid, Spain: Elsevier. Available at: <http://www.scimagojr.com/>. Accessed February 18, 2018.
- Huamani C, Romani F, González-Alcaide G, Mejia MO, Ramos JM, Espinoza M, Cabezas C, 2014. South American collaboration in scientific publications on leishmaniasis: bibliometric analysis in SCOPUS (2000–2011). *Rev Inst Med Trop Sao Paulo* 56: 381–390.
- Schmidt C, 2018. A shifting burden. *Nature* 562: S65–S67.
- Centro de Estudios sobre Ciencia, Desarrollo y Educación Superior, 2009. *El Estado de la Ciencia 2009: Principales Indicadores de Ciencia y Tecnología Iberoamericanos/Interamericanos*. Buenos Aires, Argentina: Red Iberoamericana de Indicadores de Ciencia y Tecnología.
- Astmh.org [Internet], 1998. Available at: <https://www.astmh.org/>. Accessed February 17, 2018.
- von Elm E, Costanza MC, Walder B, Tramèr MR, 2003. More insight into the fate of biomedical meeting abstracts: a systematic review. *BMC Med Res Methodol* 3: 12.
- Pereyra-Elías R, Ng-Sueng LF, Toro-Polo LM, Nizama-Vía A, Piscocoy A, Mayta-Tristán P, 2011. Low publication of the papers presented at the Congresses of Gastroenterology Society of Peru 1998–2008. *Rev Gastroenterol Peru* 31: 124–132.
- Toro-Polo M, Pereyra-Elías R, Nizama-Vía A, Ng-Sueng LF, Vélez-Segovia E, Galán-Rodas E, Mayta-Tristán P, 2012. Publication of summaries presented at the scientific congresses of medical students, Peru 2002–2009: characteristics and related factors [in Spanish]. *Rev Peru Med Exp Salud Publica* 29: 461–468.
- Dangouloff-Ros V, Ronot M, Lagadec M, Vilgrain V, 2015. Analysis of subsequent publication of scientific orally presented abstracts of the French National Congress of Radiology. Part II: focus on the French abstracts. *Diagn Interv Imaging* 96: 467–476.
- Canosa D, Ferrero F, Malamud A, Otero PD, Merech RS, Ceriani-Cernadas JM, 2011. Publicación completa de trabajos presentados en el 33° Congreso Argentino de Pediatría y análisis de factores que impidieron su publicación. *Arch Argent Pediatr* 109: 56–65.
- Meral UM, Urkan M, Alakus Ü, Lapsekili E, İflazoğlu N, Ünlü A, Özmen P, Demirbaş S, 2017. Publication rates of abstracts presented at the annual congress of the Turkish Society of Colorectal Surgery (years 2003–2011). *Turk J Surg* 33: 87–90.
- Taype-Rondán Á, Huaccho-Rojas J, Pereyra-Elías R, Mejia C, Mayta-Tristán P, 2015. Características de los cursos de investigación en escuelas de medicina del Perú. *Arc Med* 11: 1–7.
- Rohra DK, 2011. Representation of less-developed countries in Pharmacology journals: an online survey of corresponding authors. *BMC Med Res Methodol* 11: 60.
- Tjaden NB, Caminade C, Beierkuhnlein C, Thomas SM, 2018. Mosquito-borne diseases: advances in modelling climate-change impacts. *Trends Parasitol* 34: 227–245.
- Reaves EJ, Valle R, Chandrasekera RM, Soto G, Burke RL, Cummings JF, Bausch DG, Kasper MR, 2017. Use of bibliometric analysis to assess the scientific productivity and impact of the global emerging infections surveillance and response system program, 2006–2012. *Mil Med* 182: e1749–e1756.