



# *Challenges in implementing genomic medicine in Latin America*

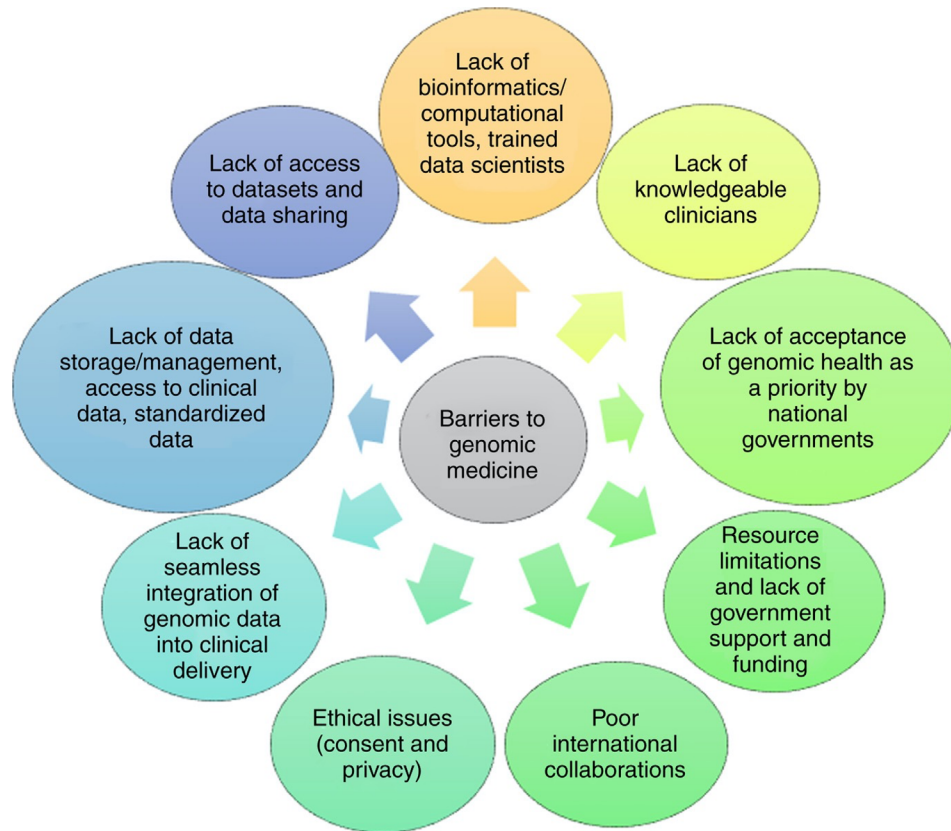
Ricardo Armisen, MD, PhD  
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Global Genomic  
Medicine Collaborative



Many  
challenges  
are  
identified.....



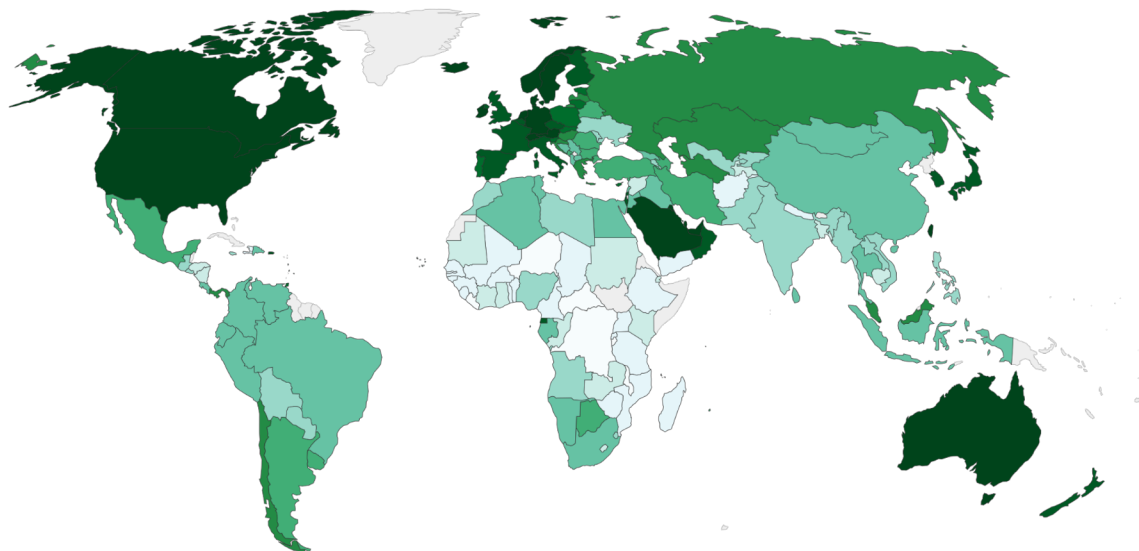
**FIGURE 2.1** Barriers to implementation of genomic medicine in developing countries.

Nirmala D.Sirisena & Vajira H.W.Dissanayake. Taking Genomics From the Bench to the Bedside in Developing Countries. Genomic Medicine in Emerging Economies. Genomics for Every Nation. Translational and Applied Genomics 2018, Chapter 2, 13-26. Edited by Catalina Lopez-Correa and George P. Patrinos



## GDP per capita, 2016

GDP per capita adjusted for price changes over time (inflation) and price differences between countries – it is measured in international-\$ in 2011 prices.



No data \$0 \$1,000 \$3,000 \$5,000 \$10,000 \$15,000 \$20,000 \$25,000 \$30,000 \$40,000 >\$50,000



Source: Maddison Project Database (2018)

Note: These series are adjusted for price differences between countries using multiple benchmark years, and are therefore suitable for cross-country comparisons of income levels at different points in time.

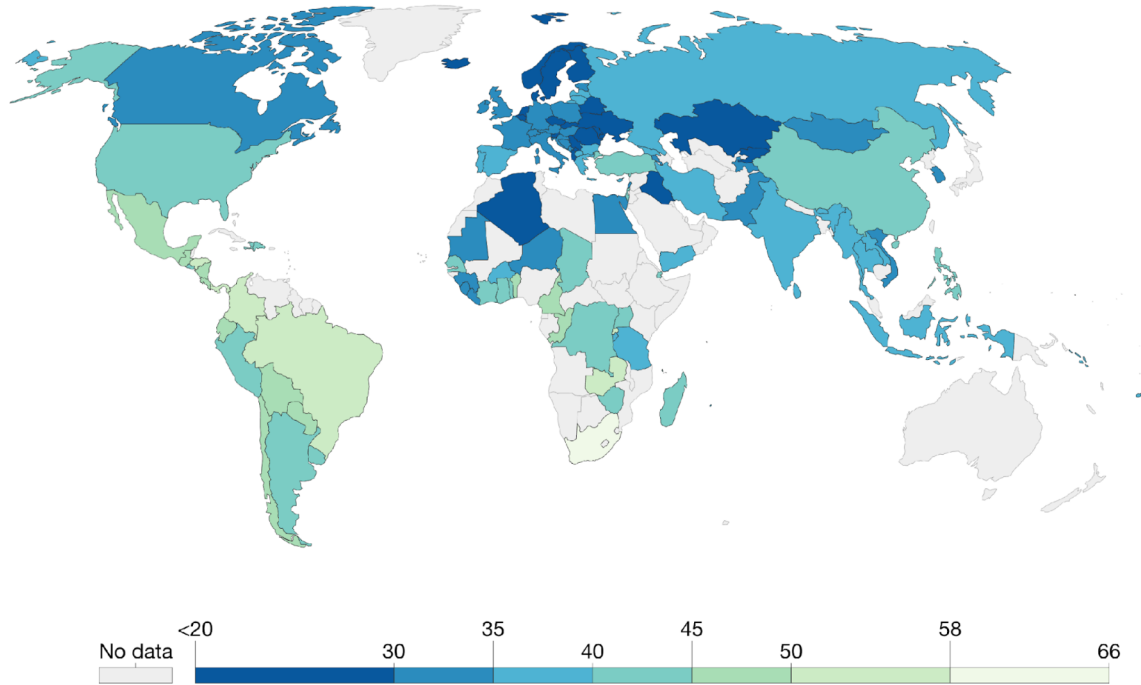
[OurWorldInData.org/economic-growth](https://OurWorldInData.org/economic-growth) • CC BY



## Economic inequality – Gini Index, 2015

Our World  
in Data

Shown is the World Bank (PovcalNet) inequality data. This data includes both income and consumption measures and comparability across countries is therefore limited. A higher Gini index indicates higher inequality.



Source: World Bank

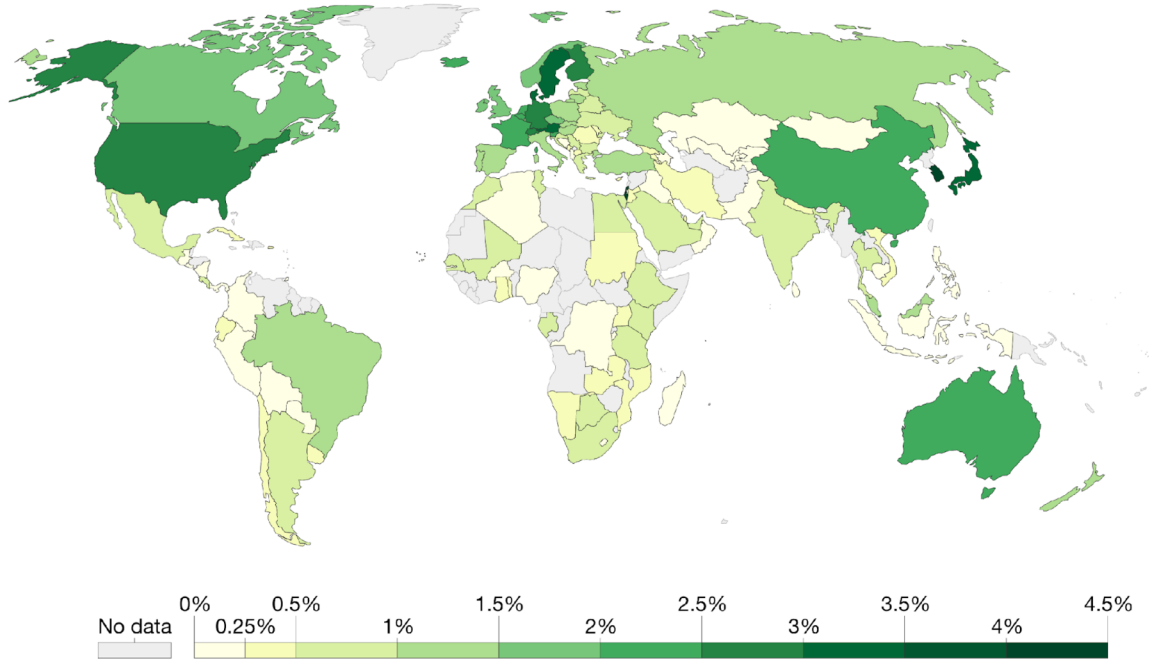
[OurWorldInData.org/income-inequality/](https://OurWorldInData.org/income-inequality/) • CC BY



## Spending on research and development as share of GDP, 2015

Our World  
in Data

Expenditures for research and development are current and capital expenditures (both public and private) on creative work undertaken systematically to increase knowledge, including knowledge of humanity, culture, and society, and the use of knowledge for new applications. R&D covers basic research, applied research, and experimental development.



Source: World Bank

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# Lack of genomic (reference) information



## MISSING DIVERSITY

Geneticists have struggled to better represent humanity's diversity in genome-wide association studies, which can reveal important information about genetic contributors to health risks. Most of the data used in such studies as of 2018 came from people of European descent.



SOURCE: REF. 3

Cristián, Genaro and Isdra (from left to right) are featured in a photography project to celebrate Afromexican culture in Coyoilillo, Mexico. They are descendants of enslaved people brought from Africa in the 1500s. Credit: Koral Carballo. Facing up to genome injustice. Giorgia Gugliemi. Nature 290 568, 2019.



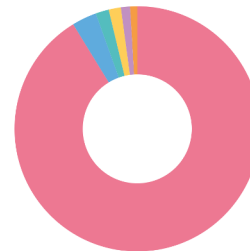
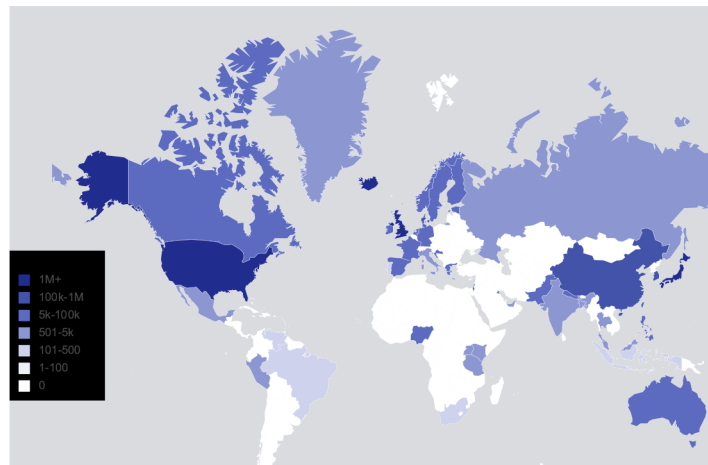
- Northern European
- Southern European
- Native American
- Sub-Saharan African
- South Asian



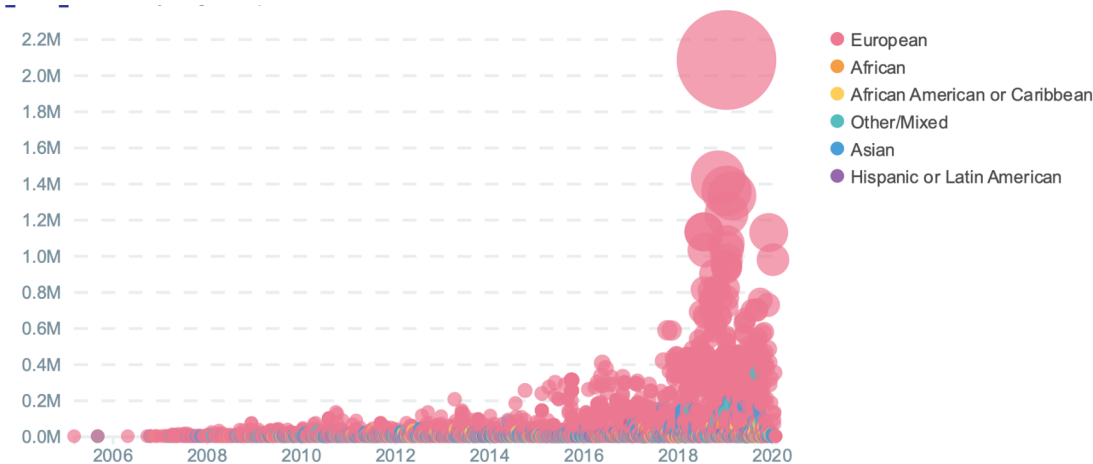




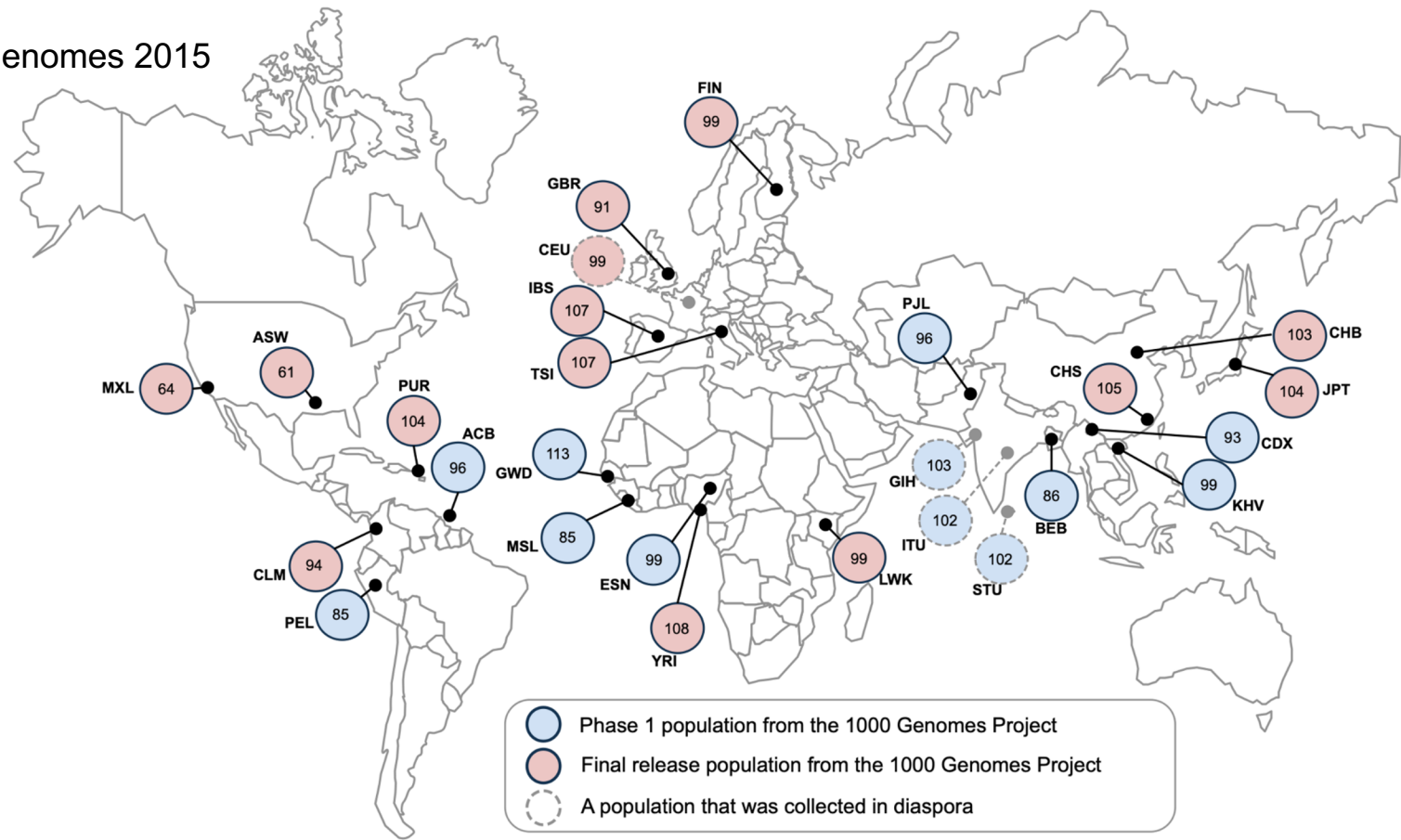
**GWAS**  
Diversity Monitor  
**Participants by ancestry**  
Discovery Stage - All parent terms - 2019



|                    |  |
|--------------------|--|
| European<br>91.25% | African American or<br>Afro-Caribbean1.61% |
| Asian<br>3.26%     | Hispanic or Latin<br>American1.2%          |
| African<br>0.94%   | Other/Mixed<br>1.74%                       |



+1000 genomes 2015



By Taras K. Oleksyk, Vladimir Brukhin and Stephen J. O'Brien - Oleksyk TK, Brukhin V, O'Brien SJ. The Genome Russia project: closing the largest remaining omission on the world Genome map. *GigaScience*. 2015;4:53. doi:10.1186/s13742-015-0095-0. <https://gigascience.biomedcentral.com/articles/10.1186/s13742-015-0095-0>, CC BY 4.0, <https://commons.wikimedia.org/w/index.php?curid=56695551>

# Local Initiatives on Human Genomic Data

ARGENTINA

URUGUAY

ECUADOR

BRASIL



Centro de  
Investigación Genética  
y Genómica-CIGG



BIPMed  
Public genomic database



CHILE

ChileGenomico



and others.....

Genomic medicine initiatives in South America. Gabriela Repetto, Center for Genetics and Genomics Facultad de Medicina Clínica Alemana Universidad del Desarrollo and Sociedad de Genética de Chile.

# Insufficient genomic knowledge.....

**XV COURSE  
LATIN AMERICAN SCHOOL OF  
HUMAN AND MEDICAL GENETICS**

APRIL 28 – MAY 04, 2019  
Samuara Hotel, Caxias do Sul, RS, Brazil

Escola Latino Americana de Genética Humana e Médica

**ELAG**



## Simposio Internacional de Biobancos

6 y 7 de Diciembre

Organizan:

**BTUCH**  
Biobanco de Tejidos de la  
Universidad de Chile .



**MÓDULO 1:** Jueves 6 de Diciembre (Alberto Donoso, Facultad de Medicina). Idiomas: español e inglés

**INSCRIPCION :** GRATUITA HASTA 1 DE DICIEMBRE  
cortesyerko@yahoo.es GENERAL \$ 20.000

AGRADECIMIENTOS A:



Embajada de  
Finlandia en  
Chile.

COLABORAN:



LUGAR: Av. Independencia 1027, SANTIAGO, CHILE



# WORKSHOP IN CANCER GENOMICS AND BIOINFORMATICS

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## Organizers



Olivier Harismendy, Ph.D  
Anil Sadarangani, Ph.D

Ricardo Arismén, Ph.D  
Katherine Morcén, Ph.D  
Ricardo Verdugo, Ph.D

## Supported by



Place / ICBM Facultad de Medicina, Universidad de Chile / Av. Independencia 1027, Santiago / 6 - 17 OCTUBRE 2014

# DIVERSIDAD GENÓMICA EN CHILE Y DESAFÍOS PARA LA MEDICINA PERSONALIZADA EN CÁNCER.

15 de Noviembre 2013

## TEMAS:

Diversidad Genética en Chile y América.  
Privacidad y Patrimonio Genómico.  
Medicina Tradicional y Personalizada en Cáncer.  
Mesa Redonda: Privacidad Genómica/ Discriminación y Legislación

## INVITADOS :

**UCSD Moores Cancer Center** University of California San Diego,  
/ Kelly A. Frazer, Ph.D. /  
/ Catriona Jamieson, M.D., Ph.D /  
/ Anil Sadarangani, Ph.D /

**Stanford Center for Computational, Evolutionary and Human Genetics**  
UStanford  
Andres Moreno Estrada, M.D, Ph.D  
Karla Sadoval Mendoza, Ph.D

**LUGAR:** Auditorio Julio Cabelo  
Facultad de Medicina / Universidad de Chile  
Av. Independencia 1027, Santiago. 08:30 - 13:00 hrs.

ENTRADA LIBERADA, CUPOS LIMITADOS. INSCRIPCIONES EN LA PAGINA:  
[WWW.CHILEGENOMICO.CL](http://WWW.CHILEGENOMICO.CL)

## Organizadores:



## Patrocinadores:







— THE KING LEGACY —

# WHERE DO WE GO FROM HERE

CHAOS OR COMMUNITY?



Martin Luther King, Jr.  
Foreword by Coretta Scott King  
Introduction by Vincent Harding

# BERNIE SANDERS

NEW YORK TIMES BESTSELLING AUTHOR

## Where We Go from Here



To develop a regional biotech and a health care ecosystem to halt the “customer-only” R&D current model.....



# Acknowledgments



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