UNITED NATIONS SUSTAINABLE DEVELOPMENT GOALS

RESEARCH IN THE CONTEXT OF THE UNITED NATIONS SUSTAINABLE DEVELOPMENT GOALS IN THE DEVELOPED AND DEVELOPING WORLD: EVIDENCE FROM THE PAST 15 YEARS

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United Nations

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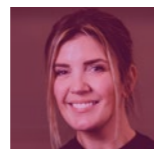
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ABSTRACT

Research in the context of the United Nations Sustainable Development Goals in the developed and developing world: Evidence from the past 15 years

To address global challenges and improve economic, social, and environmental outcomes of planetary health[1,2,3.] 193 countries have committed to the 17 United Nations Sustainable Development Goals (SDGs)[1]. The 2030 Agenda for the United Nations Sustainable Development gives equal prominence to developed countries and developing countries[3,4,5,6]. The implementation of the SDGs demands coherent collaboration to transform society across all levels of income regions and continents [4,5]. Yet, there has been little focus on SDG related research around the world and covering all fields of research. This pioneering study marks the first comprehensive exploration of two crucial aspects of research impact by country income group: research output by country income groups and participation and engagement in the annual Times Higher Education (THE) Impact Rankings. By examining these two dimensions together, we gain unique insights into the challenges faced by lower income countries in achieving visibility and recognition for their contributions to the Sustainable Development Goals (SDGs). This study highlights the importance of fostering participation and continued engagement from all countries. By addressing the barriers and promoting inclusivity, we can continue to promote a more diverse and equitable representation in the global discourse on sustainable development research, ultimately accelerating progress towards the SDGs.

Research is instrumental in addressing the challenges and possible solutions to all SDGs across the globe. However, the comparison of SDG related research is lacking globally due to complexities of data. Accordingly, this white paper proposed three hypotheses based on the data over a period of 15-20 years – (1) Research Grants and Funding on SDGs across income regions globally, (2) Research Publications on SDGs and collaboration across income regions globally, and (3) Times Higher Education Impact Rankings (mapped with the UN SDGs) 2022 data comparison on SDGs related Research across income regions globally. Based on a comprehensive analysis, the results reveal that significant gaps exist in research funding allocation and output between high/upper-middle income countries and low/lower-middle income countries. Although these gaps do appear to be closing, further interventions are required. It is also evident that low income countries are not being adequately represented in THE Impact Rankings despite an increase in participation from low and lower-middle income countries over the past three years. This report reinforces the urgent calls to action for local and international policymakers. In particular, there is a need to accurately reflect the quality and impact of research within less developed regions and suggest strategies that not only improve the research ecosystem, but that utilise the global influence of University Impact rankings.

INTRODUCTION

From 2000 until 2015, the Millennium Development Goals (MDGs) represented a groundbreaking commitment to eradicating poverty and improving global health and education outcomes[3,6]. As the 2015 deadline for the MDGs approached, it became increasingly clear that although significant progress had been made, there were still considerable gaps that had to be addressed. Anecdotally centred around helping developing countries, the MDGs failed to acknowledge the inequalities faced in middle income countries. Limited scope also meant that there was a lack of focus on Environmental Sustainability. As a result of this, issues such as climate change and natural resource depletion were not adequately managed.

The 2030 Agenda for the United Nations Sustainable Development Goals (SDGs), which were adopted in 2015 by the United Nations General Assembly as a part of the 2030 Agenda for Sustainable Development, provide guidelines for a sustainable development path aiming to balance the development of three main pillars, i.e., economy, society, and environment[1,2,3,4,7,8,9]. Compared to the conventional development framework, the SDGs provide a comprehensive and multidimensional approach[10,11,12,13,14,15]. Given that a more integrated and sustainable solution was required, there was a paradigm shift in approach. The resulting SDG agenda now represents a more holistic and inclusive framework for sustainable development. This shift has had significant implications for research and funding, particularly in the Global South (Developing Countries), where the SDGs have been recognized as an ideal opportunity to prioritise development in new areas and to ensure that the region is included in global development efforts. A summary of each of the SDGs is presented overleaf.

The SDGs reflect a recognition of the interdependence between economic, social, and environmental issues[9,10.] They have the potential to address some of the persistent challenges facing the Global South, such as poverty, inequality, and access to basic services. In terms of the research and innovation ecosystem, the SDG framework encourages collaboration and the exchange of research practices and expertise. The COVID-19 pandemic is an example of global issue which affected all SDGs implementations. Notably, the most vulnerable, including women, children, the elderly, and informal workers were impacted very badly. The impact on the environment, on the other hand, was positive in the short term, as the drastic reduction in economic activity brought about by the crisis reduced CO_2 emissions and pollution in many areas.

This report will serve as an introductory piece in a white paper series of United Nations Sustainable Development Goals (SDG) that will accompany a longitudinal investigation into SDG-related research in developed and developing regions. The research is based on three hypotheses: The overall study aims to answer several key questions:

■ What gaps are evident in inclusivity and equity between high-income and low-income countries when we look at SDG classified research?
■ What interventions can help address the gaps identified and improve the Global North/South divide?
■ What part does cross region collaboration play in the Research ecosystem in the context of the SDGs?
■ How can the THE Impact Rankings use its influence to help address global inequalities and encourage strong SDG partnerships between regions to collectively achieve the Sustainable Development Goals?
■ What data and information can be used to measure success and promote best practice in SDG research? What can each region learn from each other?

By addressing these questions, this study aims to contribute to a better understanding of the research landscape in different regions and to identify ways to improve inclusivity and equity in SDG-related research.

The remainder of this report is organised as follows: "Methods" Section describes the methodology and data, along with their limitations. "Hypothesis 1" Section provides the main findings and analysis of SDG related research grants and income by region. "Hypothesis 2" Section provides the main study findings and analysis of SDG related research publications and collaboration across income regions. "Hypothesis 3" Section provides the main study findings and analysis of Times Higher Education Impact Rankings (mapped with the UN SDGs) 2022 data comparison on SDGs related Research across income regions globally. "Summary of findings and Policy prescription" Section concludes our report discussion by summarising our main findings and policy implications of our research for local and international policymakers.

METHODOLOGY

THE STUDY FOCUSES ON THREE HYPOTHESES:
HYPOTHESIS 1: Research Grants and Funding on SDGs across income regions; **HYPOTHESIS 2:** Research Publications on SDGs and collaboration across income regions, and **HYPOTHESIS 3:** THE Impact Rankings (mapped with the UN SDGs) 2022 data comparison on SDGs related research across income regions globally.

Firstly, we examine SDG classified research funding allocation, publications output and collaboration by region - focusing on comparison between developed and lesser developed areas. We take a closer look at grant allocation within the MENA region by country over the past 12 years. We then explore the data on SDG research output, the quality of research by region and the trends in collaborations from the end of the MDG phase through the first half of the SDG agenda (from 2012 - 2022).

The second aspect of this study incorporates in-depth analysis of the participation and performance of institutions from these regions in the annual THE Impact rankings. Within this paper, we look at the increased participation in the rankings since their conception and provide a brief analysis of participation and performance by region in the 2022 submission. The longitudinal study will explore the role that THE Impact rankings can play in improving the research landscape and achieving the SDGs, and whether the impact of University Impact rankings can be evidenced in these regions over time. The principal dataset has been generated by extracting data from Dimensions through their GBQ offering. Only publications (2000 to 2022) that have been classified using Dimensions SDG classifier have been extracted [3]. Additional data from the World Bank and OECD has been integrated using GBQ.

As with similar research[3,16,17,18,19,] the data used in this report comes with acknowledged caveats. First, although the income classification (from the World Bank) offers a classification of countries based on income, it might not reflect the actual differentiation between developing and developed countries (e. g. Saudi Arabia is a developing country but according to income classification is categorized as a high-income country).

In addition, the data used for the grant and research output analysis within this report uses Digital Science's Dimensions dataset and its SDG classification methodology. The THE 2022 Impact Ranking detailed in this report relies on Elsevier's Scopus dataset and its SDG classification. Although SDG classifications within both datasets share similar themes, they exhibit differences. Whilst this is the case, it is considered that employing a range of well-established datasets and methodologies is crucial to ensure a comprehensive and diverse representation of the subject matter. By incorporating multiple sources, a more inclusive and holistic understanding can be achieved.

1. NO POVERTY
Eradicating poverty in all its forms remains one of the greatest challenges facing humanity. While the number of people living in extreme poverty dropped by more than half between 1990 and 2015, too many are still struggling for the most basic human needs.

2. ZERO HUNGER
To end all forms of hunger and malnutrition by 2030, making sure all people–especially children–have sufficient and nutritious food all year. This involves promoting sustainable agricultural, supporting small-scale farmers and equal access to land, technology and markets. It also requires international cooperation to ensure investment in infrastructure and technology to improve agricultural productivity.

3. GOOD HEALTH AND WELL-BEING
Good health is essential to sustainable development and the 2030 Agenda reflects the complexity and interconnectedness of the two. It takes into account widening economic and social inequalities, rapid urbanization, threats to the climate and the environment, the continuing burden of HIV and other infectious diseases, and emerging challenges such as noncommunicable diseases.

4. QUALITY EDUCATION
Achieving inclusive and quality education for all reaffirms the belief that education is one of the most powerful and proven vehicles for sustainable development. This goal ensures that all girls and boys complete free primary and secondary schooling by 2030. It also aims to provide equal access to affordable vocational training, to eliminate gender and wealth disparities, and achieve universal access to a quality higher education.

5. GENDER EQUALITY
Ending all discrimination against women and girls is not only a basic human right, it's crucial for a sustainable future; it's proven that empowering women and girls helps economic growth and development.

6. CLEAN WATER AND SANITATION
Water scarcity affects more than 40 percent of people, an alarming figure that is projected to rise as temperatures do. By 2050, it is projected that at least one in four people will suffer recurring water shortages. Safe and affordable drinking water for all by 2030 requires we invest in adequate infrastructure, provide sanitation facilities, and encourage hygiene. Protecting and restoring water-related ecosystems is essential.

7. AFFORDABLE AND CLEAN ENERGY
Expanding infrastructure and upgrading technology to provide clean and more efficient energy in all countries will encourage growth and help the environment.

8. DECENT WORK AND ECONOMIC GROWTH
The SDGs promote sustained economic growth, higher levels of productivity and technological innovation. Encouraging entrepreneurship and job creation are key to this, as are effective measures to eradicate forced labour, slavery and human trafficking. With these targets in mind, the goal is to achieve full and productive employment, and decent work, for all women and men by 2030.

9. INDUSTRY, INNOVATION AND INFRASTRUCTURE
More than 4 billion people still do not have access to the Internet, and 90 percent are from the developing world. Bridging this digital divide is crucial to ensure equal access to information and knowledge, as well as foster innovation and entrepreneurship.

10. REDUCED INEQUALITIES
Income inequality requires global solutions. This involves improving the regulation and monitoring of financial markets and institutions, encouraging development assistance and foreign direct investment to regions where the need is greatest. Facilitating the safe migration and mobility of people is also key to bridging the widening divide.

11. SUSTAINABLE CITIES AND COMMUNITIES
Making cities sustainable means creating career and business opportunities, safe and affordable housing, and building resilient societies and economies. It involves investment in public transport, creating green public spaces, and improving urban planning and management in participatory and inclusive ways.

12. RESPONSIBLE CONSUMPTION AND PRODUCTION
A large share of the world population is consuming far too little to meet their basic needs. Halving the per capita of global food waste at the retailer and consumer levels is important for creating more efficient production and supply chains. This can help with food security, and shift us towards a more resource efficient economy.

13. CLIMATE ACTION
Supporting vulnerable regions will directly contribute to Goal 13 but also to the other SDGs. These actions must go hand in hand with efforts to integrate disaster risk measures, sustainable natural resource management, and human security into national development strategies. It may still be possible to limit the increase in global mean temperature to two degrees Celsius above pre-industrial levels, aiming at 1.5°C, but this requires urgent and ambitious collective action.

14. LIFE BELOW WATER
To sustainably manage and protect marine and coastal ecosystems from pollution, as well as address the impacts of ocean acidification. Enhancing conservation and the sustainable use of ocean-based resources through international law will also help mitigate some of the challenges facing our oceans.

15. LIFE ON LAND
To reduce the loss of natural habitats and biodiversity which are part of our common heritage and support global food and water security, climate change mitigation and adaptation, and peace and security

16. PEACE, JUSTICE AND STRONG INSTITUTIONS
To significantly reduce all forms of violence, and work with governments and communities to end conflict and insecurity. Promoting the rule of law and human rights are key to this process, as is reducing the flow of illicit arms and strengthening the participation of developing countries in the institutions of global governance.

17. PARTNERSHIPS FOR THE GOALS
To enhance North-South and South-South cooperation by supporting national plans to achieve all the targets. Promoting international trade, and helping developing countries increase their exports is all part of achieving a universal rules-based and equitable trading system that is fair and open and benefits all.

HYPOTHESIS 1
RESEARCH GRANTS & FUNDING ON SDGS

The 17 SDGs are integrated—they recognize that action in one area will affect outcomes in others, and that development must balance social, economic and environmental sustainability [20,21,22,23,24,25,26]. Countries have committed to prioritize progress for those who're furthest behind. The SDGs are designed to end poverty, hunger, AIDS, and discrimination against women and girls[25,26].

The number of research grants (including and excluding SDG research) for both high/upper middle income countries and low/lower middle income countries has been increasing gradually over the years, with the highest number of grants issued in 2019 for high and upper/middle income countries (240,841). However, from 2020 to 2021, the number of grants issued decreased significantly. This may be a reflection of the available data so it is something that can be reviewed again over time.

The number of grants in high/upper middle income countries is significantly and consistently higher than that of low/lower middle income countries. Lower figures are in part due to the availability of funder data from Lower/Lower middle income countries and the fact that a proportion of research in lower income countries is likely financed directly by charitable or aid agencies, however the data used still provides the best evaluation for funding trends.

We note that the percentage change in grants for both income groups fluctuates over the years. The overall trend however is that the number of grants given to high/upper middle income countries has been relatively stable in comparison to the lower income countries, with some minor fluctuations. On the other hand, the number of grants given to low/lower middle income countries has been more volatile, with significant fluctuations in some years.

Funding and its availability is a major influence on the direction of research priorities within each country. On applying the SDG Classifier to the funding records we observe how SDG related grants have steadily increased year on year in High and Upper-Middle income countries with exception to 2019 and 2020. The growth on SDG classified grants in Low and Lower-Middle income countries again follows a more volatile growth.

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Figure 1

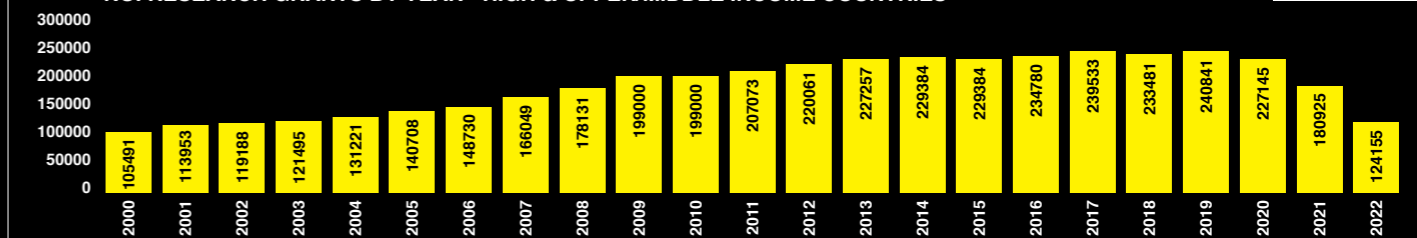NO. RESEARCH GRANTS BY YEAR - HIGH & UPPER/MIDDLE INCOME COUNTRIES

Figure 2

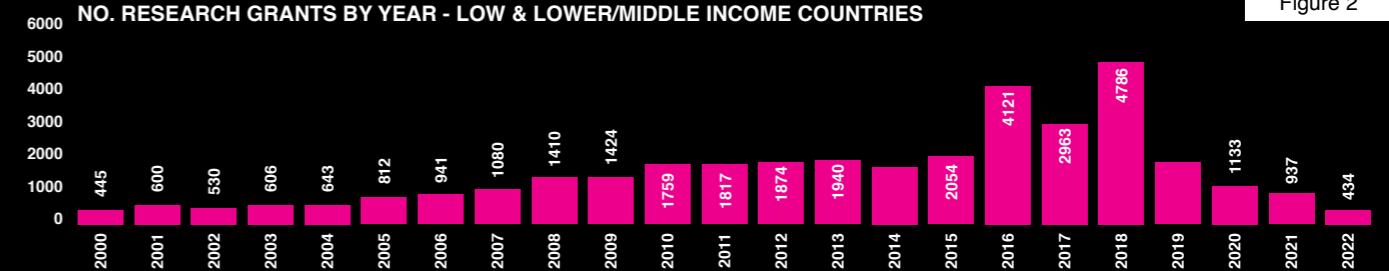NO. RESEARCH GRANTS BY YEAR - LOW & LOWER/MIDDLE INCOME COUNTRIES

Fig. 1 Number of Research Grants per year for countries with at least 1 Investigator based in a High or Upper-Middle Income region.

Fig. 2 Number of Research Grants per year for countries with at least 1 Investigator based in a Low or Lower-Middle Income region.

When looking closer at individual SDGs, some trends within research priorities are evident. For example we can see that in general, SDG classified grants are more likely to be classified as SDG 1 or 2 in lower income countries than higher income countries. Poverty and hunger are likely a higher priority here in terms of research funding. Climate Action is a higher priority within higher income countries when we look at research grants that have been classified as SDG13.

Based on the grants information available in Dimensions (including and excluding SDG research) India is consistently the top ranked country within Low and Lower-Middle-Income countries over the years. The number of grants per year with at least 1 investigator from an Indian institution ranges from 845 in 2014 to 3,897 in 2018. This suggests that within this income category, India is a major player in the field of research and development.

Kenya, Nigeria, and Uganda are also recurring countries in the top 5 countries over the years. Their rankings may change from year to year, but they consistently remain among the top 5 recipients of research grants in the lower and middle income regions.

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SDG classified grants are more likely to be classified as SDG 1 or 2 in lower income countries than higher income countries. Climate Action is a higher priority within higher income countries when we look at research grants that have been classified as SDG13.

% GRANTS CLASSIFIED BY SDG

Year	% SDG LOW AND LOWER MIDDLE INCOME	% SDG HIGH AND UPPER/MIDDLE INCOME
2022	30%	20%
2021	26%	19%
2020	31%	16%
2019	21%	16%
2018	8%	17%
2017	13%	17%
2016	8%	16%
2015	13%	15%
2014	12%	15%
2013	12%	14%
2012	10%	13%
2011	10%	12%
2010	10%	12%
2009	9%	12%
2008	9%	11%
2007	9%	10%
2006	16%	10%
2005	12%	10%
2004	10%	9%
2003	8%	9%
2002	12%	8%
2001	9%	8%
2000	11%	7%

Figure 3

Percentage of Research Grants Classified as SDG research by High and Upper-Middlwe Income and Low and Lower-Middle Income regions.

% SDG GRANTS CLASSIFIED AS SDG1 OR SDG2

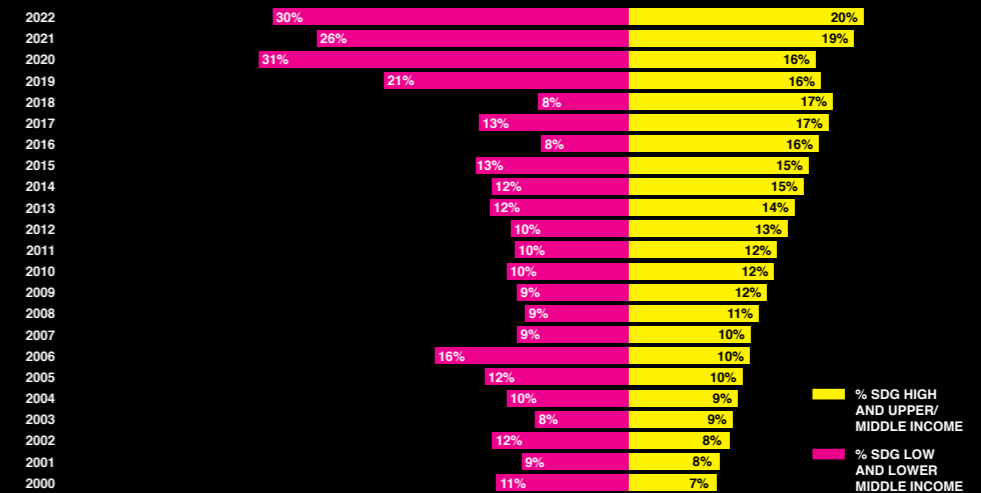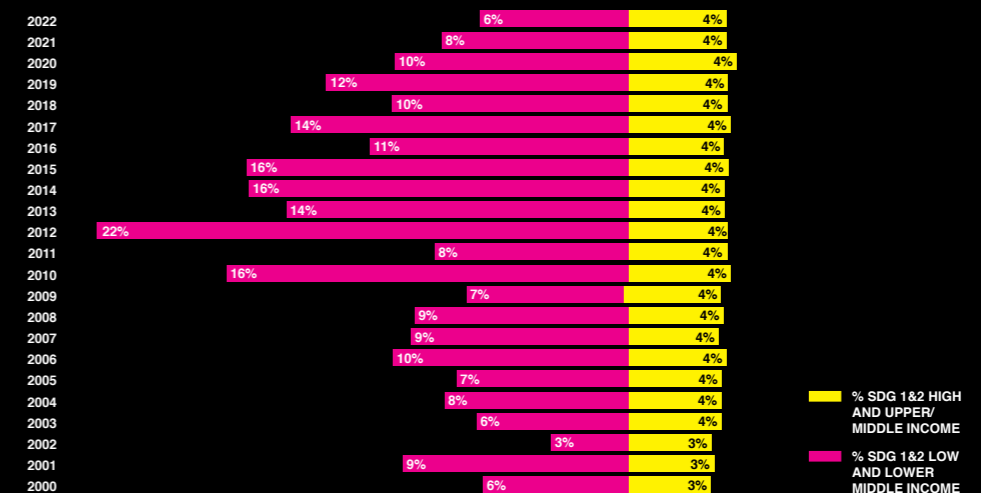| Year	% SDG 1&2 LOW AND LOWER MIDDLE INCOME	% SDG 1&2 HIGH AND UPPER/MIDDLE INCOME
2022	6%	4%
2021	8%	4%
2020	10%	4%
2019	12%	4%
2018	10%	4%
2017	14%	4%
2016	11%	4%
2015	16%	4%
2014	16%	4%
2013	14%	4%
2012	22%	4%
2011	8%	4%
2010	16%	4%
2009	7%	4%
2008	9%	4%
2007	9%	4%
2006	10%	4%
2005	7%	4%
2004	8%	4%
2003	6%	4%
2002	3%	3%
2001	9%	3%
2000	6%	3%

Figure 4

Percentage of Research Grants Classified as SDG1 & 2 research by High and Upper-Middle Income and Low and Lower-Middle Income regions.

% SDG GRANTS CLASSIFIED AS SDG13

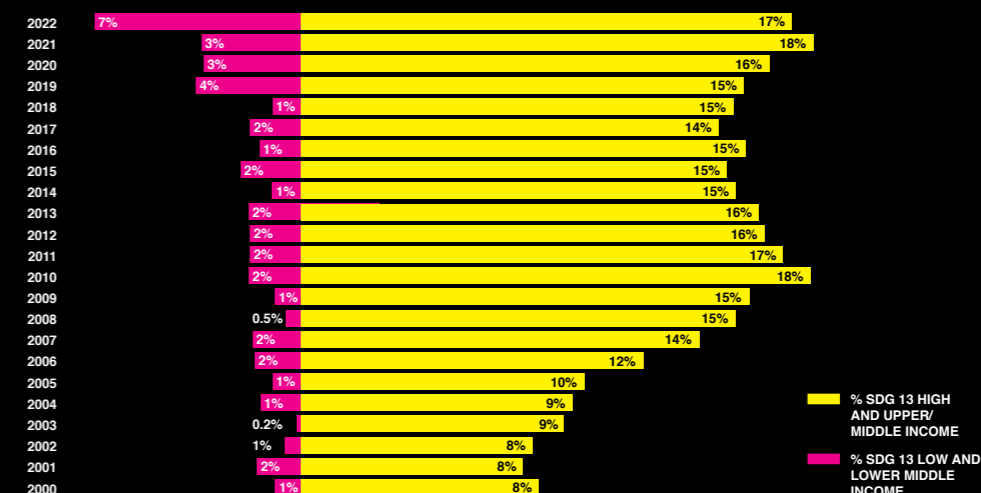| Year	% SDG 13 LOW AND LOWER MIDDLE INCOME	% SDG 13 HIGH AND UPPER/MIDDLE INCOME
2022	7%	17%
2021	3%	18%
2020	3%	16%
2019	4%	15%
2018	1%	15%
2017	2%	14%
2016	1%	15%
2015	2%	15%
2014	1%	15%
2013	2%	16%
2012	2%	16%
2011	2%	17%
2010	2%	18%
2009	1%	15%
2008	0.5%	15%
2007	2%	14%
2006	2%	12%
2005	1%	10%
2004	1%	9%
2003	0.2%	9%
2002	1%	8%
2001	2%	8%
2000	1%	8%

Figure 5

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An te ariam tum Rommovivicae efecrem potimus senihili ta Serdi, tam actui ignor

Egypt, Ghana, Indonesia, Pakistan, Philippines, Tanzania, and Ukraine have also appeared in the top 5 grant recipients in the past. They are however less consistent in their rankings and in the number of grants that they have or collaborate on. This potentially indicates that there is untapped research potential across these countries. While their positions may not match the dominance of India or Kenya, the data indicates room for growth. Further analysis should delve into identifying the factors hindering their research capabilities, such as a shortage of well-equipped facilities and affiliated researchers and or collaboration opportunities.

The total number of grants with investigators from low and low-middle income countries appear to be increasing over time. For instance, in 2010, a total of 1,320 grants were allocated to the top 5 countries. In 2022, a total of 228 grants were allocated to the top 5 countries. With the caveat that not all funder data in this region is currently available within the dataset, it does still suggest that there is increasing interest and investment in research and development in the low and lower-middle income regions.

As this dataset only provides information on the top 5 countries per year, we are not comparing how other countries in lower/middle income regions are faring in terms of research grants. However, the fact that the same countries keep appearing in the top 5 suggests that there is a degree of stability or dominance in the field of research and development in the lower and middle income regions.

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The total number of grants with investigators from low and low-middle income countries appear to be increasing over time.

NO. GRANTS TOP RANKED LOW/LOWER MIDDLE INCOME COUNTRIES

NO. GRANTS TOP RANKED HIGH/UPPER MIDDLE INCOME COUNTRIES
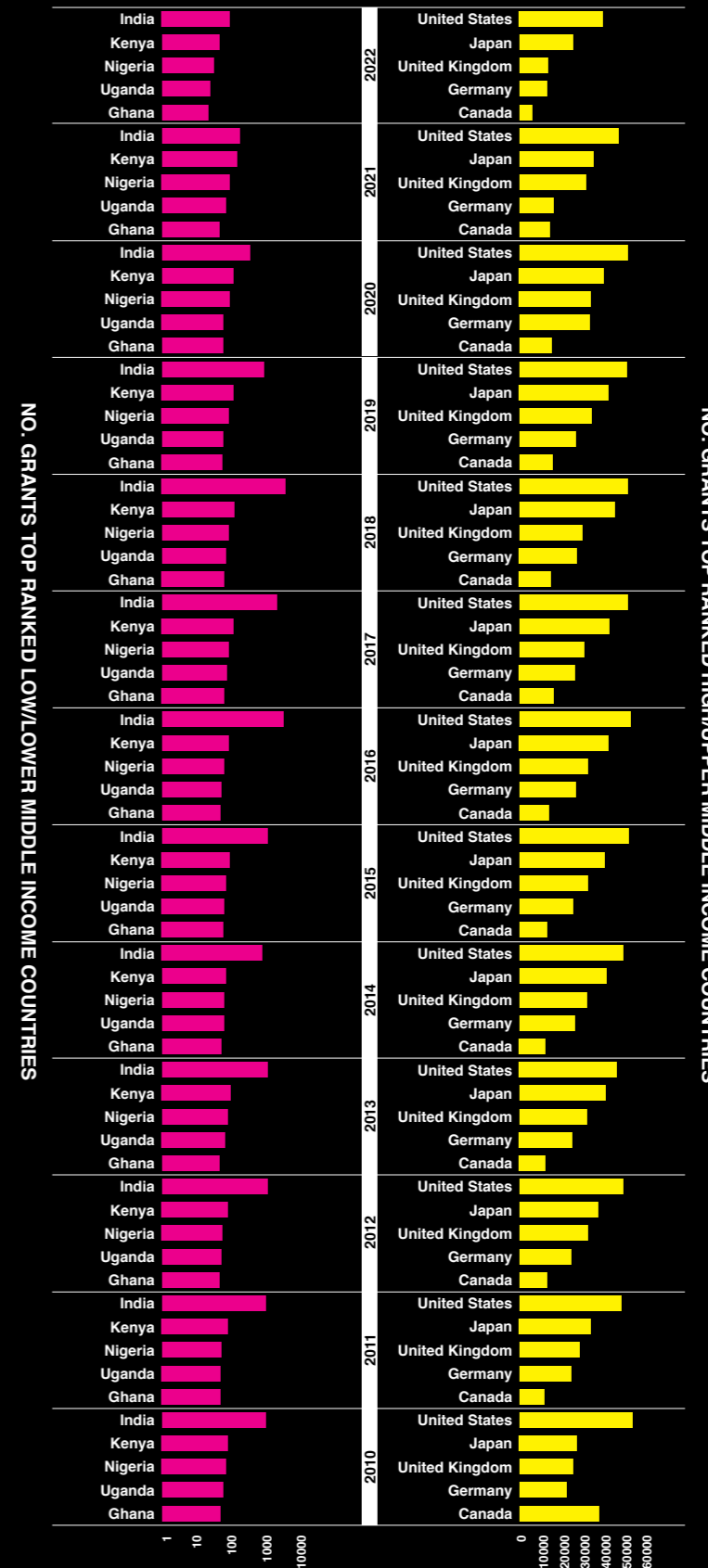
Figures 6 & 7

Fig. 6 Number of Research Grants per year for countries with at least 1 Investigator based in a Low or Lower-Middle Income region ranked by top 5 countries/year

Fig. 7 Number of Research Grants per year for countries with at least 1 Investigator based in a High or Upper-Middle Income region ranked by top 5 countries/year

SDG FUNDING AND COLLABORATION IN KENYA

If we look specifically at SDG classified research grants data from Kenya and examine in further detail, we see that for the most part, funded grants are international collaborations. In line with the Wellcome Trust's approach to funding African led research, we note that WT funded research in Kenya has not required international joint investigators. The majority of other funded research is made up with joint investigators from other countries.

A large percentage (42%) of these grants have joint investigators from high income countries. When we look at the top 5 collaborating organizations, we can see University of Oxford has a strong research grant collaboration with Kenyan Universities. Funders behind this research partnerships include the Medical Research Council, European & Developing Countries Clinical Trials Partnership, Economic and Social Research Council and the European Commission.
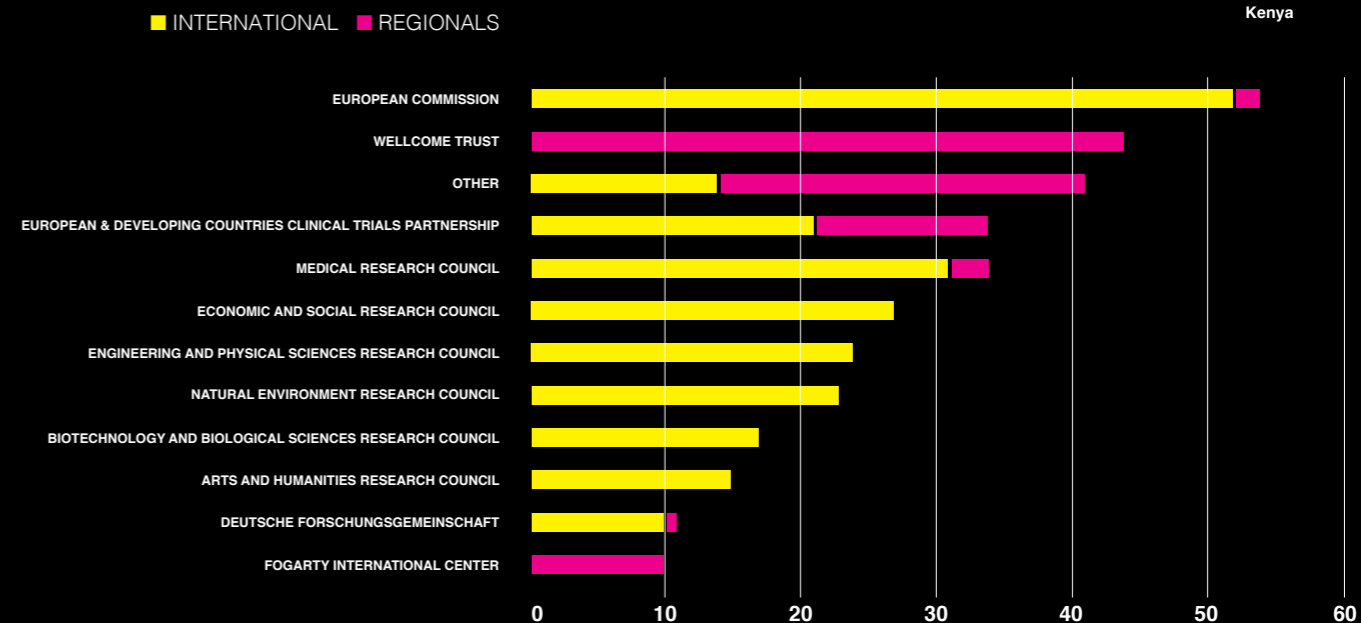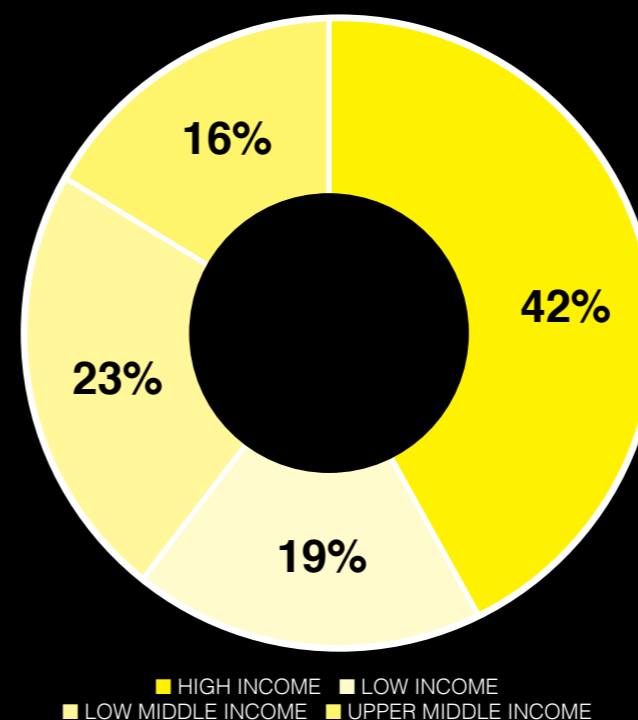
GRANT FUNDERS AND COLLABORATIONS KENYA 2016 - 2022

Figure 8

Funders and Collaboration in Kenya

■ INTERNATIONAL   ■ REGIONALS

EUROPEAN COMMISSION
WELLCOME TRUST
OTHER
EUROPEAN & DEVELOPING COUNTRIES CLINICAL TRIALS PARTNERSHIP
MEDICAL RESEARCH COUNCIL
ECONOMIC AND SOCIAL RESEARCH COUNCIL
ENGINEERING AND PHYSICAL SCIENCES RESEARCH COUNCIL
NATURAL ENVIRONMENT RESEARCH COUNCIL
BIOTECHNOLOGY AND BIOLOGICAL SCIENCES RESEARCH COUNCIL
ARTS AND HUMANITIES RESEARCH COUNCIL
DEUTSCHE FORSCHUNGSGEMEINSCHAFT
FOGARTY INTERNATIONAL CENTER

0   10   20   30   40   50   60

KENYA GRANT COLLABORATIONS BY INCOME REGION 2016 - 2022

Figure 9

Funders and Collaboration in Kenya

16%
42%
23%
19%

■ HIGH INCOME   ■ LOW INCOME
■ LOW MIDDLE INCOME   ■ UPPER MIDDLE INCOME

TOP 5 HIGH INCOME REGION COLLABORATORS

UNIVERSITY OF OXFORD - 30
UNIVERSITY COLLEGE LONDON - 27
LONDON SCHOOL OF HYGIENE & TROPICAL MEDICINE - 24
LIVERPOOL SCHOOL OF TROPICAL MEDICINE- 18
UNIVERSITY OF LEEDS - 18

GRANTS –
LOW AND LOWER-
MIDDLE INCOME
COUNTRIES WITH RD
EXPENDITURE (%GDP)

RD expenditure (% GDP) taken as an average value from data available from 2018 varies significantly among these countries, with India having an average RD expenditure of 0.69%, while Uganda has the lowest average RD expenditure of 0.14%.

The top 10 countries in terms of research grants received have an average RD expenditure of 0.46%, which is slightly above than the total average of 0.42%.

The countries with the highest number of research grants also tend to have a higher average RD expenditure, with India, Egypt, and Ghana having the highest RD expenditure among the top 10 countries.

There seems to be no obvious correlation between the number of research grants received and the average RD expenditure (% GDP) for a country, as some countries with a high number of research grants have a lower average RD expenditure compared to other countries with a lower number of research grants.

Overall, the data suggests that while RD expenditure is an important factor to consider with regard to a country's research capabilities, the number of grants and potential collaborations is also an important factor that can determine a country's research and innovation potential. Further analysis will allow us to determine the leading SDG research and areas of expertise within each region. This will ultimately provide policy makers and funding bodies with the data required to bolster research capacities and collaborations.

Figure 10

No. GRANTS PER COUNTRY IN LOW AND LOWER/MIDDLE INCOME REGIONS FROM 2010

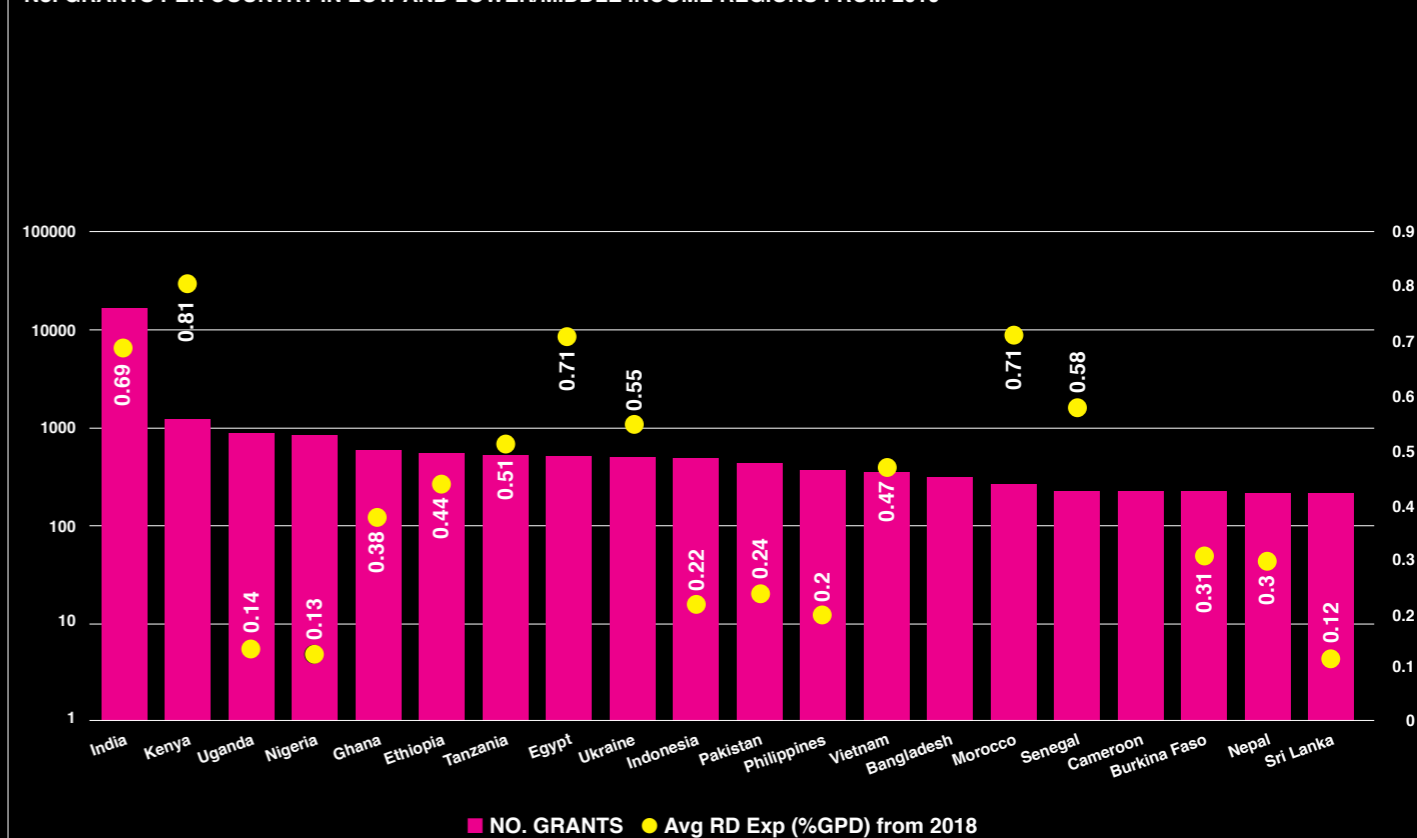■ **NO. GRANTS** ● **Avg RD Exp (%GPD) from 2018**

Figure 10

No. Grants per country (ranked by top 20) in Low and Lower-Middle income regions from 2010 Fig. 10 No. Grants per country (ranked by top 20) in Low and Lower-Middle income regions from 2010

GRANT ANALYSIS (INC. AND EXCL. SDG CLASSIFIED RESEARCH) OF THE MENA REGION

Before we focus on the research output within these regions, let's focus specifically on the MENA region. Fig 11 ranks the top 5 countries in terms of grant allocations by year. Please note the log scale due to the high variation in grant numbers.

Based on the available data within Dimensions, it is clear that Israel has consistently been the country that has been involved in the highest number of research grants allocated in the MENA region since 2010. In the year 2022, Israel had at least 1 institution / investigator in 844 research grants, while Qatar, Malta, Saudi Arabia, and Tunisia ranked second to fifth, respectively.

Qatar is the second-highest ranked country in terms of the number of research grants allocated, followed by the United Arab Emirates, Egypt, Jordan, and Lebanon. It is noteworthy that Qatar has consistently been among the top two countries since 2010, indicating a strong commitment to research and development.

In contrast, the allocation of research grants to other countries in the MENA region appears to be relatively low compared to Israel and Qatar. For example, Tunisia, which ranked fifth in 2022, only received 13 research grants, and other countries such as Morocco, Saudi Arabia, and Palestinian Territory have received less than 100 grants per year on average.

From the data, it is evident that there has been a consistent trend of high grant allocation to Israel and Qatar over the years.

The data suggests that there is a concentration of research grants in a few countries in the MENA region, mainly Israel and Qatar, with other countries receiving relatively fewer grants. The trend also indicates an increasing commitment to research and development in the region, particularly in Qatar.
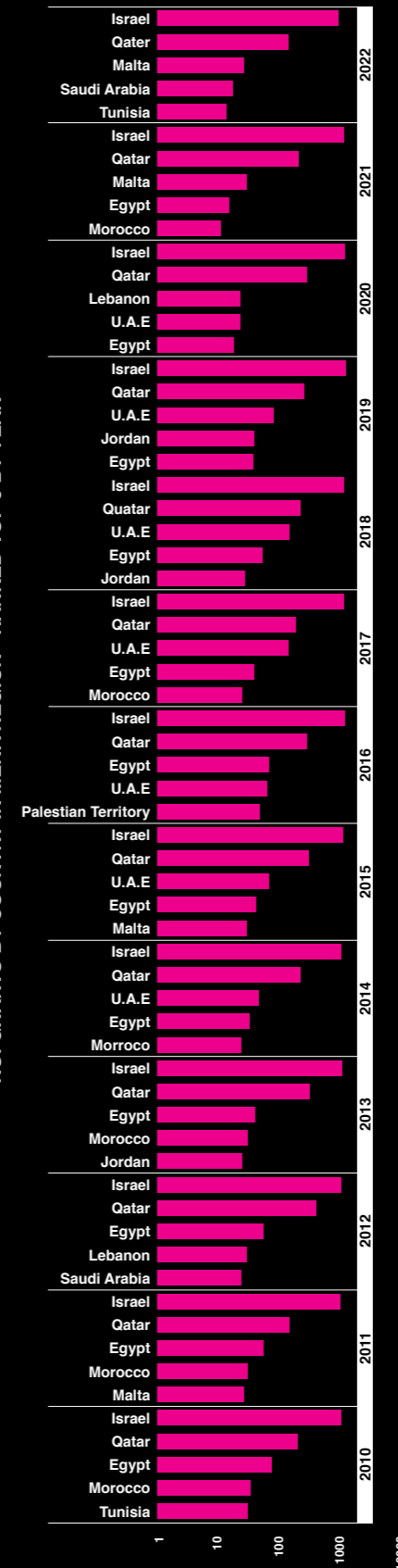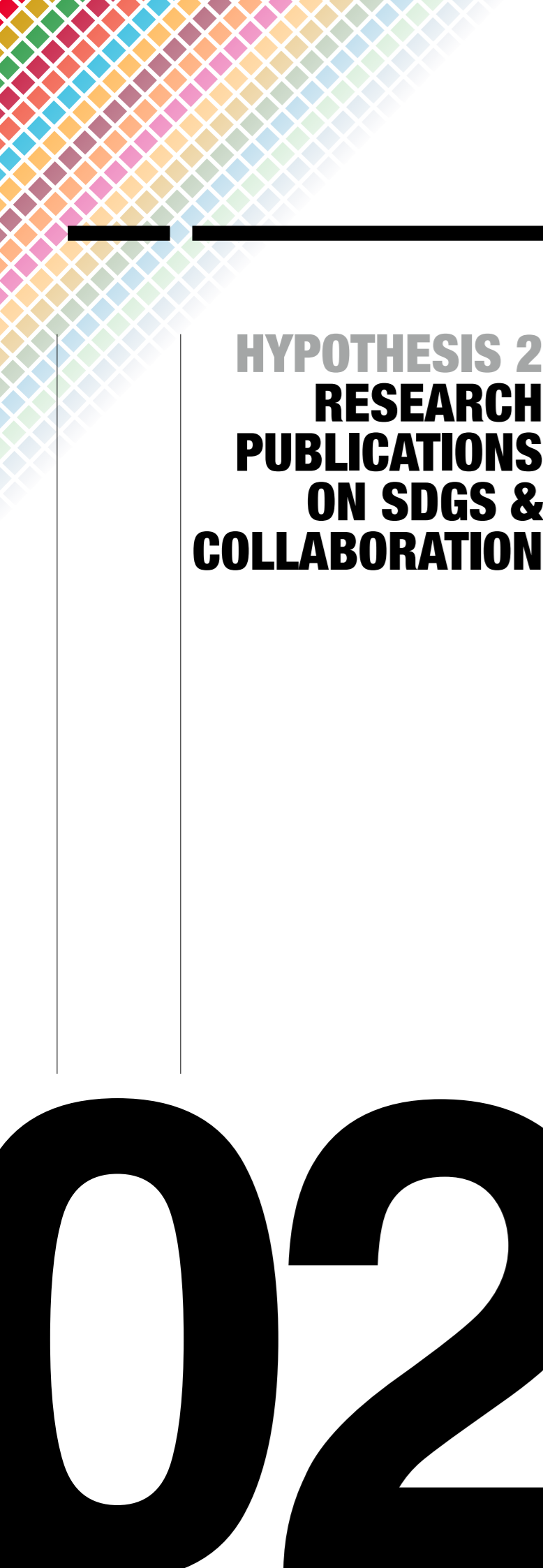

Figure 11

No. Grants for top ranked countries in MENA region by year

HYPOTHESIS 2
RESEARCH PUBLICATIONS ON SDGS & COLLABORATION

RESEARCH OUTPUT

Focusing on SDG classified research output over the past 20 years (with an FCR >= 1), the overall trend reads that the number of research publications has shown a consistent increase over the years for both higher and lower income countries. Higher income countries consistently have a higher number of research publications compared to lower income countries. This difference is substantial throughout the dataset.

The growth rate of research publications appears to be higher in higher income countries. The number of publications from higher income countries has steadily increased over the years, while the growth of SDG research output in lower income countries appears to have fluctuated. We note that the number of publications from higher income countries has more than doubled from 2000 to 2022, while the increase for lower income countries is comparatively smaller.

Despite the disparity, there is evidence of catch-up efforts by lower income countries. While the number of research publications (co-) authored by MENA based research organizations starts on a low base number, a doubling of the number of publications every seven years since 2000 has narrowed the gap over time. The rate of catch-up appears somewhat slower compared to the growth in higher income countries.

In summary, the analysis of the dataset reveals a consistent increase in research publications for both higher and lower income countries. However, there remains a substantial disparity between the two groups, with higher income countries consistently outperforming lower income countries in terms of research output. Efforts to bridge this gap may require targeted support for research infrastructure and funding in lower income countries to promote equitable knowledge production.

As we take a more detailed look into the research output by SDG we can see that there have been some changes between the period 2016-2018 and 2019-2022. Over both periods, the distribution of research publications varies across various SDGs. The highest number of publications in both High & Upper-middle Income and Low & Lower-middle Income countries was observed for "Good Health and Well Being" (SDG3) with 420,253 and 55,534 publications, respectively.

02

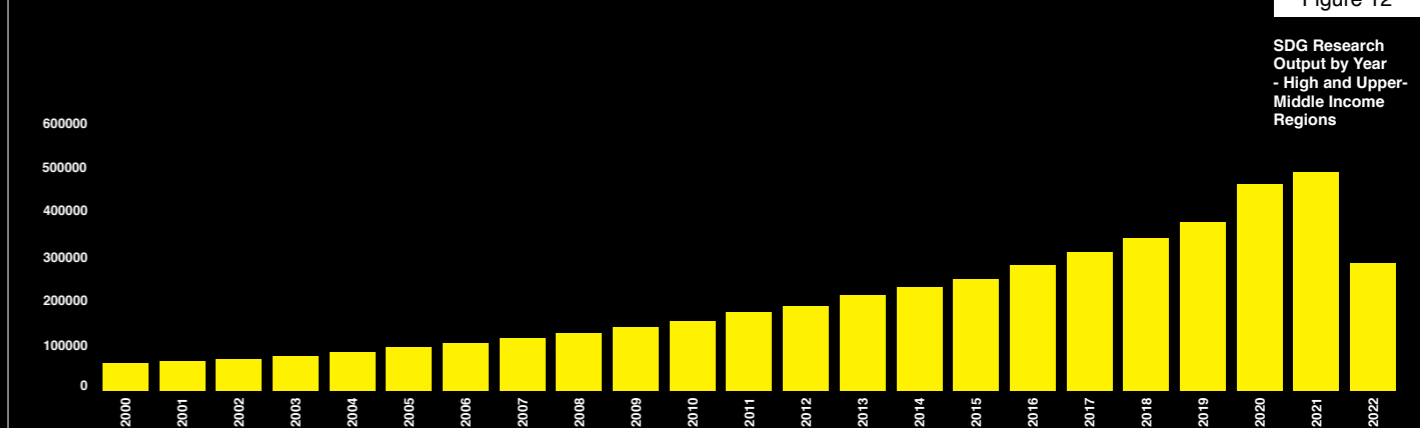**NO. SDG RESEARCH OUTPUTS BY YEAR - HIGH & UPPER/MIDDLE INCOME COUNTRIES**

Figure 12

SDG Research Output by Year - High and Upper-Middle Income Regions

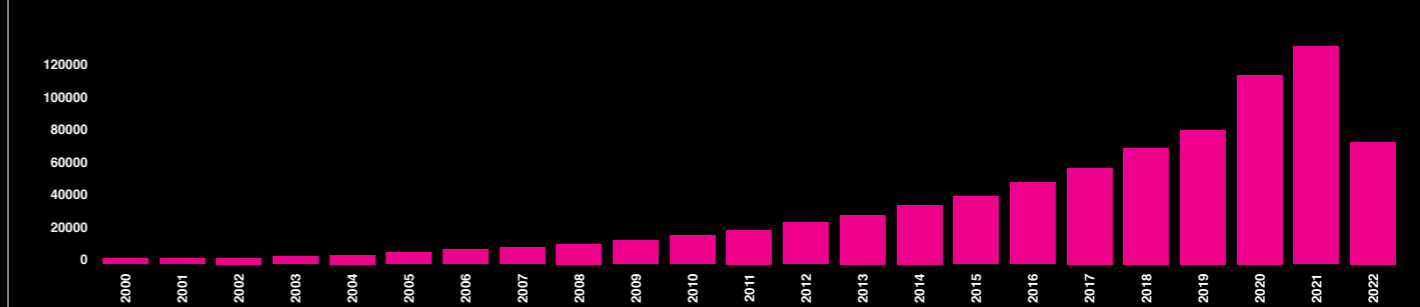**NO. SDG RESEARCH OUTPUTS BY YEAR - LOW & LOWER/MIDDLE INCOME COUNTRIES**

Figure 13

SDG Research Output by Year - Lower and Lower-Middle Income Regions

In general, there is a huge disparity between the 2 income groups. High Income countries have a higher number of research publications across all SDGs compared to Low Income countries. This is evident from the higher percentages of publications in higher income countries for most SDGs, ranging from 77% to 92%.

Some SDGs exhibit less severe disparities between high income and lower income countries. For example, in the case of "Zero Hunger" (SDG2), higher income countries have 77% of the publications compared to "Life Below Water" (SDG14), where high income countries contribute 92% of the publications.

If we compare the 2 SDG breakdowns for each period of time (2016-2018 - after the SDGs were first implemented) and 2019-2022, we can see a number of changes. In general, there has been an increase in the percentage of research output with institutions/researchers from lower income countries for most SDGs, indicating a growth in research publications from Low Income countries over this time period.

Notably, "Decent Work and Economic Growth" (SDG8) saw an increase from 13% to 20%, indicating substantial growth. Similarly, "Quality Education" (SDG4) showed growth from 11% to 18%, and "Clean Water and Sanitation" (SDG6) increased from 22% to 26%.

SDGs with Moderate Growth: Some SDGs exhibited moderate growth in research publications from Low Income countries. These include "Climate Action" (SDG13), which increased from 12% to 17%, and "Life on Land" (SDG15) and "Industry, Innovation and Infrastructure" (SDG9), both increasing from 14% to 17% .

Overall, the analysis suggests that research publications from Low Income countries have shown growth across multiple SDGs between 2016-2018 and 2019-2022. Notably, SDGs such as "Decent Work and Economic Growth," "Quality Education," and "Clean Water and Sanitation" have experienced significant or moderate growth in research publications from Low Income countries during this period. These trends indicate increased attention and efforts towards research and development in these areas in Low Income countries.

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In general, there has been an increase in the percentage of research output with institutions/researchers from lower income countries for most SDGs.

% SDG RESEARCH OUTPUT 2016 - 2018

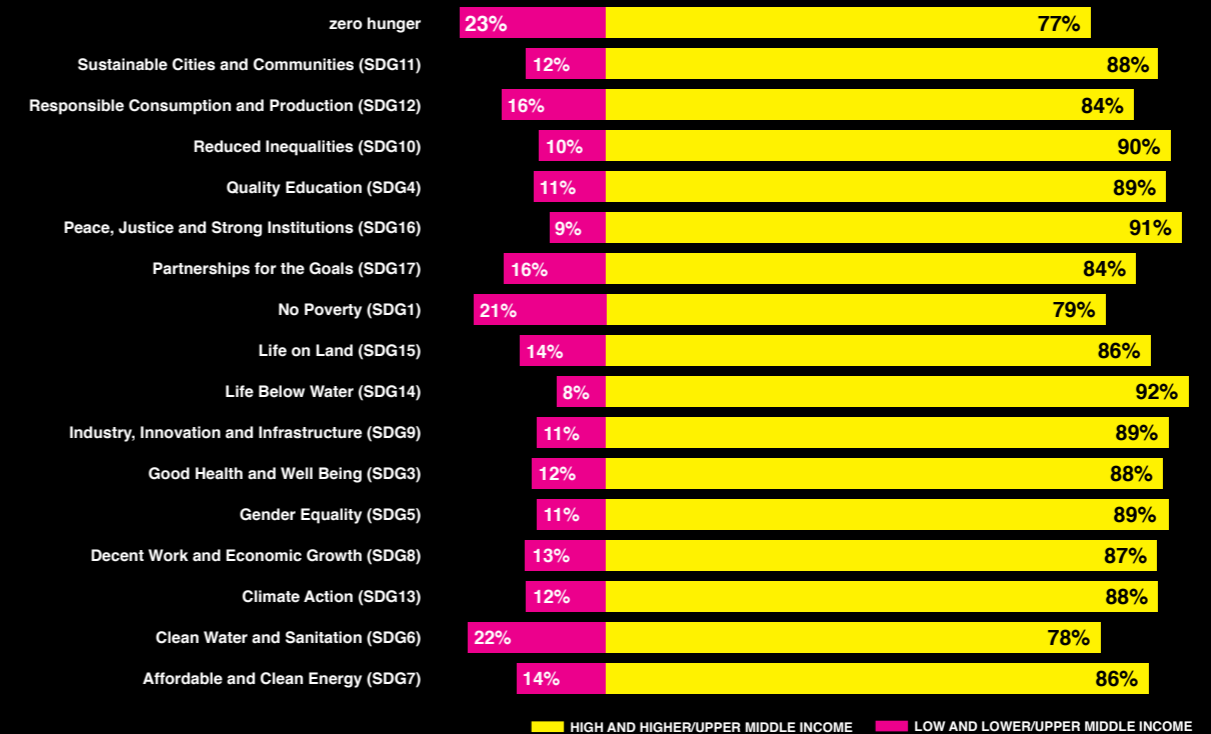| SDG	Low and Lower/Upper Middle Income	High and Higher/Upper Middle Income
zero hunger	23%	77%
Sustainable Cities and Communities (SDG11)	12%	88%
Responsible Consumption and Production (SDG12)	16%	84%
Reduced Inequalities (SDG10)	10%	90%
Quality Education (SDG4)	11%	89%
Peace, Justice and Strong Institutions (SDG16)	9%	91%
Partnerships for the Goals (SDG17)	16%	84%
No Poverty (SDG1)	21%	79%
Life on Land (SDG15)	14%	86%
Life Below Water (SDG14)	8%	92%
Industry, Innovation and Infrastructure (SDG9)	11%	89%
Good Health and Well Being (SDG3)	12%	88%
Gender Equality (SDG5)	11%	89%
Decent Work and Economic Growth (SDG8)	13%	87%
Climate Action (SDG13)	12%	88%
Clean Water and Sanitation (SDG6)	22%	78%
Affordable and Clean Energy (SDG7)	14%	86%

HIGH AND HIGHER/UPPER MIDDLE INCOME   LOW AND LOWER/UPPER MIDDLE INCOME

Figure 14

SDG Research Output Share by Income Region 2016-2018

% SDG RESEARCH OUTPUT 2019 - 2021

SDG	Low and Lower/Upper Middle Income	High and Higher/Upper Middle Income
zero hunger	26%	74%
Sustainable Cities and Communities (SDG11)	16%	84%
Responsible Consumption and Production (SDG12)	21%	79%
Reduced Inequalities (SDG10)	14%	86%
Quality Education (SDG4)	18%	82%
Peace, Justice and Strong Institutions (SDG16)	14%	86%
Partnerships for the Goals (SDG17)	19%	81%
No Poverty (SDG1)	25%	75%
Life on Land (SDG15)	17%	83%
Life Below Water (SDG14)	10%	90%
Industry, Innovation and Infrastructure (SDG9)	17%	83%
Good Health and Well Being (SDG3)	13%	87%
Gender Equality (SDG5)	15%	85%
Decent Work and Economic Growth (SDG8)	20%	80%
Climate Action (SDG13)	17%	83%
Clean Water and Sanitation (SDG6)	26%	74%
Affordable and Clean Energy (SDG7)	17%	83%

HIGH AND HIGHER/UPPER MIDDLE INCOME   LOW AND LOWER/UPPER MIDDLE INCOME

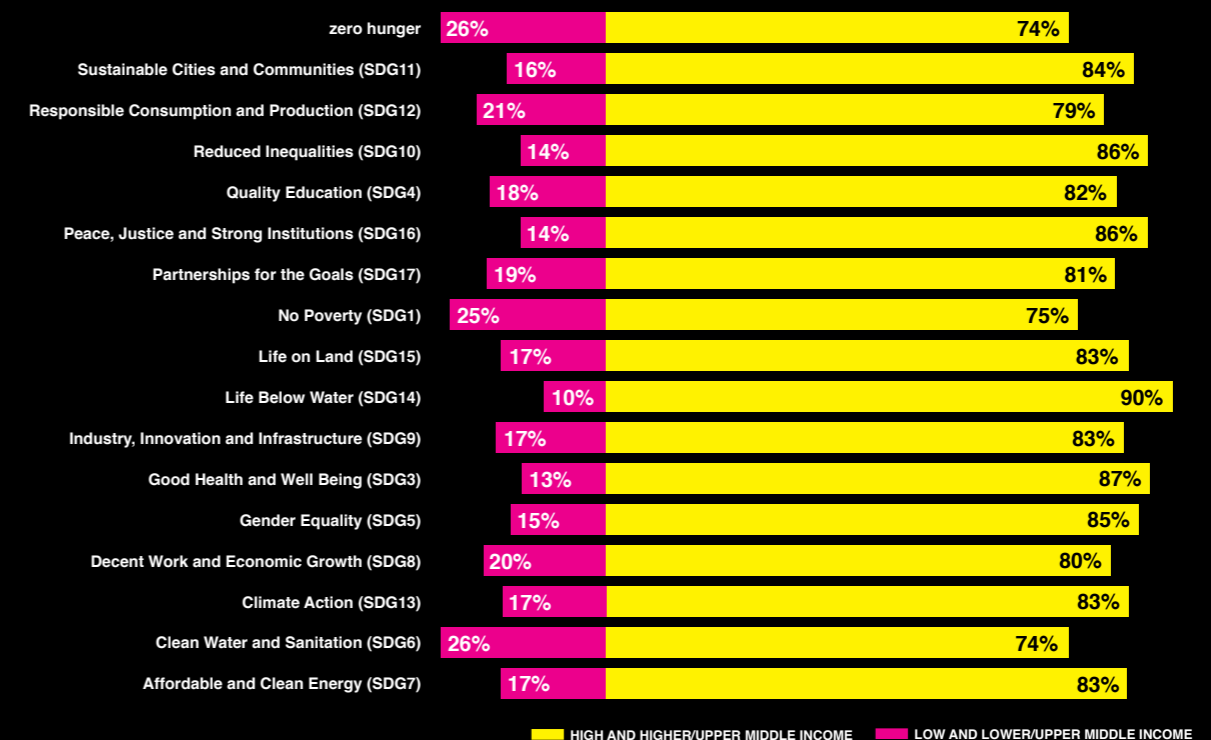**Figure 15**

SDG Research Output Share by Income Region 2019-2021

PUBLICATIONS AND COLLABORATION BY GEOGRAPHICAL REGION

As the global research landscape continues to evolve, understanding the patterns and trends in SDG-related research publications and collaborations across geographical regions becomes crucial. This section examines the growth and collaboration dynamics in SDG research within 4 specific geographical regions, namely Europe & Central Asia, the Middle East & North Africa, East Asia and Pacific and Sub-saharan Africa.

Building upon the previous section's analysis of high-income and low-income regions, we delve deeper into the research output and collaborative efforts within these regions. By exploring the number of research publications and the percentage of international collaborations, we gain valuable insights into the contributions and collaborative networks that drive global SDG research.

The number of research publications has been increasing over the years for both Europe & Central Asia and Middle East & North Africa. Europe & Central Asia region has however has consistently had a higher number of research publications compared to the Middle East & North Africa region. The percentage of international collaborations has been increasing for both regions over the years, with the Middle East & North Africa having a higher percentage than Europe & Central Asia. There is a notable increase in collaboration across income groups for both regions, with Middle East & North Africa having a consistently higher percentage than Europe & Central Asia. Europe & Central Asia has a lower percentage of cross-regional collaborations compared to Middle East & North Africa, and there is a slight increase in both regions over the years.

Overall, it can be seen that there is an increasing trend in international collaboration and collaboration across income groups for research publications in both regions. However, there is still a significant gap between the number of research publications and collaborations between the two regions.
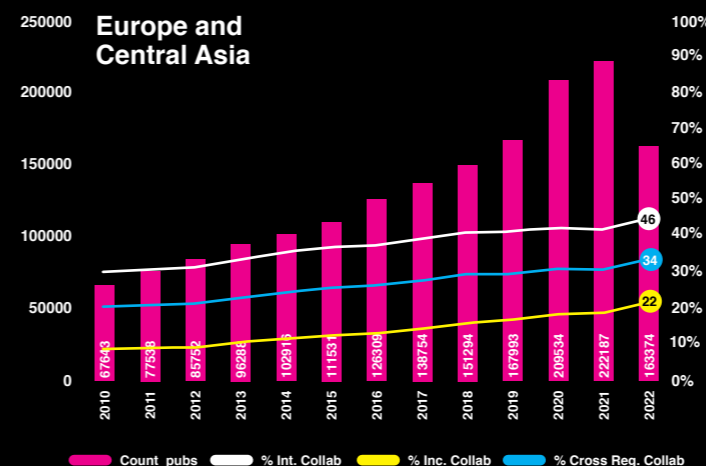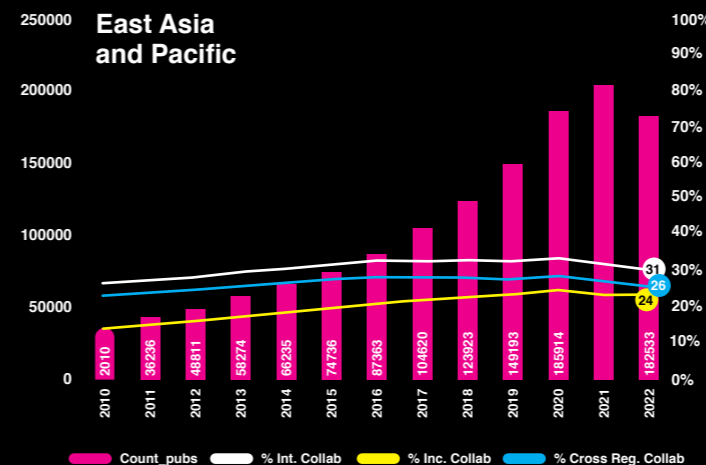
Within the East Asia and Pacific region, we can see that there has been a general trend of increasing publication numbers each year, with a peak in 2021, followed by a slight dip in 2022. The percentage of publications involving international collaboration has also increased over the years, reaching a high of 34% in 2018 and 2019, and then dropping slightly to 32% in 2021

The number of research publications in the Sub-Saharan African region has been steadily increasing over the years, with a significant increase from 2019 to 2020. The percentage of research publications with international collaboration has been consistently high, ranging from 52% to 59% over the years.
We note how the percentage of research publications with cross-regional collaboration in this region has been steadily increasing, from 50% in 2010 to 55% in 2020. The percentage of research publications with collaboration across countries with different income categories has remained relatively constant, ranging from 51% to 55% over the years.

Overall, it can be seen that there is an increasing trend in international collaboration and collaboration across income groups for research publications in all regions. However, there is still a significant gap between the number of research publications and collaborations between regions.

East Asia and Pacific
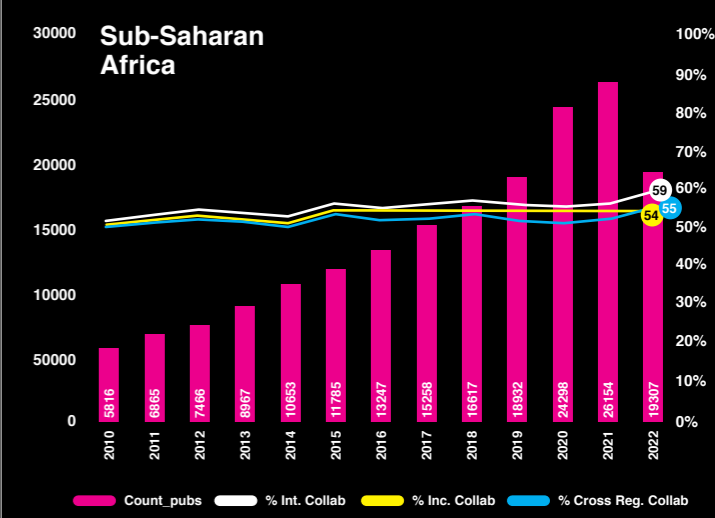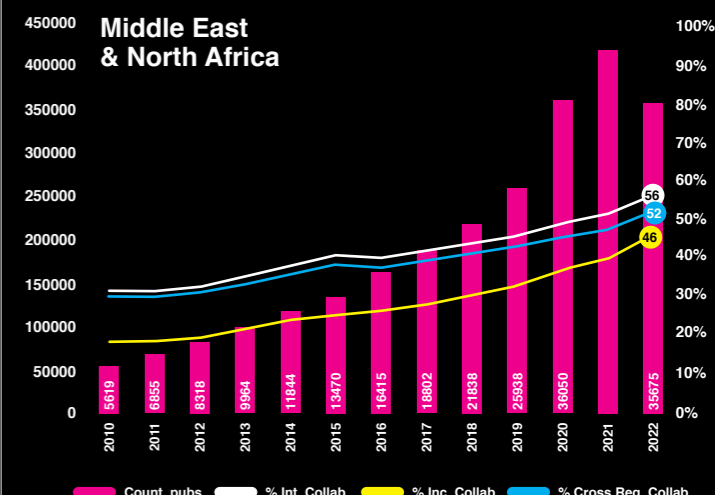

Europe and Central Asia

Figures 16 & 17

SDG Research East Asia and Pacific Region with Collaboration Trends

SDG Research Sub-Saharan Africa with Collaboration Trends

Figures 18 & 19

SDG Research Europe and Central Asia with Collaboration Trends

SDG Research Middle East & North Africa with Collaboration Trends

Middle East & North Africa

Sub-Saharan Africa

SDG PRIORITIES – HIGHER / UPPER MIDDLE INCOME AND LOW / LOWER-MIDDLE INCOME
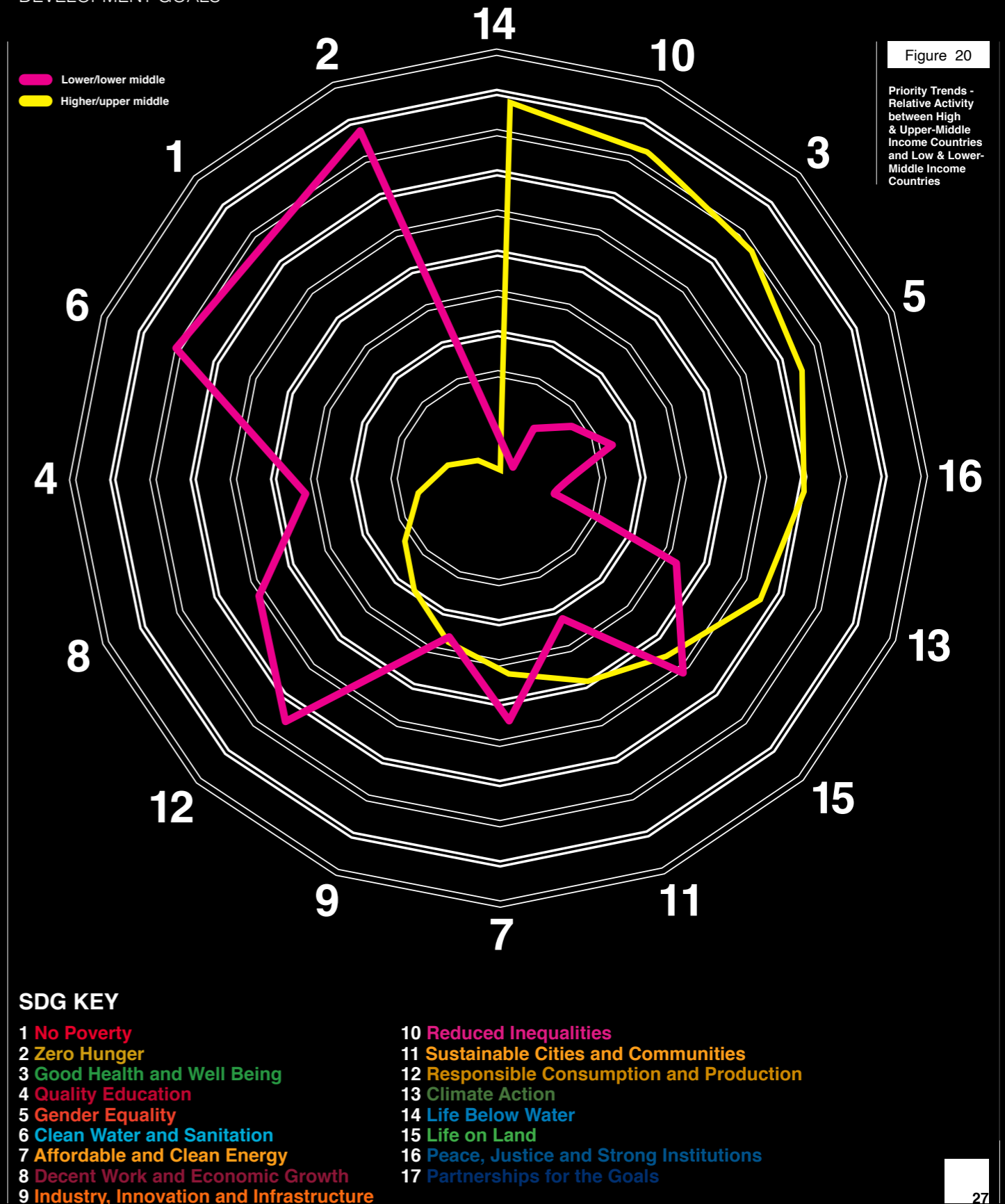
In order to obtain a metric that reflected relative activity, we obtained counts of publications that were classified by SDG and that had a Field Citation Ration >= 1 in the Dimensions dataset.

These were categorised by regional income and narrowed down to publication year 2015-2021.

The proportion of the total of publications were grouped by income category and then ranked in by SDG.

The following graphic illustrates the ranking by region where 1 is the outer circle and 17 is the centre. Please note that SDG10 and SDG3 ranked joint 2nd for Higher and Upper-Middle income regions.

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The proportion of the total of publications were grouped by income category and then ranked in by SDG.

The following graphic illustrates the ranking by region where 1 is the outer circle and 17 is the centre. Please note that SDG10 and SDG3 ranked joint 2nd for Higher and Upper-Middle income regions.

The chart clearly demonstrates the varied research priorities by region. As expected, Zero Hunger SDG2 and No Poverty both rank highly in low and lower-middle income countries, as does Clean Water and Sanitation (SDG6).

Figure 20

Priority Trends -
Relative Activity
between High
& Upper-Middle
Income Countries
and Low & Lower-
Middle Income
Countries

Legend:
— Lower/lower middle
— Higher/upper middle

SDG KEY

1 No Poverty
2 Zero Hunger
3 Good Health and Well Being
4 Quality Education
5 Gender Equality
6 Clean Water and Sanitation
7 Affordable and Clean Energy
8 Decent Work and Economic Growth
9 Industry, Innovation and Infrastructure

10 Reduced Inequalities
11 Sustainable Cities and Communities
12 Responsible Consumption and Production
13 Climate Action
14 Life Below Water
15 Life on Land
16 Peace, Justice and Strong Institutions
17 Partnerships for the Goals

FOCUSING ON SPECIFIC SDGS – CLIMATE ACTION (SDG13) AND GOOD HEALTH AND WELLBEING (SDG3)

With regard to Climate Action (SDG13), the region with the highest number of publications is Europe & Central Asia, with a total of 77,242 publications across the past 5 years. The region with the second-highest number of publications is East Asia & Pacific, with 69,901 publications.

However, when considering international collaboration, the region with the highest percentage of collaboration is Sub-Saharan Africa, with 61% of their publications being a result of international collaboration. The region with the second-highest percentage of collaboration is Latin America & Caribbean, with 59% of their publications being a result of international collaboration. The MENA region has on average 57% international collaboration.

International collaboration is common: Across all regions, a significant percentage of publications involve international collaboration, with the average being around 50%. This suggests that climate action is a global issue that requires cooperation and coordination among researchers from different countries and regions.

Publication numbers are increasing: The dataset shows that the number of publications on climate action is increasing across all regions over time. This suggests that climate action is becoming an increasingly important and relevant topic in research.

Cross-regional collaboration is increasing: The underlying data (not pictured) shows that the number of publications that involve cross-regional collaboration is increasing over time, suggesting that researchers from different regions are increasingly working together to address climate action. Overall, these trends suggest that climate action is a growing area of research that requires collaboration and support from governments, as well as a global perspective.

The regions ranked by the number of publications in SDG 13 Climate Action in descending order are: Europe & Central Asia; East Asia & Pacific; North America; Latin America & Caribbean; Middle East & North Africa; South Asia; and Sub-Saharan Africa.

The region with the highest number of publications is North America, with over 100,000 publications in 2020 and 2021.
Europe and Central Asia also have a high number of publications, with over 95,000 in 2020 and 2021.
Sub-Saharan Africa has the lowest number of publications, with around 13,000 in 2020 and 2018.
In terms of international collaboration, South Asia has the highest percentage of publications with international collaboration ranging from 36% to 41% over the 5 year span, while Europe and Central Asia have the highest absolute number of international collaborations with over 33,000 in 2020 and 2021.

The percentage of publications with international collaboration has generally increased over time across all regions apart from East Asia and Pacific, with the Middle East and North African region having the largest increase (41% to 54%).

NO. OF PUBLICATIONS ON SDG13 CLIMATE ACTION BY REGION

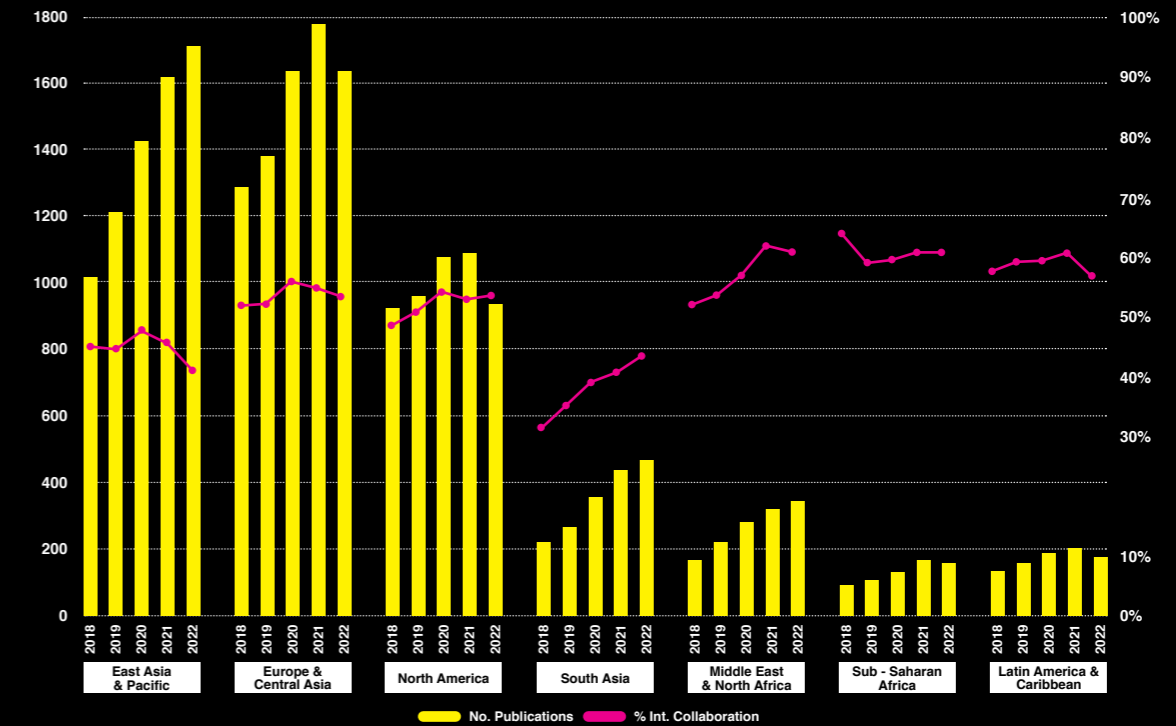No. Publications   % Int. Collaboration

Figure 21

SDG13 Research output by top ranked 5 countries within geographical region & collaboration trends

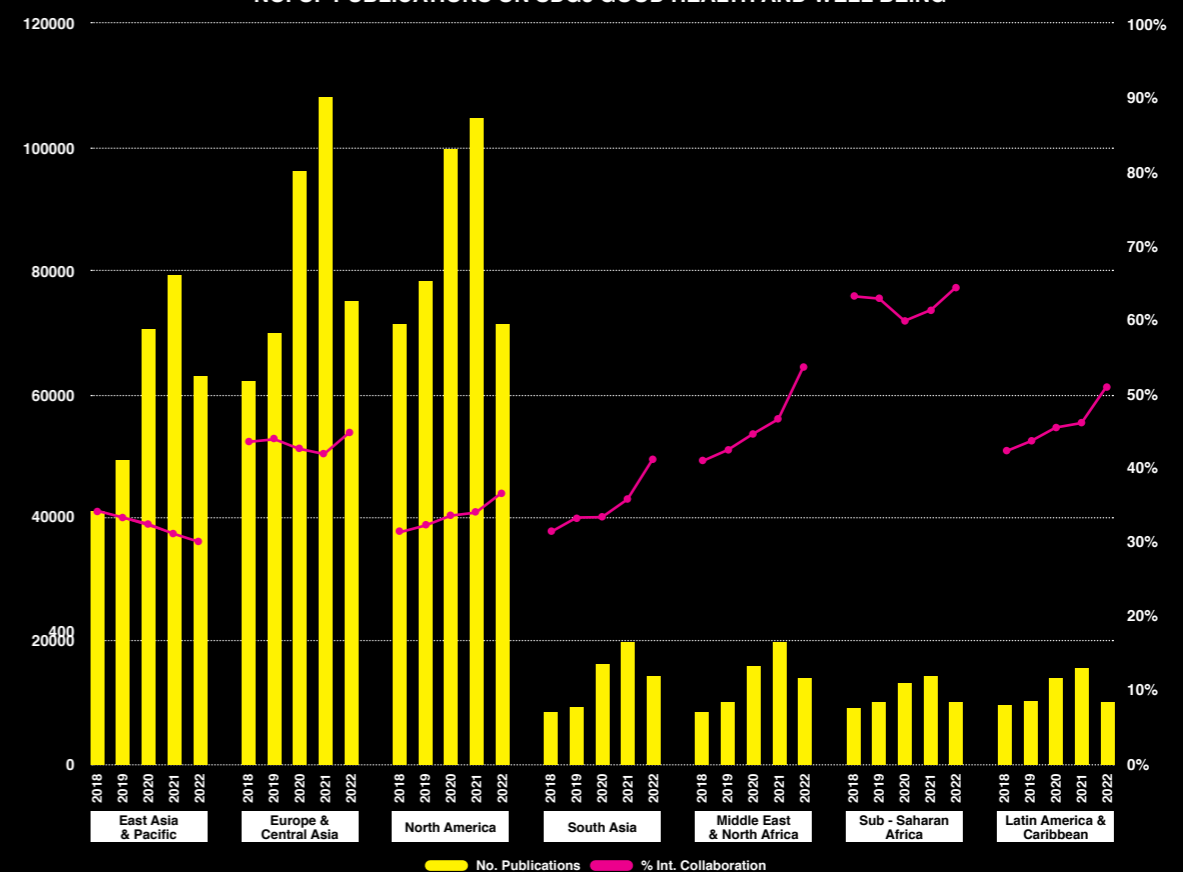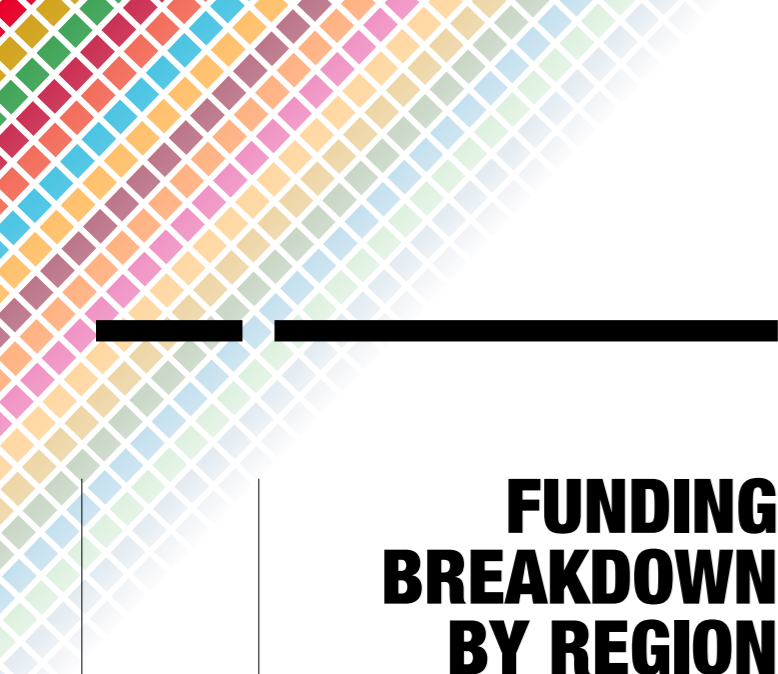**NO. OF PUBLICATIONS ON SDG3 GOOD HEALTH AND WELL BEING**

No. Publications   % Int. Collaboration

Figure 22

SDG13 Research output by top ranked 5 countries within geographical region & collaboration trends

FUNDING BREAKDOWN BY REGION

To gain a deeper understanding of the research landscape, it is also essential to analyze the funding sources behind the research output, taking into consideration the geographical regions involved. By examining these interconnected dimensions, we can better evaluate the true impact of research and foster a more equitable and effective approach to advancing sustainable development on a global scale.

The data used in the analysis below include publications classified with at least 1 SDG between 2014 and 2023. For the purposes of this introductory analysis, we focus on 4 geographical regions: Sub-saharan Africa, Middle East and North Africa, Europe and Central Asia and East Asia and Pacific. The data demonstrates that research output is heavily funded by Government bodies in the APAC region in comparison to the MENA region.

Government funding is still the main contributor for all regions, reflecting the role of governments in supporting global research activities. Europe and Central Asia and East Asia & Pacific however stand out with a significantly higher volume of government funding compared to the other regions, indicating a stronger commitment to research and development by governments in these regions. Education funding is slightly more prominent in MENA, highlighting the importance of research in educational settings and academic institutions within this region.

The analysis highlights the diverse funding landscape across regions and underscores the need for continued investment and collaboration between various stakeholders to promote research, innovation, and progress towards the SDGs.

Suggested future analysis should include funding by research area. This will provide further insights into the specific areas of focus and priorities within each region. By examining the distribution of funding across research areas, we will gain a better understanding of the alignment between research investments and the SDGs. This analysis will help further identify areas of strength and potential gaps, enabling policymakers and funding agencies to make informed decisions and allocate resources more effectively..

Having examined the intricacies of measuring research impact in lower-income countries, including the exploration of alternative metrics and the analysis of funding sources, we shift our focus to the participation of universities in the Times Higher Education Impact Rankings across different regions. As we delve into this topic, we explore how universities from diverse geographical locations contribute to the assessment of their societal and sustainable development impacts. By investigating the participation trends and performances of universities worldwide, we gain valuable insights into the global landscape of higher education's engagement with the SDGs. This exploration not only highlights the progress made by institutions in addressing societal challenges but also underscores the importance of fostering collaborations and knowledge sharing among universities across the globe to drive collective efforts towards sustainable development.
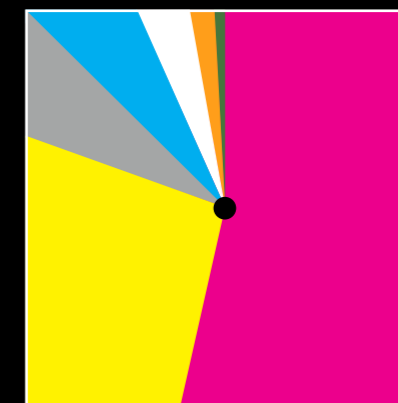
Figure 23

SUB - SAHARAN AFRICA FUNDING BEHIND PUBLICATIONS
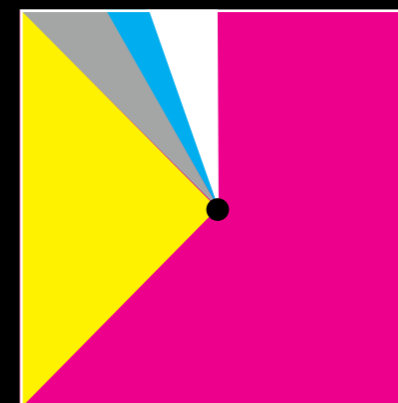
■ Government ■ Nonprofit ■ Healthcare
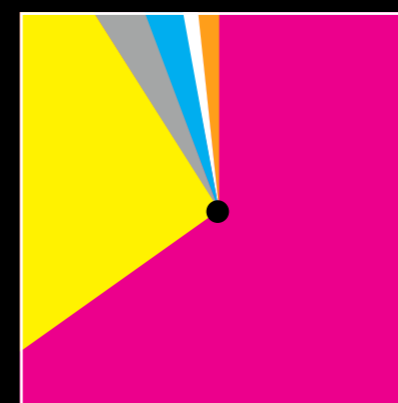■ Company ■ Other

Figure 24

MIDDLE EAST & N. AFRICA FUNDING BEHIND PUBLICATIONS

■ Government ■ Nonprofit ■ Education
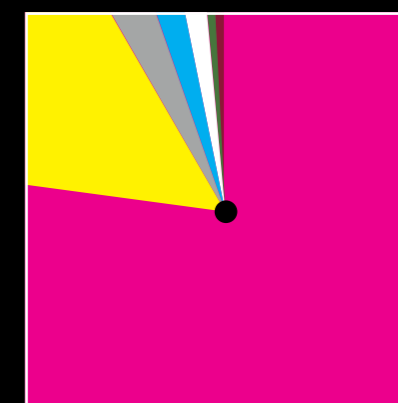■ Facility ■ Company ■ Healthcare ■ Other

Figure 25

EUROPE AND CENTRAL ASIA FUNDING BEHIND PUBLICATIONS

■ Government ■ Nonprofit ■ Company
■ Facility ■ Other ■ Education

Figure 26

EAST ASIA AND PACIFIC FUNDING BEHIND PUBLICATIONS

■ Government ■ Nonprofit ■ Company
■ Facility ■ Healthcare ■ Education ■ Other

HYPOTHESIS 3
TIMES HIGHER EDUCATION IMPACT RANKING 2022

Times Higher Education (THE) publishes the annual Impact Rankings, which measure how universities are contributing to the United Nations Sustainable Development Goals (UN SDGs). There are over 200 metrics that have been mapped to the 17 UN SDGs, which demonstrate how universities contribute toward research, teaching, outreach and stewardship for each SDG.

Using the World Bank income-level categories, this section shows how universities in countries from different income groups have performed in the research metrics that have been aligned to each of the UN SDGs. A full list of the research metrics used can be found in Table 1 on page 35 .

Universities that participate in the Impact rankings can submit data for as many SDGs as they wish; to be ranked, they must submit data for SDG 17 and three more SDGs. SDG 17- Partnership for Goals- is compulsory, as it reflects the core of the mission of universities to support global sustainability and the UN SDGs. As such, any data

presented in the following analysis for SDG 17 represents the totality of institutions that participated in the Impact Rankings.

The data for SDG 17 in figure 27 shows the overall number of universities that participated in the THE Impact Rankings in 2022 according to the World Bank income group category that their country belongs to.

It should be noted that here, and for the rest of the analysis, universities from low-income countries have been excluded due to low participation and the potential to skew data. Only six universities from low-income countries participated in the Impact Rankings, representing five different countries. The performance of these universities should be commended, however the small number of participants makes comparisons and trends with other income groups statistically uncredible.

Figure 28 shows that in terms of overall participation in the 2022 Impact Rankings (using SDG 17 data), there were 593 universities from high-income countries, 472 universities from upper-middle income countries, and 370 from lower middle-income countries (and 6 from low-income countries as mentioned). It also shows there were more universities from high income countries in each SDG category except SDG 1. Excluding the compulsory SDG 17, for all income groups, SDG 3 (Good Health and Well-Being) and SDG 4 (Quality Education) had the most universities submitting data. SDG 14 (Life Below Water) and SDG 15 (Life On Land) had the least submissions across all income groups.

The participation data in figure 28 shows that measured contributions to the UN SDGs are dominated by universities in high-income and upper-middle income countries, reflecting the broader global structural imbalance of power, wealth and influence. However, relational dynamics between countries contributing to sustainability is not only down to income level; there are some countries in the high-income and upper-middle income groups that could be classified as 'Global South' in the sense that they remain impacted by the historical and structural dynamics that have shaped global power. (This London School of Economics blog provides a useful perspective on the analytical relevance of the term 'Global South')

Other factors influencing participation may include resourcing; it is far more likely that universities in high-income or upper-middle income groups have organizational capacity and resources to collate data.

03

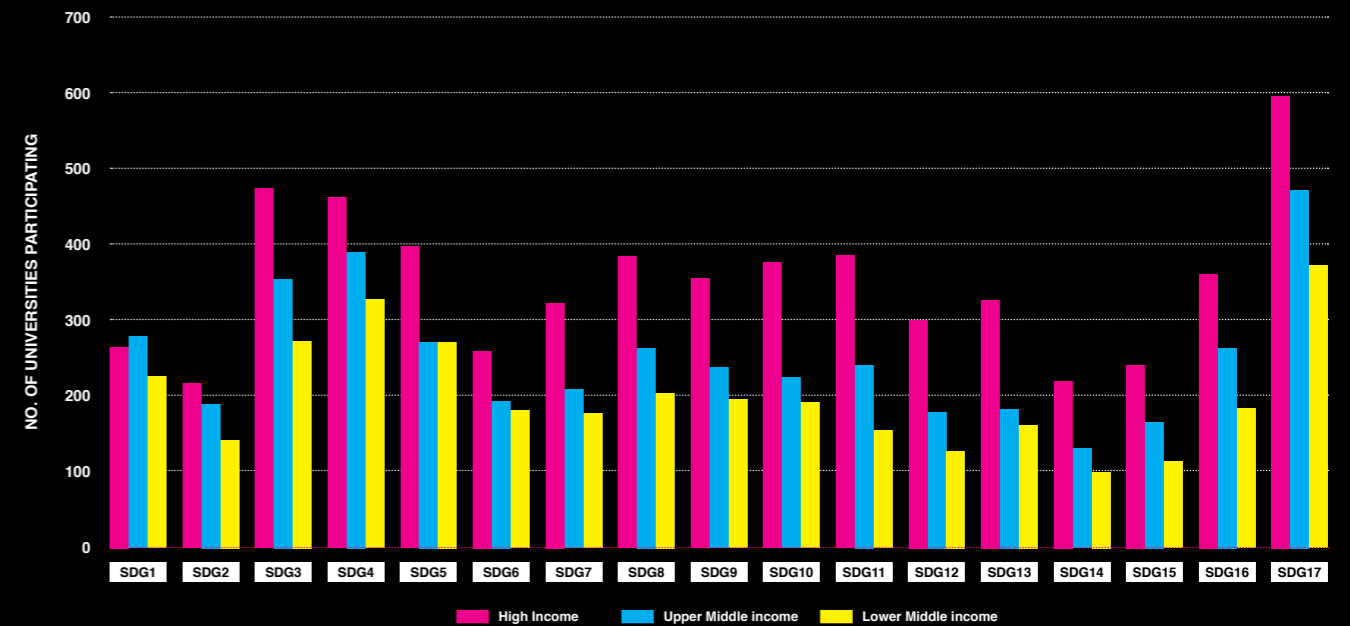**OVERALL PARTICIPATION IN EACH SDG ACCORDING TO INCOME GROUP 2022**

Overall participation of universities in each UN SDG according to income group in 2022

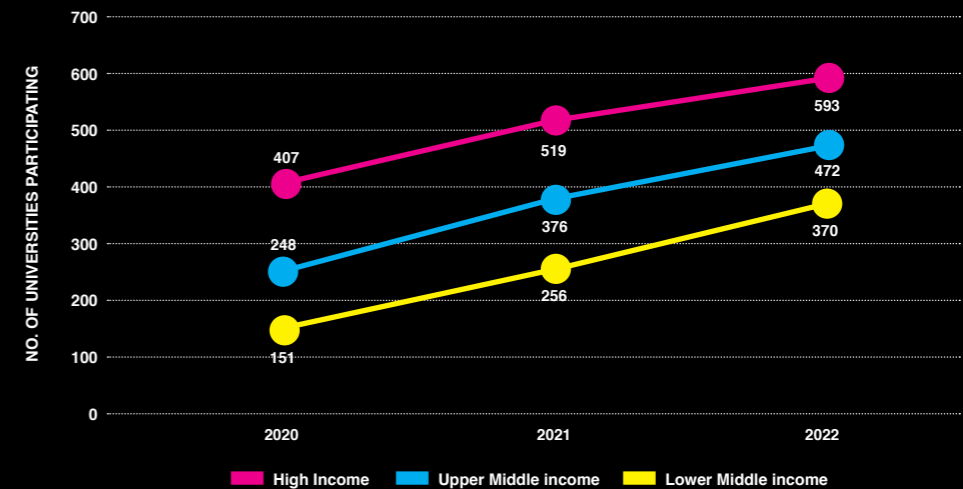**GROWTH IN UNIVERSITIES PARTICIPATING IN THE IMPACT RANKINGS**

Figure 28

Apere, quius iae et, non vid more intem ia estrat. Ducommolica, nonsultod dium

A positive sign is that the number universities participating in the Impact Rankings from countries in all income groups has risen in the last three years, as figure 2 shows. This means that more universities are submitting transparent and relevant data to be analysed for their contributions to the SDGs, which in turn can lend a better understanding of global best practice for the SGDs, and the opportunities and challenges for universities moving forward.

RESEARCH METRICS FOR THE SDGS
For all 17 SDGs, THE has created research metrics to measure the quality and quantity of university contributions to the SDGs, using the Scopus datasets. The full methodology for 2022 can be found here. In most of the SDGs there are three research metric indicators; SDG 8 and 13 have two research metric indicators, and SDG 9 has just one.

The table below shows all the research metrics used in the THE Impact Rankings. Some definitions to consider include:

a) Citescore (appears columns 'Research Metric 1' and 'Research Metric 2'): proportion of university's publication that appear in the top 10% of journals relevant to that SDG (using the Citescore metric). It is mean to reflect the excellence of academic output.

b) FWCI (usually under column 'Research Metric 2'): refers to Field Weighted Citation Impact, a normalised number of citations a publication receives as proxy for quality of academic output.
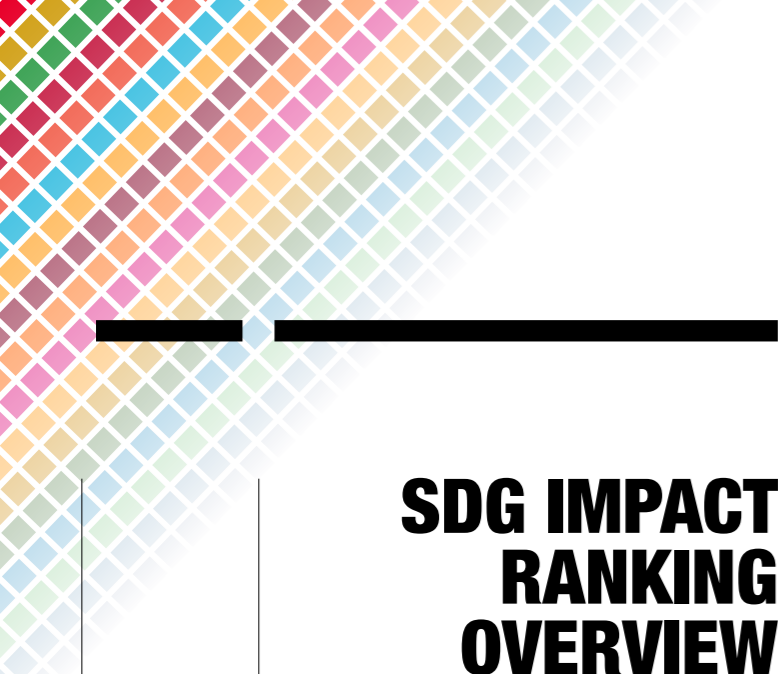
c) Publications (usually under column 'Research Metric 3'): The number of publications looks at the scale of research output from a university relevant to that SDG

Table 1

Research Metrics used in the THE Impact Rankings

SDG GROUP	Research Metric 1	Research Metric 2	Research Metric 3
SDG 1: No Poverty	1.1.1 Papers co-authored with low or lower-middle income	1.1.2 No poverty: FWCI	1.1.3 No poverty: publications
SDG 2: Zero Hunger	2.1.1 Zero Hunger:	2.1.2 Zero hunger: FWCI	2.1.3 Zero hunger: publications
SDG 3: Good Health and Well-Being	3.1.1 Good Health and Well-being: paper views	3.1.2 Clinical citations	3.1.3 Good Health and Well-being: publications
SDG 4: Quality Education	4.1.1 Quality Education: paper views	4.1.2 Quality Education: CiteScore	4.1.3 Quality Education: publications
SDG 5: Gender Equality	5.1.1 Proportion of research with female authors	5.1.2 Gender Equality: CiteScore	5.1.3 Gender Equality: publications
SDG 6: Clean Water and Sanitation	6.1.1 Clean Water and Sanitation: CiteScore	6.1.2 Clean Water and Sanitation: FWCI	6.1.3 Clean Water and Sanitation: publications
SDG 7: Affordable and Clean Energy	7.1.1 Clean Water and Sanitation: publications	7.1.2 Affordable and Clean Energy: FWCI	7.1.3 Affordable and Clean Energy: publications
SDG 8: Decent Work and Economic Growth	8.1.1 Decent Work and Economic Growth: CiteScore	8.1.2 Decent Work and Economic Growth: publications	
SDG 9: Industry, Innovation and Infrastructure	9.1.1 Industry, Innovation and Infrastructure:		
SDG 10: Reduced Inequalities	10.1.1 Reduced Inequalities: CiteScore	10.1.2 Reduced Inequalities: FWCI	10.1.3 Reduced Inequalities: publications
SDG 11: Sustainable Cities and Communities	11.1.1 Sustainable Cities and Communities:	11.1.2 Sustainable Cities and Communities: FWCI	11.1.3 Sustainable Cities and Communities: publications
SDG 12: Responsible Consumption & Production	12.1.1 Responsible Consumption and Production: CiteScore	12.1.2 Responsible Consumption and Production: FWCI	12.1.3 Responsible Consumption and Production: publications
SDG 13: Climate Action	13.1.1 Climate Action: CiteScore	13.1.2 Climate Action: FWCI	13.1.3 Climate Action: publications
SDG 14: Life Below Water	14.1.1 Life Below Water: CiteScore	14.1.2 Life Below Water: FWCI	14.1.3 Life Below Water: publications
SDG 15: Life On Land	15.1.1 Life On Land: CiteScore	15.1.2 Life On Land: FWCI	15.1.3 Life On Land: publications
SDG 16: Peace, Justice and Strong Institutions	16.1.1 Peace, Justice and Strong Institutions: CiteScore	16.1.2 Peace, Justice and Strong Institutions: FWCI	16.1.3 Peace, Justice and Strong Institutions: publications
SDG 17: Partnership For The Goals	17.1.1 Proportion of output co-authored with low or lower-	17.1.2 Partnerships for the goals: publications	

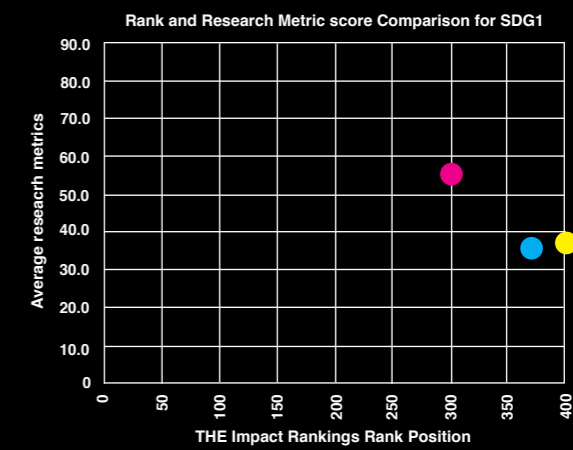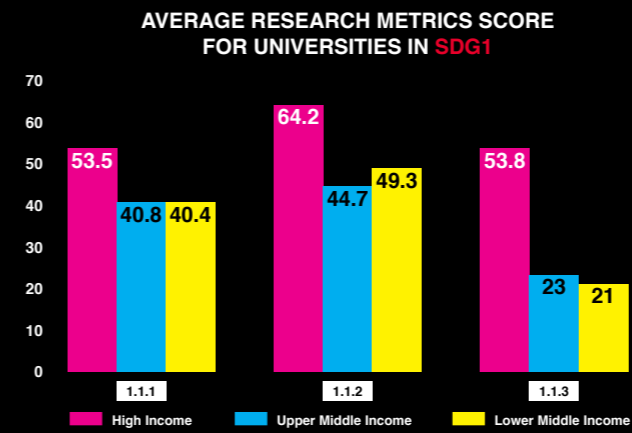# SDG IMPACT RANKING OVERVIEW

The following charts show for each SDG, the performance of universities from high, upper-middle and lower-middle income countries.

For SDG 1, figure 29 shows universities from high-income countries perform considerably between than those from other income-groups, particularly in metric 1.1.3 which looks at the scale of publications on the theme of 'No Poverty'. The data indicates a need for universities in both upper- and lower- middle income countries to increase the quantity of publications in this area. However, the scores for metric 1.1.2 show a narrower gap between the three income-groups, and a higher average research score for universities in lower-middle income countries than in upper-middle income countries. This trend is also reflected in figure 30, which shows that although universities in lower-middle income countries have a lower average rank, they slightly outperform the upper-middle income countries on overall average research metrics score for SDG 1.
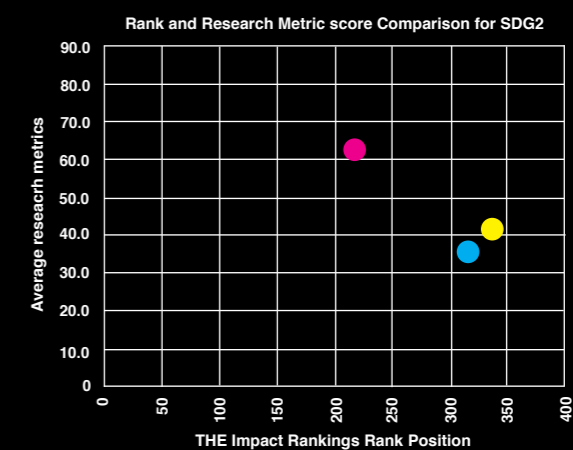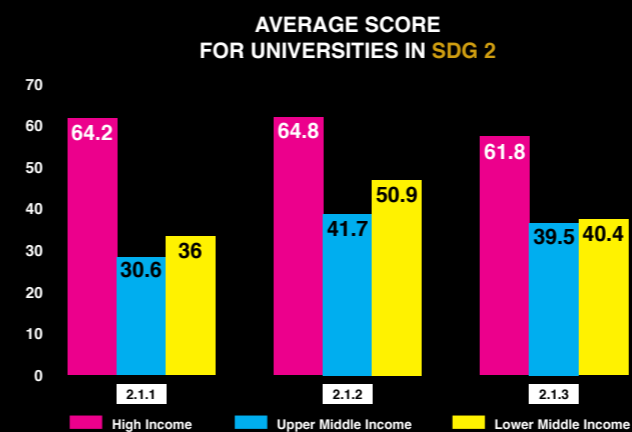
For SDG 2, figure 31 shows that across all research metrics, universities from lower-middle income countries performed better than those from upper-middle income countries in terms of average score. The research metrics for SDG 2 'Zero Hunger' showcase university research in terms of excellence (CiteScore), quality (FWCI) and scale (publications). However, universities from lower-middle countries have a slightly lower average rank than universities from upper-middle income countries. This is largely because of a heavier distribution of lower ranked universities at the lower end of the ranking scale, particularly from the Europe and Central Asian region (principally Ukraine, Uzbekistan and Kyrgyzstan). Across both upper-middle income and lower-middle income categories, there universities from the Europe and Central Asian region had lower average ranks than those from the South Asia or East Asia and Pacific region.

As figure 33 shows, the SDG research metric score for 3.1.1 – views or downloads for research on SDG 3 Good Health and Well-Being- show a remarkable closeness on average score between universities from high, upper-middle and lower-middle income countries. With only 4.6% between high and lower-middle income countries on this indicator, it shows that downloads for research papers on this SDG has relative equity across income-groups. However, research metrics for 3.1.2 (clinical citations) and 3.1.3 (scale of output) show a vast gap between universities from high income countries on the one hand, and universities from upper- and lower-middle income countries on the other. This consequently impacts on the overall average metric, with high-income over 20% higher than upper-middle income. It also impacts average rank, as can be seen in figure 34.
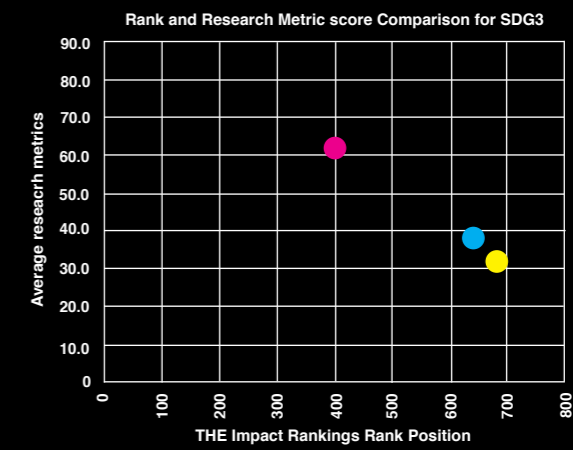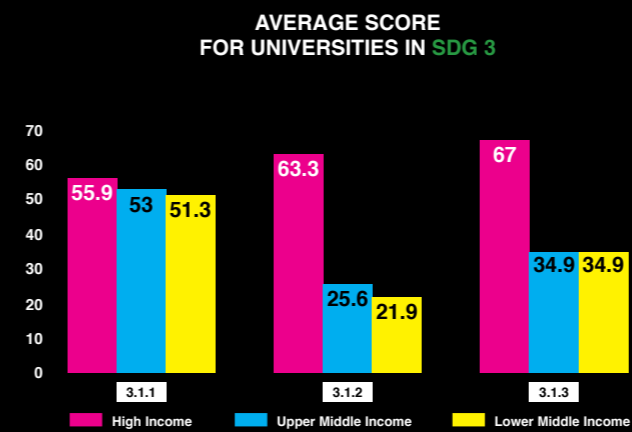
AVERAGE RESEARCH METRICS SCORE FOR UNIVERSITIES IN SDG1

Rank and Research Metric score Comparison for SDG1

Figures 29 & 30

AVERAGE SCORE FOR UNIVERSITIES IN SDG 2

Rank and Research Metric score Comparison for SDG2

Figures 31 & 32

AVERAGE SCORE FOR UNIVERSITIES IN SDG 3

Rank and Research Metric score Comparison for SDG3

Figures 33 & 34

For SDG 4, figure 35 shows that similar to SDG 3, the metric related to views and downloads (4.1.1) has a narrower gap between the income groups, with less than 10% difference on the average score between universities from high income countries compared to those from lower-middle income countries. This trend, demonstrated in two SDGs, shows that measuring research through downloads/views (rather than say, citation impact or CiteScore, may be more equitable for countries in the lower income categories. The other research metrics used for this SDG- CiteScore (4.1.2) and publications (4.1.3) restore the far bigger gap between high income countries and the others, with over a 40% gap between high and lower-middle income countries for 4.1.3
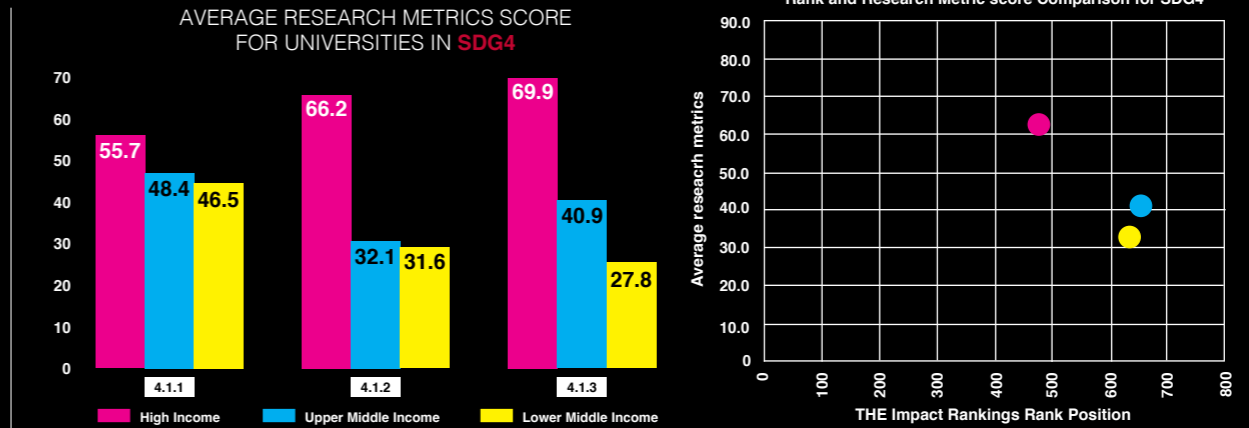
Although the average research metric score for universities from upper-middle incomes is higher than those from lower-middle income countries, the lower-middle income group has a slightly higher rank, as show in figure 36. This can be accounted for by a large number of low ranked university in this SDG from the Russian Federation and Iraq.

As shown in figure 37, the first research metric score for SDG 5 (5.1.1- proportion of research with female authors), is higher for both universities from upper-middle income countries and lower-middle countries than those from high income countries- a rare occurrence across the SDGs. Universities from the higher income countries lead on the other metrics (CiteScore and publications)- significantly so- and the ranking comparison in figure 38 shows the common pattern of high average and higher rank for high income countries compared to the others.
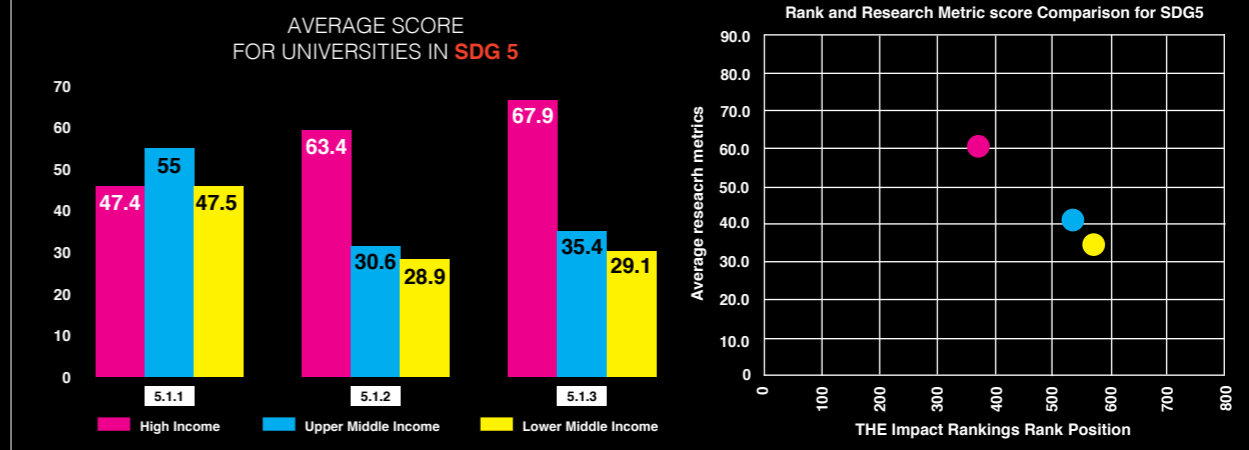
However, there is real significance in the scored for 5.1.1, indicating again that research measures that are different from the mainstream indicators (FWCI, CiteScore and Publications), can bring about a more equitable position for non-high income countries. In the case of SDG 5, it is clear that universities from upper-middle and lower-middle income countries do have an greater relative percentage of research with female authors, arguably contributing to achieving the SDG 5 target more than high income countries.

As figure 39 shows, the key noticeable trend across all three research metrics for SDG 6 is that universities from lower-middle income countries perform better than those from upper-middle income countries, with the largest gap being nearly 15% for metric 6.1.2, which measures FWCI. It is rare for FWCI to be higher from lower-middle income countries, which indicates that the quality of research from lower-middle income countries for Clean Water and Sanitation should be relatively strong. The performance of universities from lower-middle class countries also impacts the rank averages, as shows in figure 40, where they have a higher average rank and higher average research score than universities from upper-middle income countries. Underlying data shows that this was driven by strong performances from universities in Indonesia and India.

AVERAGE RESEARCH METRICS SCORE FOR UNIVERSITIES IN **SDG4**

Rank and Research Metric score Comparison for SDG4

AVERAGE SCORE FOR UNIVERSITIES IN **SDG 5**

Rank and Research Metric score Comparison for SDG5

AVERAGE SCORE FOR UNIVERSITIES IN **SDG 6**

Rank and Research Metric score Comparison for SDG6

Figures 35 & 36

Figures 37 & 38
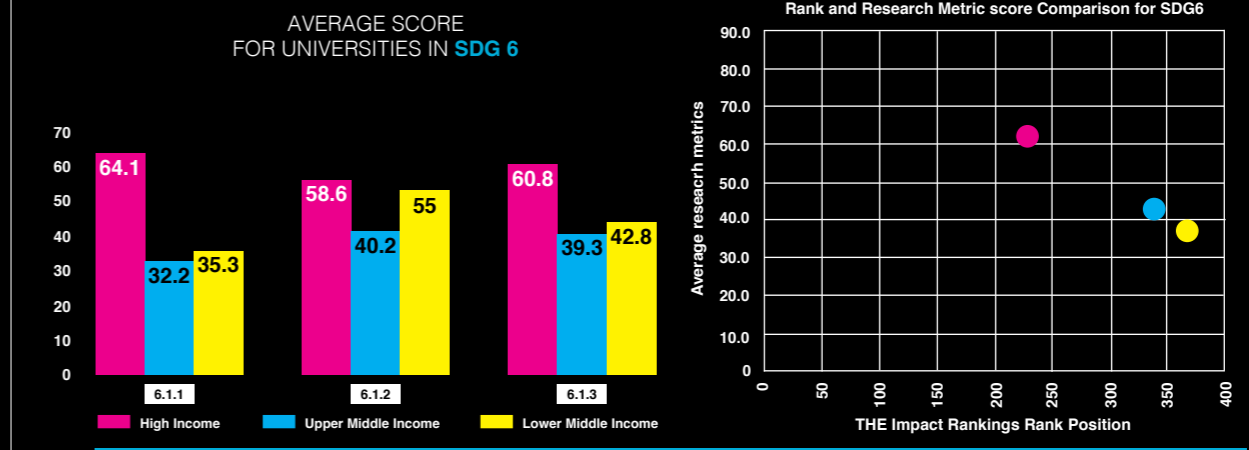
Figures 39 & 40

Figure 41 show that universities from lower-middle income countries had higher average scores that those from upper-middle countries for two out of the three metrics for SDG 7 (Affordable and Clean Energy). For metric 7.1.2 (FWCI) the lower-income group scored 9% higher than the upper-middle group, and there was a smaller difference of just over 3.5% in favour or the lower-income group for metric 7.1.3 (publications). This indicates that universities in lower-middle income countries are currently publishing more impactful research as measured though FWCI, as well as a greater output as measured through the number of publications. Although the need for affordable and clear energy is needed worldwide, the more acute effect it has on lower-middle income countries may lead to more dedicated research to solutions.

The better performance of the lower-middle income group is also reflected in the average rank, with universities from lower-middle income groups ranked 35 places higher than the upper-middle income groups. This is partially stimulated by high performance of universities from India, Indonesia and Egypt in the lower-middle income group, and under-performance by some universities in Turkey, Brazil and Iraq in the upper-middle income group.
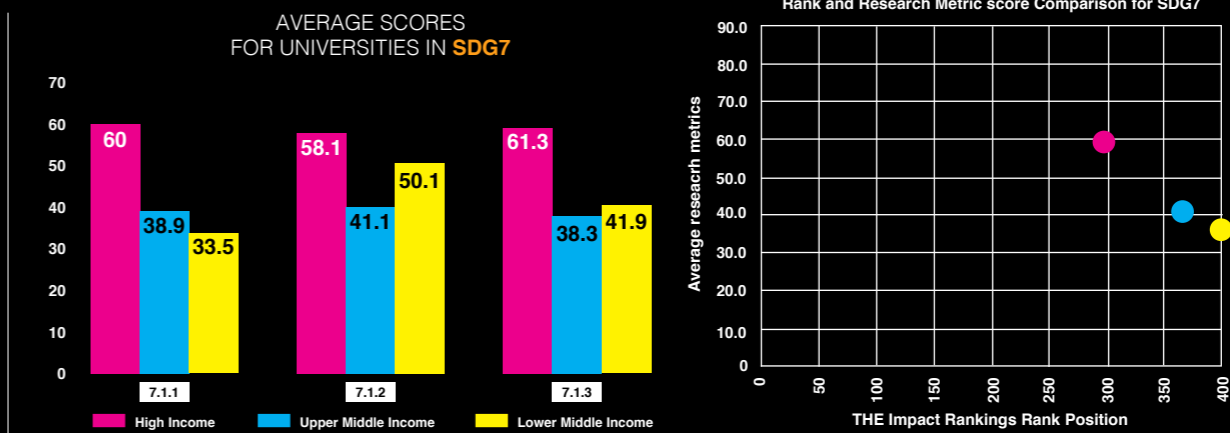
Figure 43 shows that universities in high income countries perform significantly better than those from upper-middle and lower-middle income countries in both the research metrics for SDG 8 (Decent Work and Economic Growth), which cover CiteScore and publications. There is a slightly higher average of less than 2% difference for the lower-middle groups compared to the upper-middle group for research metric 8.1.1.

The overall rank position for the upper-middle income group is higher than the lower income-group, though significantly behind that of the high income group. High performing universities in the high-income group for this SDG represent a diversity of countries and educational cultures, including those from South Korea, the United Kingdom, Australia, Saudi Arabia and Bahrain in the top 10 performers.
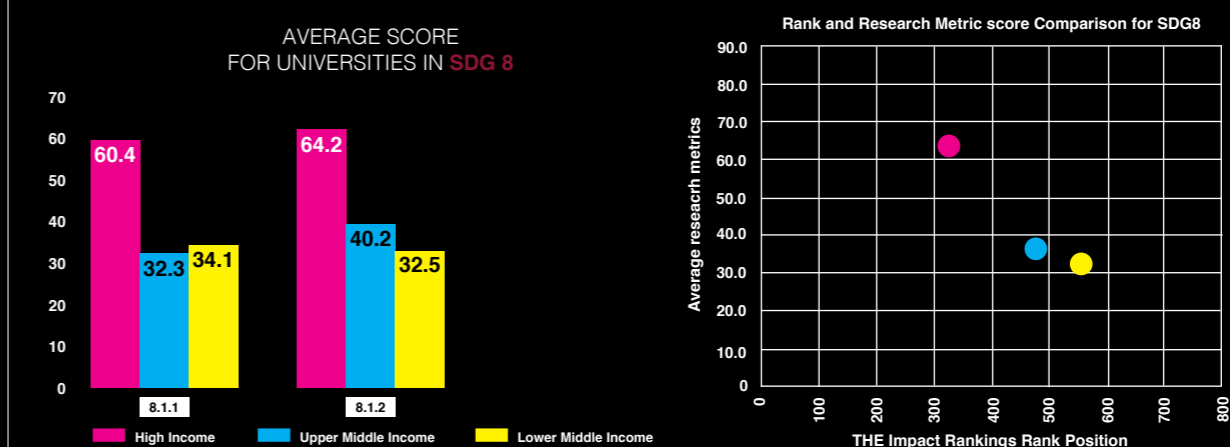
There is only one research metric used for SDG 9, which shows a large difference in the average score between high, upper-middle and lower-income groups. This metric looks at scale of publications, which may favour the academic strengths of high-income countries in subject areas related to industry, innovation an infrastructure.

Despite the large gap in both average score and rank, several universities in the upper-middle income group were ranked in the top 100 universities for this SDG, with stronger representation from China, Brazil and Turkey. There was a large variance of universities from lower-middle income groups, with no clear patterns of which countries produced higher-scale publications for this SDG.

AVERAGE SCORES
FOR UNIVERSITIES IN **SDG7**

Rank and Research Metric score Comparison for SDG7

AVERAGE SCORE
FOR UNIVERSITIES IN **SDG 8**

Rank and Research Metric score Comparison for SDG8

AVERAGE SCORE
FOR UNIVERSITIES IN **SDG 9**

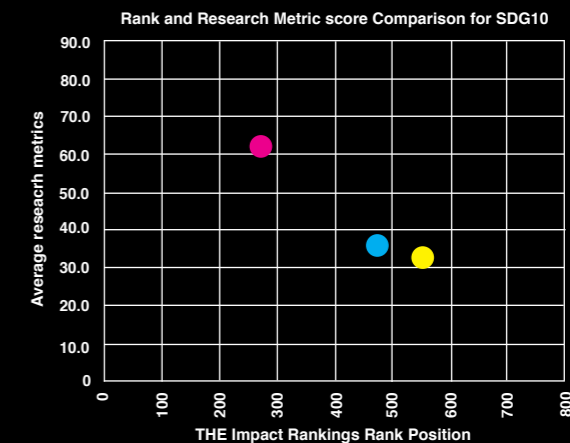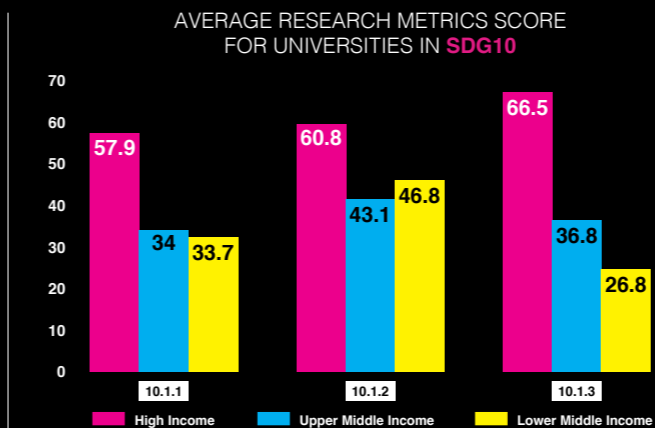Rank and Research Metric score Comparison for SDG9

Figure 47 shows that universities from high income countries perform exceptionally well in all the research metrics for SDG 10, with a particularly high score of 66.5 (nearly 30 points above the upper-middle income group) on research metrics 10.1.3, related to overall output of publications. In research metric 10.1.2, measuring FWCI, the lower-middle income group outperforms the upper-middle income group.

As figure 48 demonstrates, there is a significant rank and average score gap between the high income group and the rest. Universities from the United Kingdom have the most appearances in the top 30 for this SDG, whilst universities from South Africa are the best performing of the upper-middle income group. Only three universities from countries in the lower-income group appeared in the top 100 for this SDG. These trends point towards a need for greater collaboration between universities across the income groups, and a need to support raising the profile and quality of research in this SDG in the lower-income group.
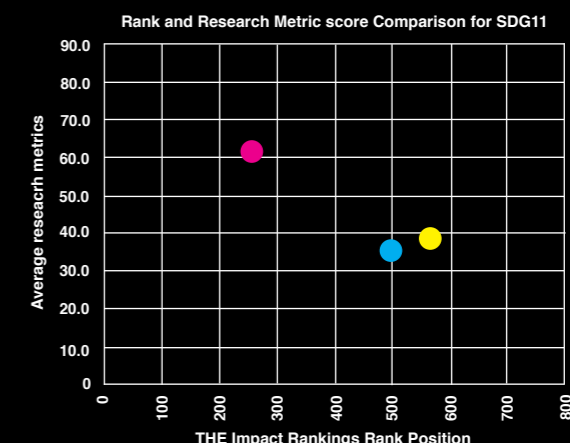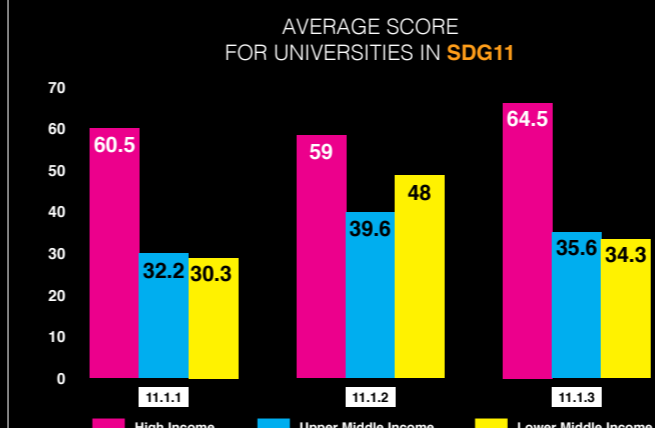
Figure 49 shows that universities from high income countries higher average scores across all three research metrics, with lead of over 25 points in 11.1.1 (CiteScore) and 11.1.3 (publications). This suggests that both the volume and excellence of research in this SDG is dominated by the high income group. For research metric 11.1.2 (FWCI), universities from lower-middle income countries have over an 8 point lead over those from upper-middle income countries, demonstrating a larger citation impact for the lower-income group. Figure 50 shows that although the upper-middle income group has a higher average rank, universities from the lower-middle income group have a higher average research score. This could be because of distribution of universities in the ranking, and also that in some of the non-research metrics for SDG 11, universities in the upper-middle income group may have more resources and better performance (e.g., metric 11.3.1 is about university expenditure on arts, culture and heritage as a proportion of total spending).

Figure 51 shows that for SDG 12 (Responsible Consumption and Production), universities from lower-middle income countries outperform those from upper-middle countries in every research metric, covering CiteScore (excellence), FWCI (quality) and publications (scale). For research metric 12.1.2, the lower-middle group is less than 4 points behind the high income group. This demonstrates a strong performance from universities in the lower-middle income group for this SDG, though there is still a significant gap between them and the high-income group interns of overall output. Figure 52 shows that universities in lower-income groups are more highly ranked and have a higher than average research score than those from upper-middle income groups. Underlying data suggests that universities in India and Indonesia contribute to the relatively higher average rank of the lower-middle income group compared to the upper-middle income group (for whom the universities from the Russian Federation pull the overall overage and rank downward).

AVERAGE RESEARCH METRICS SCORE FOR UNIVERSITIES IN **SDG10**

Rank and Research Metric score Comparison for SDG10

AVERAGE SCORE FOR UNIVERSITIES IN **SDG11**

Rank and Research Metric score Comparison for SDG11

AVERAGE SCORE FOR UNIVERSITIES IN **SDG 12**

Rank and Research Metric score Comparison for SDG12
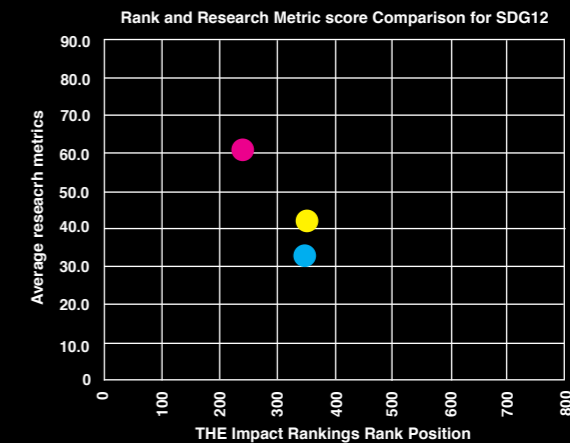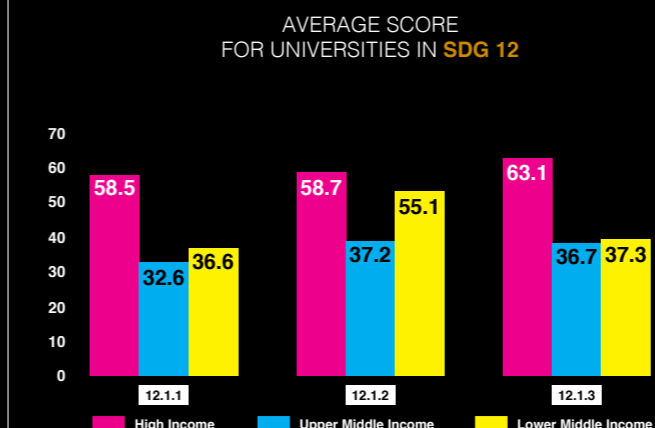
As shown in figure 26, there is variation in the performance of universities from the different income-level groups on each of the metrics for SDG 13. For research metric 13.1.2 (FWCI), there is a relatively narrower gap of 14 points between the high and lower-middle income groups, compared to a gap of almost 35 points for 13.1.3 (publications). Universities from lower-middle income countries also outperform those from upper-middle income countries in FWCI, showing a greater research impact.

In terms of average rank, there is a large distance between universities in high income group compared to others; underlying data shows that universities from high-income countries occupy 49 out of the top 50 in this SDG, with a diversity of countries including Australia, Canada, the Netherlands, the United States, Saudi Arabia, Finland, Sweden, New Zealand, the United Kingdom and Denmark all represented in the top 20. For universities in the lower-income group, stronger performances from universities in India, Pakistan and Egypt may account for the higher ranking average compared to upper-middle income countries.
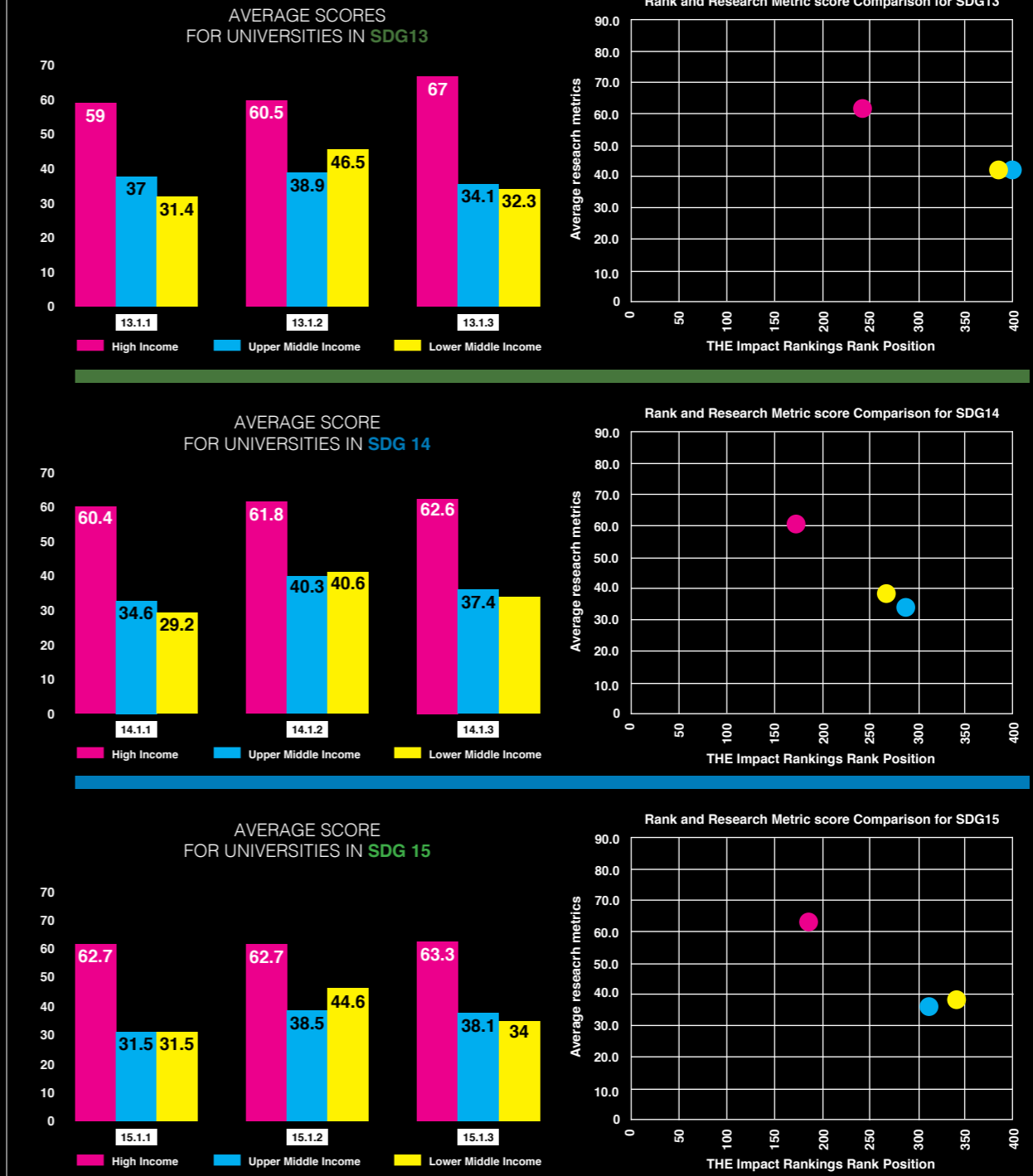
As shown earlier in figure 1, SDG 14 (Life Below Water) is the SDG with the least overall participation, across all income groups. Universities from high income group performs strongly in this SDG, with +20 points above the other income-level groups in all the research metrics, as shown in figure 28.
Figure 29 demonstrates that there is a significant ranking and average gap between universities from high income countries and the rest. Underlying data shows a domination of Anglosphere universities in Australia, the United Kingdom, Canada, the United States and New Zealand. Amongst upper-middle income countries, Thailand has the highest quality and quantity of SDG 14 related research, and universities in Indonesia are the best performing in the lower-income group.

Figure 30 shows a very high performance in the research metrics from university in high income countries in SDG 15 (Life On Land), including a gap of over 30 points in 15.1.1 (CiteScore). Universities from lower-middle income countries have a marginal lead over upper-middle income countries in 15.1.2 (FWCI) and a more significant lead in 15.1.3 (publications).
As figure 31 shows, this translates into a slightly higher overall average research score for the lower-middle income group compared to upper-middle income groups, but not a higher ranking. Whilst representation from the high-income group is again dominated by the anglosphere countries, the upper-middle income group contributions to SDG 15 represents a greater diversity of countries, including top 100 performances from universities in Thailand, Brazil, South Africa, Mexico, Costa Rica, Turkey and Malaysia. Higher-level contributions to the SDG from lower-middle income countries came primarily from universities in India and Indonesia, with Algeria and Ukraine skewing performance at the lower end of the ranking scale.

AVERAGE SCORES
FOR UNIVERSITIES IN **SDG13**

■ High Income ■ Upper Middle Income ■ Lower Middle Income

Rank and Research Metric score Comparison for SDG13

AVERAGE SCORE
FOR UNIVERSITIES IN **SDG 14**

■ High Income ■ Upper Middle Income ■ Lower Middle Income

Rank and Research Metric score Comparison for SDG14

AVERAGE SCORE
FOR UNIVERSITIES IN **SDG 15**

■ High Income ■ Upper Middle Income ■ Lower Middle Income

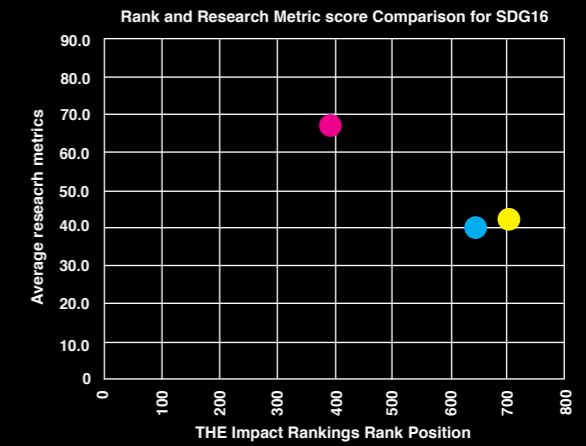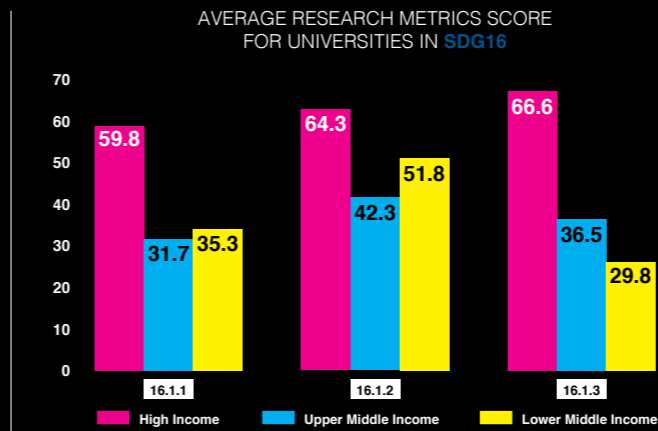Rank and Research Metric score Comparison for SDG15

Figure 59 shows high average scores in SDG 16 (Peace, Justice and Strong Institutions) for universities from high income countries, and with a +30 point gap with those from upper-middle income countries for research metric 16.1.3 (publications). This demonstrates that high income countries have a far greater scale of publications in this SDG area, and one that is reflected in both the quality (FWCI) and excellence (CiteScore). Universities from lower-middle income groups perform better than those from the upper-middle income group in both 16.1.1 (CiteScore) and 16.1.2 (FWCI), the latter by nearly 10 points, indicating a greater impact and higher relative proportion of research in global standard publications.

As figure 60 shows, this no doubt contributed to a higher overall average score for the lower-middle income group compared to the upper-middle income group, but not necessarily the average rank, which is lower. This could be due to better performance in non-research indicators for SDG 16 by universities in upper-middle income countries, which include metrics related to university governance measures, working with government and the proportion of graduate working in law and civil enforcement. There was a diversity of high-income countries represented in the top 20 for SDG 16, including Canada, Netherlands, Portugal, the United Kingdom, Japan, Italy, the United States, Germany, Switzerland, Saudi Arabia and Australia. Upper-middle income group representation was also diverse, with the Russian Federation and Colombia the most frequent in the top 150, whereas Indonesia was the only lower-middle income country with more than 3 universities in the top 200 for SDG 16.
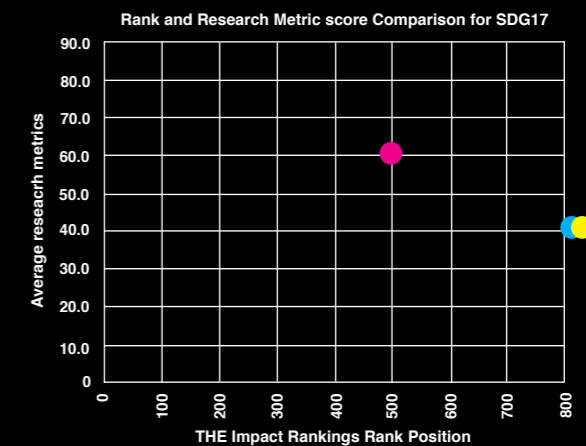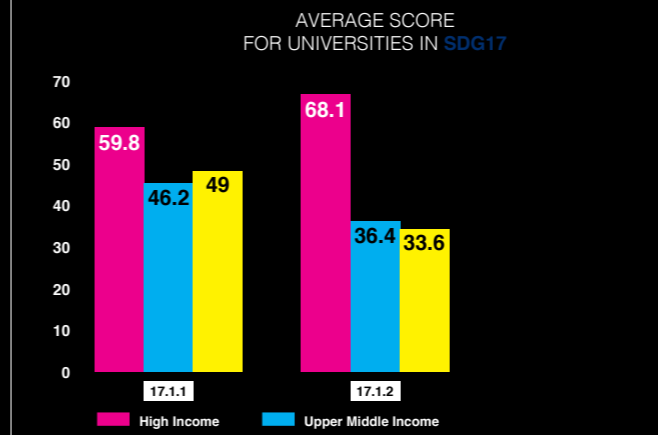
As stated at the start of this section, SDG 17 has the most participants, as it is the only compulsory submission for universities taking part in the Impact Rankings- therefore all universities that submitted data are represented in this SDG. The two research metrics shown in figure 24 confirm universities from high income countries as having higher scores, though the gap between the income groups is narrower for 17.1.1, which indicates the proportion of output authored with low or lower-middle income countries. The gap between the high and lower-middle income group is only 10 points for 17.1.1, amongst the lowest across all metrics, though it also shows more can be done to encourage publications with universities from low and lower-middle income countries. However, in research metric 17.1.2, which looks at publications, there is a vast gap of over 30 points between the high income group and the rest, indicating that high income countries still publish at a far higher scale.

This ultimately impacts the extremely large ranking gap between the high income group, where the average rank is 506, and the upper- and lower-middle income groups, where the average rank for both is 866. This is the largest gap across all the SDGs, indicating a serious gap in the overall quality of contributions. The data indicates that there is a much greater propensity to work in partnership for the SDG goals at universities in the high income countries- a deficit that can be best addressed by further collaboration with both low and lower-middle income countries. The top 20 universities for this SDG are dominated by UK and Australian universities; there are only 9 universities from upper-middle income countries in the top 100, with Thailand being the most representative, and just 2 universities in the top 100 from lower-middle income universities. Outside of the top 100, India and Indonesia are the most representative from the lower-middle income groups.

AVERAGE RESEARCH METRICS SCORE
FOR UNIVERSITIES IN **SDG16**

Rank and Research Metric score Comparison for SDG16

Figures 59 & 60

AVERAGE SCORE
FOR UNIVERSITIES IN **SDG17**

Rank and Research Metric score Comparison for SDG17

Figures 61 & 62

OVERVIEW OF RESEARCH TRENDS IN THE THE IMPACT RANKINGS

The data extracted from the research metrics that underpin each SDG in the THE Impact Rankings show a few discernible patterns. The first is that across almost all metrics, universities from high income countries perform significantly better than those from both upper-middle and lower-middle income countries; there are 47 research metrics covering the 17 SDGs, and only in 1 (5.1.1) was there a higher average for the upper-middle income group that of the high income group (and no occasions where the lower-middle income group was placed higher than the high income group).

There are, however, several instances where the gap in scores between the three income groups is narrowed, and many metrics where the lower-middle income group score more than the upper-middle income group. In SDG 4 and 5, metrics based on downloads or views empower the upper-middle and lower-middle income groups vis-à-vis the high income group, showing that this way of 'measuring' research may be more beneficial for universities in those countries. Similarly, there are a few occasions that the gaps between even the high income and lower-middle income groups are narrowed significantly. When this happened it tended to be on FWCI, and more rarely on CiteScore. However, the research metrics on publications (overall output) were always led by the high income group, and some by gaps of over 30 points.

In terms of rank and research metric average score, the general pattern was clear for all SDGs- a significant gap between the high income group and the rest. High income group always had a higher average research metric score, and a significantly higher rank. Upper-middle and lower-middle income groups were much close together, in terms of both average score and rank, with some SDGs having the lower-middle income group leading the upper-middle income group in score, rank, or both. But the basic pattern was the same, with the high income group far head of the others.

The data therefore shows that in terms of research contributions to the SDG, there is very little difference between the upper-middle and lower-middle income groups; what makes the real difference is being in the high income group. This is a serious issue of inclusivity that needs to be addressed. Although some of the SDGs showed diversity within the high income group at the higher levels of rank, many were dominated by anglosphere universities. Meanwhile the upper-middle and lower-middle income groups showed great diversity, inconsistency, and high levels of variance in the quality of research contributions. In the lower-income group, India and Indonesia appear to be leading the way, whereas the upper middle-income group was highly diversified, with universities from within countries also showing great levels of quality, excellence and output in SDG research.

> **In terms of research contributions to the SDGs, there is very little difference between the upper-middle and lower-middle income groups; what makes the real difference is being in the high income group. This is a serious issue of inclusivity that needs to be addressed.**

RESEARCH IMPACT MEASUREMENT - COMPLEMENTARY APPROACHES

The data within this paper has begun to reveal an important issue of inclusivity and research visibility in the Global South, which may contribute to a significant gap in University Impact rankings between higher income and lower income countries. We have established that traditional research metrics, while providing some measure of productivity and impact, often fail to capture the diverse range of research outputs and contributions in different contexts. It is increasingly clear that a one-size-fits-all approach cannot adequately address the nuances and specificities within individual regions.

By moving beyond traditional metrics, we can embrace a more inclusive and contextual approach to evaluating research. This involves considering a broader set of indicators that reflect the diverse goals, values, and impacts of research within specific regions.

One potential avenue for measuring research impact in lower income countries lies in examining policy citations. Research plays a pivotal role in shaping policies and driving socio-economic development and innovation, making policy citations a vital indicator of real-world impact. By analyzing how scholarly work is referenced in policy documents, reports, and governmental strategies, it is possible to gain valuable insights into the influence of research on decision-making processes and the practical applications of research.

Using SDG research output from 2016-2022 (with a FCR greater than 1), we have ranked the top 10 countries by percentage of research output that has been cited within policy. Due to small publication numbers for some countries - we excluded any countries with less than 1000 publications over this time frame.

The data highlights the significant impact of research in influencing policy decisions, even in countries with lower publication numbers. Both low-income and low-middle income countries in the dataset generally demonstrate a higher policy citation percentage, suggesting that their research is more influential in shaping policies despite lower overall publication numbers. This is with the caveat that the total number of research publications for these countries are smaller, however the trend is still clear.
Overall, the importance of research from both high-income countries and lower-income countries in informing policy-making processes and advancing the SDGs is evident. Further analysis on this data will examine the extent of collaboration behind these policy cited publications, providing insights into knowledge exchange and joint research efforts. We will also further examine geographic focus and regional partnerships with respect to research subject area. This will provide insight into interdisciplinary collaborations and should help identify unique challenges and opportunities within specific regions. Finally, it is envisaged that further exploration into the funding patterns behind policy cited research will provide further insights into the sustainability and effectiveness of research funding models in specific regions.
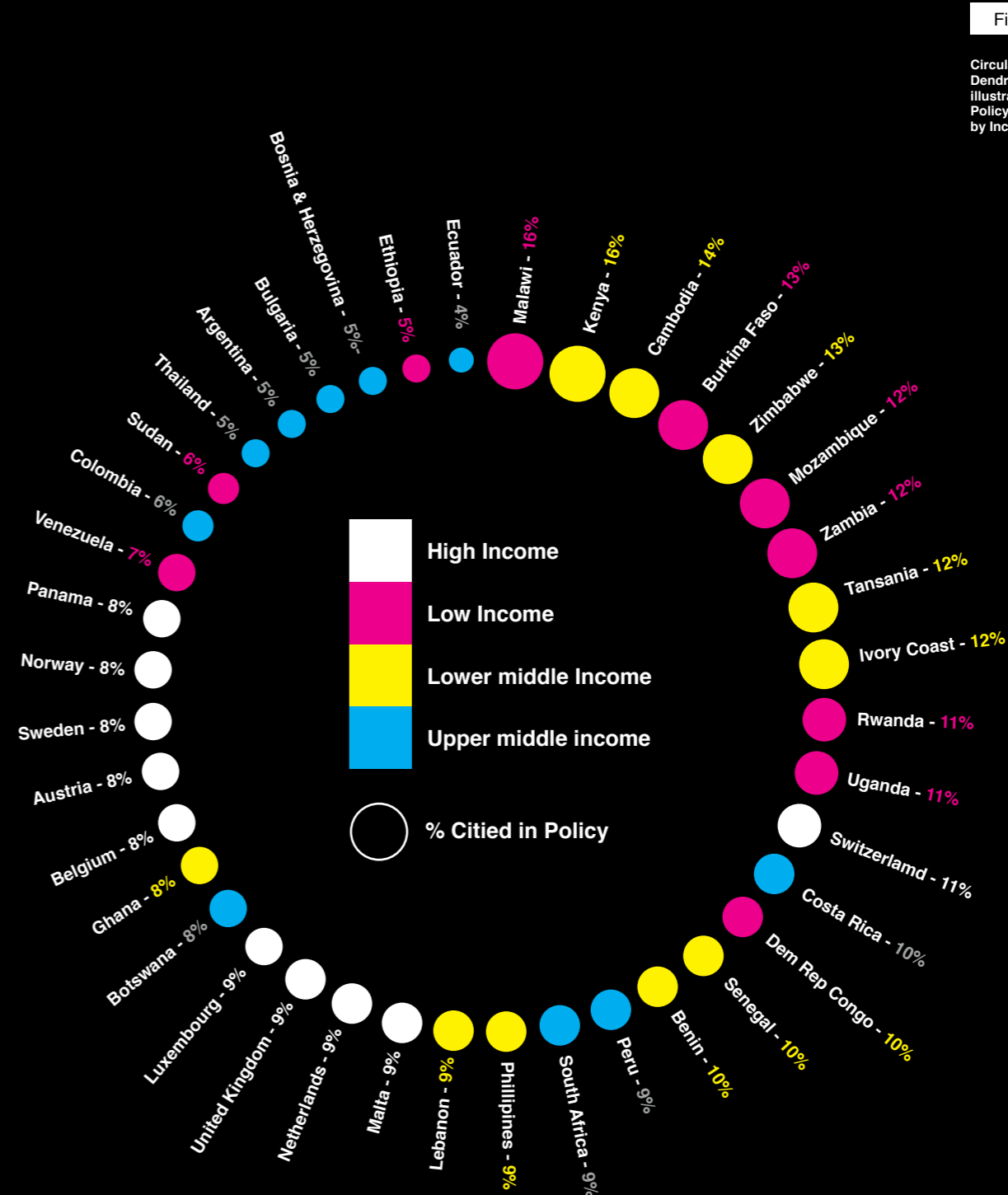
Figure 63

Circular Dendrogram illustrating SDG Policy Citations % by Income region

High Income

Low Income

Lower middle Income

Upper middle income

% Citied in Policy

RESEARCH REPRODUCIBILITY & BEST PRACTICE - TRUST MARKERS IN ETHIOPIA

Although the Global South faces unique challenges, this region clearly has its own strengths, and priorities. A brief data overview on SDG research in Ethiopia exemplifies the presence of excellent research practices in the Global South that the Global North can learn from. Ethiopia demonstrates good practices in areas such as open science, transparency and reproducibility. This is made clear through analysis of the Dimensions Research Integrity Dataset - which acts as a metric that highlights good practices in scientific communication. The data set records whether research outputs have ethical approval statements, data availability statements, author contribution statements, and other hallmarks of reproducibility and transparency. We refer to these features of high-integrity scientific reporting as Trust Markers.

Figure 64 is a data extract of SDG research output from 6 chosen countries between 2016 and 2022. Publications were filtered to those with an FCR of at least 1 or at least 2 citations in the case of those publications from 2022.

Ethiopia clearly emerges as a country that demonstrates strong adherence to best practices based on the Trust Marker data. Firstly, Ethiopia showcases the highest percentages across the multiple Trust Markers listed, including data availability (53.18%), funder statement (53.90%), ethical statement (54.38%), and author contribution statement (54.30%). These figures surpass those of other countries in the dataset. Ethiopia's commitment to consistently incorporating trust markers in its research publications exemplifies its dedication to transparency and integrity in scientific endeavours, positioning it as a leader in following best practices in Research Integrity.

Figure 64

SDG Research Europe and Central Asia with Collaboration Trends

% RESEARCH OUTPUT CONTAINING TRUSTMARKER METADATA 2016 - 2021

Conflict of interests statement
- ETHIOPIA - 71%
- Germany - 51%
- United Kingdom - 51%
- France - 52%
- Qatar- 42%
- India - 38%

Author contributions
- ETHIOPIA - 54%
- Germany - 29%
- United Kingdom - 25%
- France - 28%
- Qatar- 22%
- India - 13%

Ethics statement
- ETHIOPIA - 54%
- Germany - 14%
- United Kingdom - 20%
- France - 15%
- Qatar- 14%
- India - 11%

Funder statement
- ETHIOPIA - 54%
- Germany - 51%
- United Kingdom - 49%
- France - 48%
- Qatar - 34%
- India - 24%

Data availabiliity statement
- ETHIOPIA - 53%
- Germany - 21%
- United Kingdom - 20%
- France - 20%
- Qatar - 15%
- India - 9%

SUMMARY OF FINDINGS AND POLICY PRESCRIPTION

This innovative study offers an in-depth investigation into the research landscape based on income group - along with the levels of participation and success in THE Impact Rankings. By analysing these intertwined dimensions, the paper begins to unveil the unique challenges confronting lower income countries in attaining visibility and acknowledgment for their contributions towards the SDGs.

The transformative potential of research from lower income countries can only be fully realised through concerted efforts by multiple stakeholders. Encouraging collaboration, knowledge and expertise transfer, and leveraging influence are paramount in making research from lower income countries visible, valued, and impactful. It is imperative for policy makers, influencers, academics, and funders to actively promote and support initiatives that facilitate partnerships, knowledge exchange, and joint research endeavours between higher income and lower income countries. By recognizing and rewarding good practices and research excellence from lower income countries, it is possible to create a more equitable research landscape that appreciates the varied and diverse contributions towards sustainable development. This may necessitate embracing alternative metrics that capture the nuanced and multidimensional aspects of research impact beyond conventional or traditional measures. Additionally, fostering inclusive platforms and networks will facilitate the dissemination and uptake of research findings, ensuring their meaningful impact on policy formulation and decision-making processes.

By embracing the following recommendations, we can promote and nurture an environment where research from lower income countries is both valued and acknowledged for its crucial role in addressing global challenges and advancing the UN Sustainable Development Goals.

■ There is a pressing need to address the gaps in inclusivity and equity between high-income and low-income countries in SDG-related research. Targeted interventions should be implemented to support lower-income countries, promote research infrastructure, and provide funding opportunities to bolster their research capacities and collaborations. We will further investigate and put forward approaches to address the causes behind the large ranking gap between high-income countries and the remaining regions. This, along with continued examination of individual regions and their approach to SDG research will provide the necessary framework to identify and negotiate the challenges that are presented within these complex research ecosystems.

■ THE Impact Rankings should persevere in using its influence to help address global inequalities and promote strong SDG partnerships between regions. By continuing to highlight and recognize impactful research from diverse regions, the rankings can encourage best practices, inspire collaborations, and drive progress towards the SDGs.

Future iterations of this research can leverage THE's Impact Rankings data for granular analysis of research performance and collaborations. This will be important to put forward definitive strategies of improving SDG research co-operation between high income countries and lower-middle and low income countries. This can include data on volume of research, strategies to target highly ranked journals (as measured through CiteScore), and insight into how to improve FWCI.

■ Measuring success and promoting best practices in SDG research require robust data and information. Developing comprehensive and if necessary, bespoke metrics that capture the multidimensional aspects of research impact and align with the SDGs can provide valuable insights and guide policy-making and funding decisions. This paper emphasises the significance of research integrity in SDG-related research. Ethiopia emerges as a country exemplifying strong adherence to best practices, including open science, transparency, and reproducibility. Higher income countries have an opportunity to draw valuable insights and adopt these best practices, leveraging the knowledge transfer of effective methodologies for enhancing research integrity. By recognizing the transfer of best practice as a valuable form of impact, policymakers, influencers, academics, and funders can further support and incentivize the dissemination and adoption of effective methodologies

■ Cross-region collaboration plays a crucial role in the research ecosystem for achieving the SDGs. Encouraging and facilitating partnerships between regions can enhance knowledge exchange, leverage expertise, and foster innovation for sustainable development. Policy makers and stakeholders must incentify and accelerate SDG research collaboration between high-income and lower-income countries to ensure greater visibility of contributions. Some metrics, most notably CiteScore are dominated by research output from high-income countries. Greater collaboration will allow researchers from lower-income countries to benefit from that exposure. This relies on a greater mentality shift from universities from high income countries to collaborate with universities from lower-middle or low income countries with genuine mutality and

equity, as well as a broader ethical responsibility to uplift scholars and research from countries that suffer from structural, historical and contemporary imbalances of power in the global research eco-system.

■ Local and International Policymakers should incentivize SDG related research, In particular, the high income countries may collaborate with low income countries to reduce the ever increasing gap on research productivity.

■ Local and International Policymakers should provide local/national, regional and international strategy for conducting impact study on SDG related research through which the solutions of current issues and challenges could be identified.

In conclusion, this report underscores the need to bridge the gap in research output and participation between higher income and lower income countries. Through collaboration, inclusivity, and knowledge sharing, the global research community can work together to achieve sustainable development goals and address the challenges faced by lower income countries.

By implementing the aforementioned recommendations and fostering an inclusive research landscape, we can collectively advance towards a more equitable and impactful research ecosystem for sustainable development.

> " **Encouraging collaboration, knowledge and expertise transfer, and leveraging influence are paramount in making research from lower income countries visible, valued, and impactful.**

References

[1] United Nations. 2015. General Assembly Resolution A/RES/70/1. Transforming Our World, the 2030 Agenda for Sustainable Development. Available at: https://www.un.org/en/development/desa/population/migration/generalassembly/docs/globalcompact/A_RES_70_1_E.pdf, 21 October 2015. (Accessed at: 12 March 2023)

[2] United Nations. 2020. Shared Responsibility, Global Solidarity: Responding to the Socio-economic Impacts of COVID-19. UN Executive Office of the Secretary-General (EOSG) Policy Briefs and Papers, 19 May 2020. Available at: https://doi.org/10.18356/5c353f7e-en (Accessed at: 12 March 2023)

[3] Sugiawan, Y., Kurniawan, R., and Managi, S. 2023. Assessing the United Nations sustainable development goals from the inclusive wealth perspective. Scientific Reports (Nature), 13, pp. 1601. https://doi.org/10.1038/s41598-023-28540-0

[4] Overland, I., Sagbakken, H.F., Isataeva, A., Kolodzinskaia, G., Simpson, N.P., Trisos, C., and Vakulchuk, R. 2022. Funding flows for climate change research on Africa: where do they come from and where do they go?, Climate and Development, 14(8), pp. 705-724, https://doi.org/10.1080/17565529.2021.1976609

[5] Nonet, G.AH., Gössling, T., Van Tulder, R. and Bryson, J.M. 2022. Multi-stakeholder Engagement for the Sustainable Development Goals: Introduction to the Special Issue. Journal of Business Ethics, 180, pp. 945–957. https://doi.org/10.1007/s10551-022-05192-0

[6] Blicharska, M., Teutschbein, C. & Smithers, R.J. 2021. SDG partnerships may perpetuate the global North–South divide. Scientific Reports (Nature), 11, pp. 22092. https://doi.org/10.1038/s41598-021-01534-6

[7] Wastl, J., Porter, S., Draux, H., Fane, B., and Hook, D. 2020. Contextualizing Sustainable Development Research. Digital Science. Report, Digital Science, United Kingdom. https://doi.org/10.6084/m9.figshare.12200081.v2

[8] Basheer, M., Nechifor, V., Calzadilla, A., Ringler, C., Hulme, D., and Harou, J.J. 2022. Balancing national economic policy outcomes for sustainable development. Nature Communications, 13 , p. 5041. https://doi.org/10.1038/s41467-022-32415-9

[9] Kaklauskas, A., Milevicius, V., and Kaklauskiene, L. 2022. Effects of country success on COVID-19 cumulative cases and excess deaths in 169 countries. Ecological Indicators, 137, p. 108703. https://doi.org/10.1016/j.ecolind.2022.108703

[10] United Nations Development Programme (UNDP). 2023. Sustainable Development Goals. Available at: https://www.undp.org/sustainable-development-goals (Accessed at: 12 March 2023).

[11] Kaklauskas, A., Herrera-Viedma, E., Echenique, V., Zavadskas, E.K., Ubarte, I., Mostert, A., Podvezko, V., Binkyte, A. and Podviezko, A., 2018. Multiple criteria analysis of environmental sustainability and quality of life in post-Soviet states. Ecological Indicators, 89, pp. 781–807. https://doi.org/10.1016/j.ecolind.2017.12.070

[12] Holden, E., Linnerud, K. and Banister, D., 2014. Sustainable development: Our common future revisited. Global environmental change, 26, pp.130-139. https://doi.org/10.1016/j.gloenvcha.2014.04.006

[13] Breuer, A., Janetschek, H. and Malerba, D., 2019. Translating sustainable development goal (SDG) interdependencies into policy advice. Sustainability, 11(7), p. 2092. https://doi.org/10.3390/su11072092

[14] French, D. and Kotzé, L.J. eds., 2018. Sustainable development goals: law, theory and implementation. Edward Elgar Publishing.

[15] Sachs, J., Kroll, C., Lafortune, G., Fuller, G. and Woelm, F., 2022. Sustainable development report 2022. Cambridge University Press.

[16] Talwar, S., Wiek, A. and Robinson, J., 2011. User engagement in sustainability research. Science and Public Policy, 38(5), pp.379-390. https://doi.org/10.3152/030234211X12960315267615

[17] Norström, A.V., Cvitanovic, C., Löf, M.F., West, S., Wyborn, C., Balvanera, P., Bednarek, A.T., Bennett, E.M., Biggs, R., de Bremond, A. and Campbell, B.M., 2020. Principles for knowledge co-production in sustainability research. Nature sustainability, 3(3), pp.182-190. https://doi.org/10.1038/s41893-019-0448-2

[18] Allen, C., Metternicht, G. and Wiedmann, T., 2018. Initial progress in implementing the Sustainable Development Goals (SDGs): a review of evidence from countries. Sustainability Science, 13, pp.1453-1467. https://doi.org/10.1007/s11625-018-0572-3

[19] Weitz, N., Carlsen, H., Nilsson, M. and Skånberg, K., 2018. Towards systemic and contextual priority setting for implementing the 2030 Agenda. Sustainability Science, 13, pp.531-548. https://doi.org/10.1007/s11625-017-0470-0

[20] van Vuuren, D.P., Kok, M., Lucas, P.L., Prins, A.G., Alkemade, R., van den Berg, M., Bouwman, L., van der Esch, S., Jeuken, M., Kram, T. and Stehfest, E., 2015. Pathways to achieve a set of ambitious global sustainability objectives by 2050: explorations using the IMAGE integrated assessment model. Technological Forecasting and Social Change, 98, pp.303-323. https://doi.org/10.1016/j.techfore.2015.03.005

[21] Collste, D., Pedercini, M. and Cornell, S.E., 2017. Policy coherence to achieve the SDGs: using integrated simulation models to assess effective policies. Sustainability Science, 12, pp.921-931. https://doi.org/10.1007/s11625-017-0457-x

[22] Nilsson, M., Chisholm, E., Griggs, D., Howden-Chapman, P., McCollum, D., Messerli, P., Neumann, B., Stevance, A.S., Visbeck, M. and Stafford-Smith, M., 2018. Mapping interactions between the sustainable development goals: lessons learned and ways forward. Sustainability Science, 13, pp.1489-1503. https://doi.org/10.1007/s11625-018-0604-z

[23] Nilsson, M., Griggs, D. and Visbeck, M., 2016. Policy: map the interactions between Sustainable Development Goals. Nature, 534(7607), pp.320-322. https://doi.org/10.1038/534320a

[24] Salvia, A.L., Leal Filho, W., Brandli, L.L. and Griebeler, J.S., 2019. Assessing research trends related to Sustainable Development Goals: Local and global issues. Journal of Cleaner Production, 208, pp. 841-849. https://doi.org/10.1016/j.jclepro.2018.09.242

[25] Kaklauskas, A., and Kaklauskiene, L. 2022. Analysis of the impact of success on three dimensions of sustainability in 173 countries. Scientific Reports (Nature), 12, p. 14719. https://doi.org/10.1038/s41598-022-19131-6

[26] Xu, Z., Chau, S.N., Chen, X., Zhang, J., Li, Y., Dietz, T., Wang, J., Winkler, J.A., Fan, F., Huang, B. and Li, S., 2020. Assessing progress towards sustainable development over space and time. Nature, 577, pp. 74-78. https://doi.org/10.1038/s41586-019-1846-3

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