ICMM
International Council on Mining & Metals

SOCIAL PROGRESS IN MINING-DEPENDENT COUNTRIES

ANALYSIS THROUGH THE LENS OF THE SDGS

Contents

Executive summary

The question of whether an abundance of mineral resources hinders rather than enhances the economic progress of countries is complex and the subject of extensive study and debate. These studies have tended to focus on economic or governance metrics and overlooked social indicators meaning there is very limited research in this area. We know little about whether or how social development has progressed in resource-rich countries on metrics such as access to food, life expectancy, health, education, or water and sanitation.

To close this research gap, we examine trends across a broad set of socio-economic indicators in countries with a sustained history of mineral dependence over the past 20 years. The timeframe for this trend analysis is the two decades in the lead-up to the launch of the UN Sustainable Development Goals (SDGs). Launched in 2015, the SDGs are an ambitious set of 17 Global Goals that represent a universal call to action by UN member states to end poverty, protect the planet and ensure peace and prosperity for all by 2030.

Resource dependent countries – and why they matter

Not all resource-rich countries are resource-dependent. The definition of whether a country is resource-dependent relates to the relative economic importance of natural resources in the economic life of that country. We define a country as resource-dependent if:

1. Resources account for more than 20 per cent of export earnings; or
2. Resource rents are more than 10 per cent of gross domestic product.[1]

Applying these criteria to identify countries where the mineral and/or oil and gas sectors dominate the economy allows for an inclusive analysis of resource dependence. The most comprehensive data on export earnings and resource rents goes back to 1995, and the latest available data is 2015.

At the national level, 53 countries meet our criteria for being resource dependent for the 20-year period our research covers (Figure E1), and these can be categorised as follows:

a. 28 countries are hydrocarbon-dependent countries (HDCs), as they generate more than 75 per cent of their resources export revenue with hydrocarbons, such as oil, gas and coal.
b. 20 countries are mining-dependent countries (MDCs), as they generate more than 75 per cent of their resources export revenue with minerals and metals.

A further five countries are dependent on both minerals and hydrocarbons as their resources export revenue is derived from a mix of minerals, metals, and hydrocarbons. For the benefit of our analysis, countries labelled 'both' are grouped together with MDCs as we want to examine social progress in countries that are significantly dependent on mining.

To better understand if or how resource dependence influences social progress at a regional level, we also examine four countries that are resource dependent for a deeper, sub-national analysis – these are Chile, Ghana, Indonesia, and Peru. These countries comprise multiple regions with a range of resource dependencies.

While 53 countries have been resource dependent for the 20 years leading up to 2015, a total of 81 countries met the criteria for resource dependence in 2015. They include some of the world's poorest nations, are home to almost 30 per cent of the global population with 230 million people living in extreme poverty on less than $1.90 a day. So understanding the relative performance of countries that are resource-dependent on a range of social metrics over the past two decades is profoundly important.

Metrics of social progress – and links to the SDGs

Central to our work is the identification and analysis of more than 30 established and widely accepted social progress metrics (Figure E2), that are strongly linked to 11 of the SDGs, namely: SDG1: No poverty; SDG2: Zero hunger; SDG3: Good health & well-being;

1. Resource rents are the difference in revenues from the extraction of resources and the costs of extracting those resources. Given the lack of comprehensive data on economic value-add by sector, resource rents serve as a reasonable proxy measure of the importance of resources to overall economic output. Fiscal revenue is not used as a criterion due to a lack of a comprehensive historical data.

Figure E1: Countries that were 'resource-dependent' over the entire period from 1995–2015

	Hydrocarbons		Metal & minerals		Both
Sub-Saharan Africa	• Angola • Cameroon • Nigeria • Equatorial Guinea	• Congo • Gabon • Libya	• Botswana • Central African Republic • Niger • Mauritania • Ghana	• Guinea • Togo • Zambia • Congo, Dem. Rep • Namibia • South Africa	
Asia	• Brunei Darussalam • Indonesia • Turkmenistan		• Mongolia		• Australia • Papua New Guinea • Uzbekistan • Kazakhstan
Latin America*	• Colombia • Ecuador • Trinidad & Tobago	• Venezuela	• Bolivia • Chile • Guyana	• Jamaica • Peru • Suriname	
Middle East and North Africa & others**	• Algeria • Azerbaijan • Egypt • Iran • Iraq • Kuwait • Norway	• Oman • Qatar • Russia • Saudi Arabia • Syrian Arab Rep • UAE • Yemen	• Armenia • Georgia		• Bahrain

* Includes Caribbean countries
** Others include Europe

SDG4: Quality education; SDG5: Gender equality; SDG6: Clean water & sanitation; SDG7: Affordable & clean energy; SDG8: Decent work & economic growth; SDG9: Industry, innovation, & infrastructure; SDG10: Reduced inequalities; and SDG16:Peace, justice, & strong institutions.[2]

These social metrics provide robust and outcome-focused measures that can be used to evaluate social progress in resource dependent countries between 1995 and 2015. While these are not necessarily the same metrics countries will use to measure progress towards the achievement of the SDGs between now and 2030, we believe they provide relevant, and important insights into the relative performance of resource-dependent countries (MDCs and HDCs) in the period leading up to the launch of the SDGs.

Two important caveats apply

This research provides an approach to quantify, contextualise, and compare socio-economic progress across and within countries. While the economic impact of mining activity and the social policies of mining companies are likely to contribute to social progress (through employment, income, and social programmes), this research does not claim to attribute causality between mining and social progress.

'[Mining-dependent countries]include some of the world's poorest nations, are home to almost 30 per cent of the global population with 230 million people living in extreme poverty on less than $1.90 a day.'

2. Some of the 17 SDG areas (such as 'sustainable cities and communities'; 'responsible consumption and production'; 'climate action'; 'life below water'; 'life on land'; and 'partnerships for the goals'), while important, are either less directly relevant to social progress or lack reliable metrics to be quantified from 1995-2015.

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There are other factors in play – including government policies and capacity, the quality of governance, economic activity in other sectors, and the social programmes of non-governmental organisations and companies in non-resource sectors.

Secondly, the purpose of this work is not to make country-specific policy recommendations, especially given the global focus of the report. Instead it reaffirms the need for governments and mining companies to broaden and deepen cooperation in order for social progress to be sustained.

Key findings

1. MDCs have improved their social performance between 1995 and 2015

Life for people in countries that are 'mining-dependent' is improving. Various metrics indicate that MDCs have made substantial social progress over the past two decades. Today, people in these countries are generally healthier, wealthier, and better educated.

Our research shows that social progress in MDCs improved, in absolute terms between 1995 and 2015 (Figure E3), with greatest progress seen in providing people with improved access to infrastructure (SDG9, specifically ICT infrastructure and access to finance), more affordable and clean energy (SDG7), and in promoting good health and well-being (SDG3) between 1995 and 2015. For each of these areas, over 90 per cent of the metrics across all countries improved.

Progress was weakest across various governance (SDG16: Peace, justice, & strong institutions), gender equality (SDG5: Gender

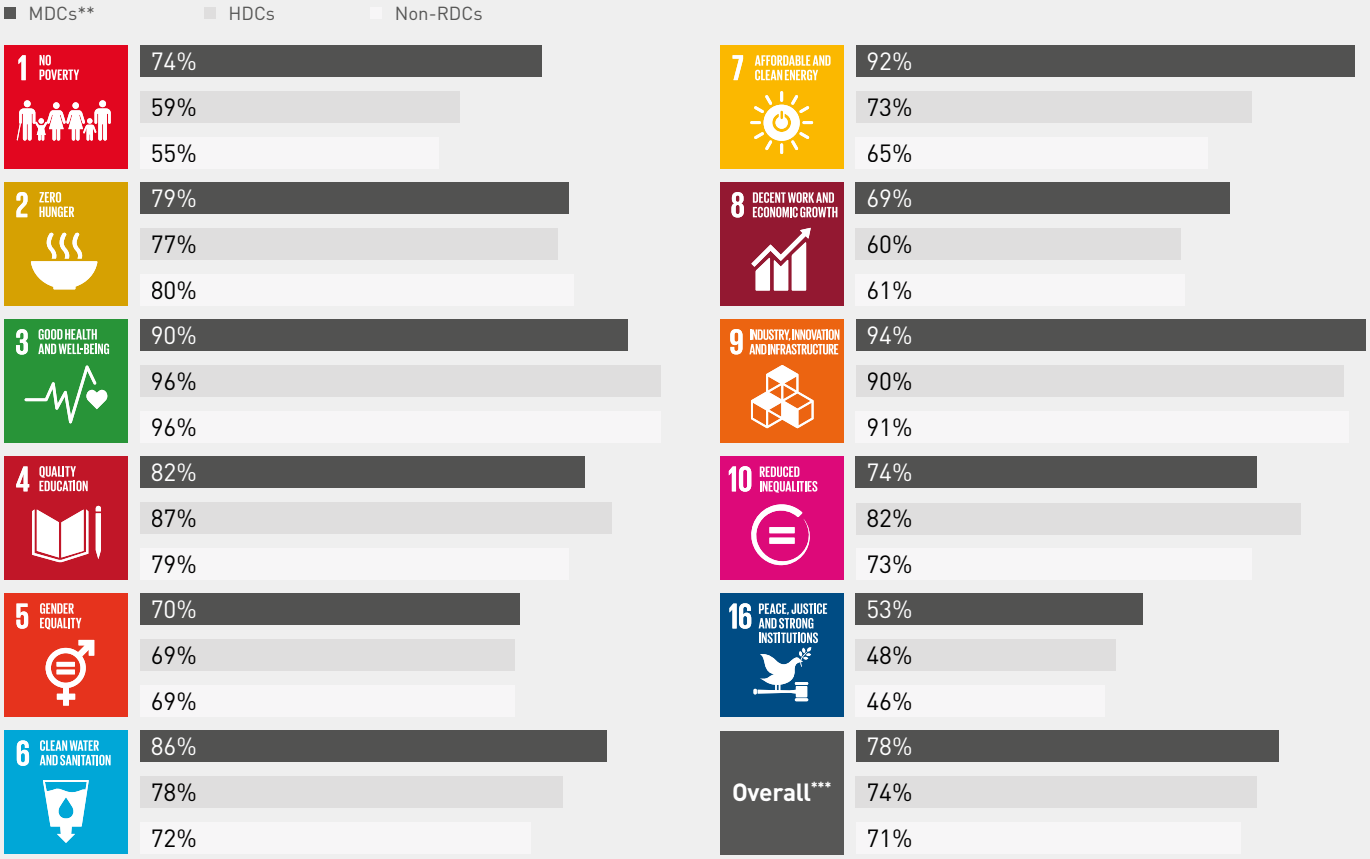
Figure E2: National-level metrics

■ 80–100% of countries covered ■ 65–80% of countries covered ■ 50–65% of countries covered

Relevant SDGs	Metrics used	Time frame
No Poverty	• Headcount: $1.9(2011 PPP) daily	■ 1995-2015[a]
Zero Hunger	• Prevalence undernourished • Depth of food deficit	■ 1995-2015[b] ■ 1995-2015[b]
Good Health and Well-Being	• Neo-natal mortality • Under-5 mortality • Maternal mortality • NCD mortality	■ 1995-2015[c] ■ 1995-2015[c] ■ 1995-2015[c] ■ 2000, 2005, 2010, 2015[d]
Quality Education	• % of children out of school • Net enrolment rate, primary • Mean years of schooling • Population with secondary level	■ 1995-2015[e] ■ 1995-2015[e] ■ 1995 (every 5 years)[c] ■ 1995 (every 5 years)[c]
Gender Equality	• Labour participation rates • Enrolment rate, primary • Adult literacy • Mean years of schooling • Share of women in parliament	■ 1995-2015[f] ■ 1995-2015[e] ■ 2000-2015[e] ■ 1995 (every 5 years)[c] ■ 1995 (every 5 years)[c]
Clean Water and Sanitation	• Improved water source (% with access) • Improved sanitation facilities (% with access)	■ 1995-2015[d] ■ 1995-2015[d]
Affordable and Clean Energy	• Access to electricity • Access to clean fuel for cooking	■ 1995-2015[g] ■ 2000-2014[d]
Decent Work and Economic Growth	• Labour force participation • Youth employment rate • GDP per employed (PPP terms) • Employment rate	■ 1995-2015[f] ■ 1995 (every 5 years)[c] ■ 1995-2015[f] ■ 1995-2015[f]
Industry, Innovation and Infrastructure	• Internet users (% population) • Account at financial institution (% population) • Mobile phone penetration	■ 1995 (every 5 years)[c] ■ 2011, 2014[a] ■ 1995-2015[h]
Reduced Inequalities	• Income quintile ratio • Final household consumption per capita	■ 1995-2014[a] ■ 1995-2015[a,i]
Peace, Justice and Strong Institutions	• WGI: Control of Corruption Index • WGI: Political stability and absence of violence/terrorism • Freedom in the World Index: average of Civil Liberty and Political Rights scores	■ 1995-2015[a] ■ 1996-2015[a] ■ 1995-2015[j]

a. World Bank
b. FAO
c. UNDP
d. WHO
e. UNESCO
f. ILO
g. IEA
h. ITU
i. OECD
j. Freedom House

Figure E3: Percentage of metrics that improved since 1995* by SDG dimension and country groups



* Share of all available metrics under each dimension that improved on absolute terms (For example, there are 4 metrics under health and well-being for each of the 25 MDCs, the number of available metrics under consideration is 4*25=100).
** Considers 25 mining-dependent countries from 1995-2015. Includes countries that are both mining and hydrocarbon dependent.
*** Based on a simple average of the SDG areas.

equality), and creating better employment opportunities (SDG8: Decent work and economic growth) metrics. However, even across these areas between 53 and 70 per cent of metrics improved between 1995 and 2015.

Income status also appears to have a bearing on the results. Overall poorer countries achieved stronger social progress across a greater number of metrics relative to wealthier ones. Between 1995 and 2015 most broad-based improvements occurred in MDCs where the average incomes are between US$766–3,035 per year (lower middle-income countries) or below US$766 per year (low-income countries) (Figure E4). The one notable exception was Chile, which despite being an upper-middle income country also experienced strong gains in social progress since 1995.

The research also appears to confirm that governance clearly matters in terms of socio-economic performance. For the most part, better governed MDCs fare better overall in terms of improvements in socio-economic performance over

'Life for people in countries that are 'mining-dependent' is improving... Today, people in these countries are generally healthier, wealthier, and better educated.'

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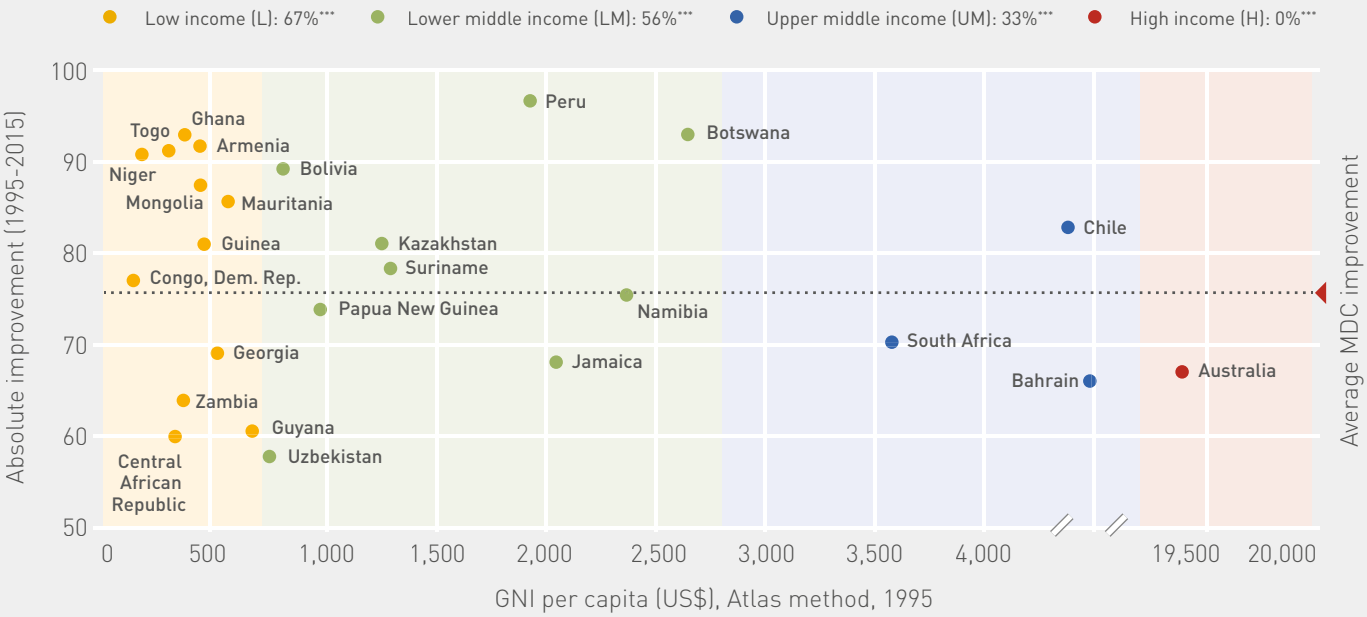
Figure E4: Absolute performance of countries by income levels* (mining-dependent countries only)**



* Average improvement across 11 SDG dimensions based on share of metrics under respective dimensions which improved in absolute terms. Income classifications are based on World Bank data.
** Considers 25 mining-dependent countries from 1995-2015. Includes countries that are both mining and hydrocarbon dependent.
*** Percentage of countries that beat the average improvement in absolute terms at the particular income level.

the past 20 years. That effect was most marked in poorer countries that were below the global average in terms of socio-economic performance in 1995.

2. The performance of MDCs compares favourably to the performance of other countries

Observed socio-economic progress across MDCs is strong, even when compared with the progress of other countries around the world. For example, MDCs managed to improve across a larger number of socio-economic metrics than HDCs and countries with no resource reliance between 1995 and 2015 (see Figure E3). Overall, MDCs improved on 78 per cent of social metrics, compared to an improvement on 74 per cent of metrics in HDCs and 71 per cent in non-resource-dependent countries (non-RDCs).

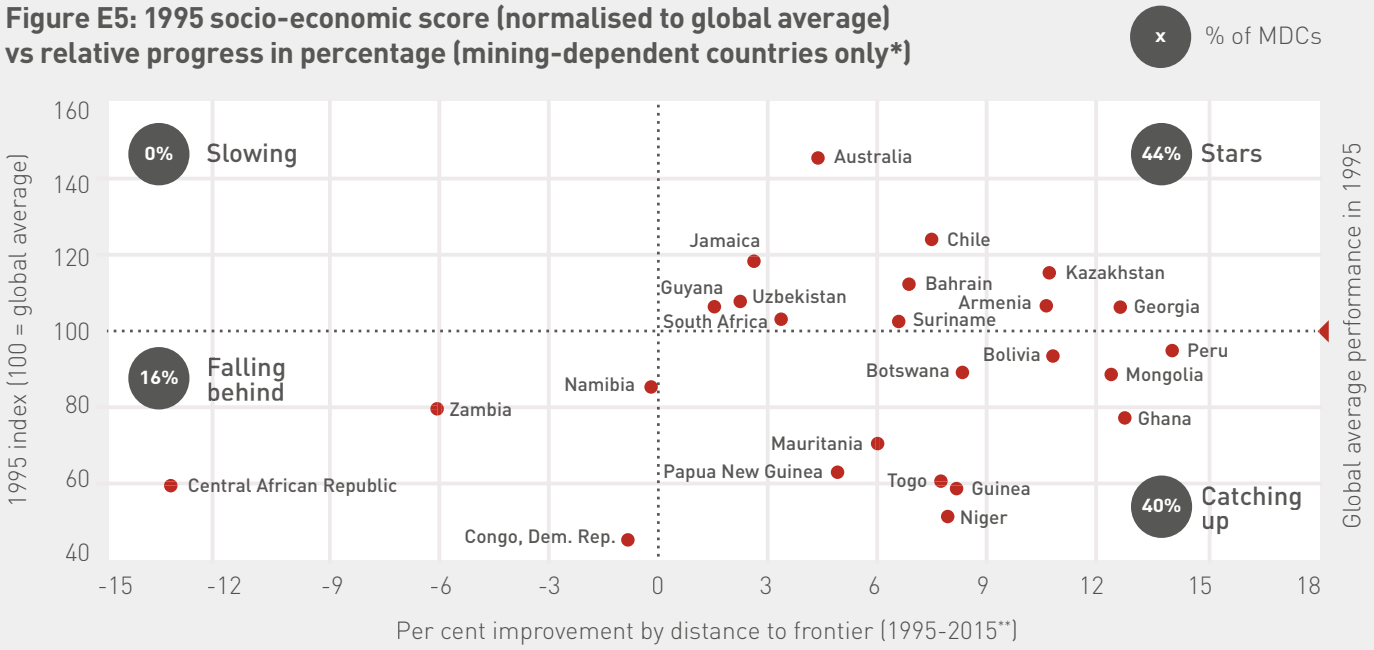
This outperformance is most notable across metrics that reflect progress in providing clean and affordable energy to people (SDG7). The average MDC improved across 92 per cent of the metrics in this area, while the average non-RDC improved across only 65 per cent of these same metrics.

Other areas where MDCs outperform either HDC or non-RDCs include poverty reduction (SDG1), access to clean water and sanitation (SDG6), provision of decent jobs (SDG8), access to ICT and financial infrastructure (SDG9), governance (SDG16) and gender equality (SDG5).

MDCs do however lag the absolute progress of HDCs and non-RDCs when it comes to improving the overall health of a population (SDG3). This lag should not be over-stated as MDCs saw an improvement of 90 per

'Observed socio-economic progress across MDCs is strong, even when compared with the progress of other countries around the world.'

Figure E5: 1995 socio-economic score (normalised to global average) vs relative progress in percentage (mining-dependent countries only*)



* Considers 25 mining-dependent countries from 1995-2015. Includes countries that are both mining and hydrocarbon dependent.
** Difference in socio-economic scores between 1995 and 2015, expressed in percentage.

cent across the four health metrics. In other areas such as education (SDG4) and reducing inequality (SDG11), MDC's lagged behind HDCs but improved across a larger number of socio-economic metrics than non-RDCs.

3. MDCs continue to lag behind best performing countries – but are closing the gap

To understand and measure differences between the social progress of RDCs and the progress of the most socially advanced countries, we developed a purpose-built socio-economic index, using a 'distance to frontier' approach.

'Distance to frontier' is a relative measure of the socio-economic performance of a country (on a scale of 0 - 1), relative to the most socially advanced country globally (ie the one with the highest average score for individual metrics, a group of social metrics under a single SDG, or across all social metrics).

The best and worst performing country on a metric is assigned a score of 1 and 0 respectively. The performance of all other countries is then measured relative to these two countries. By design therefore, almost all countries fall short of the global best performers.

In 2015, MDCs lag non-RDCs across all SDG areas by about 7 per cent. However, when comparing countries of similar income levels, differences in socio-economic performance are less evident. When only low and lower-middle income countries are compared the gap is much smaller, and MDCs lag non-RDCs by a score of just 2 per cent.

We estimate that income differences between MDCs and non-RDCs account for approximately 80 per cent of the gap in social progress, as incomes play a large role in shaping a country's socioeconomic performance.

The continuing socio-economic gap however, has not prevented MDCs from catching up with the global best performing countries over time. The socio-economic index illustrates this (Figure E5). In 1995, 56 per cent of all MDCs had overall socio-economic performances that were below the global average, but 84 per cent of them have been able to close the gap in over the next two decades. In comparison, only 69 per cent of non-RDCs have been able to close the gap over the same period.

MDCs achieving the biggest relative improvements include Bolivia, Ghana, Mongolia, and Peru. These countries are rapidly catching up to the best socio-economic performers globally. Only four MDCs – the Central African Republic, Zambia, Namibia, and the Democratic Republic of the Congo – have fallen further behind. These four countries have nonetheless improved across the majority of socio-economic metrics in absolute terms.

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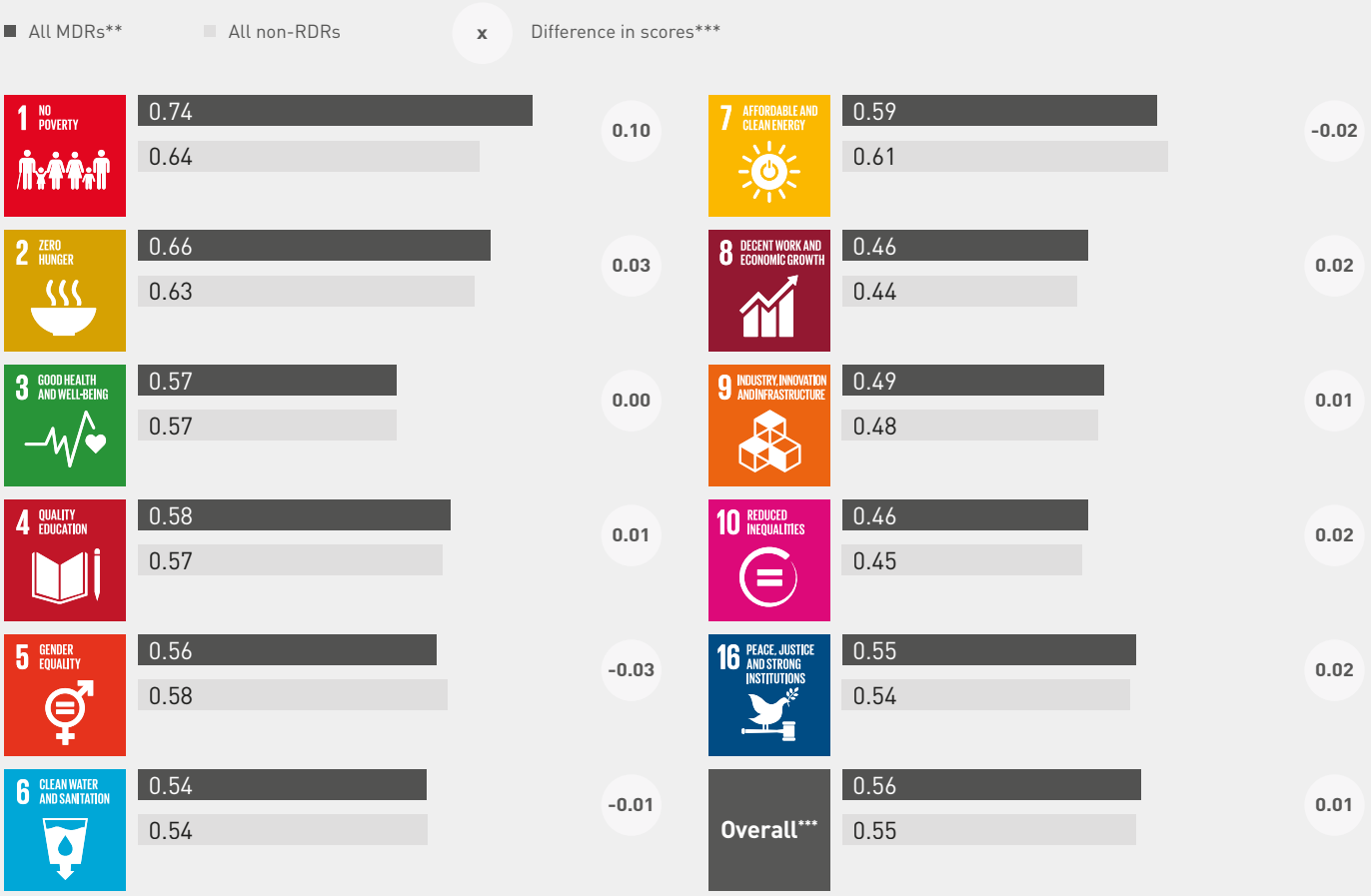
Figure E6: Average regional score across the socio-economic performance index components (index 0–1; 2015)



* Metrics in each SDG area are given equal weighting. Indicators are normalised to 1 where 1 represents the best performing region on a given metric.
** MDRs also include countries in the 'both' category (those dependent on both mining and hydrocarbons).
*** Difference in average index scores between MDRs and non-RDRs. Positive numbers indicate higher average performance by MDRs. Numbers may not sum due to rounding.
**** Based on a simple average of the SDG areas across the four countries for each regional grouping.

4. Countries where positive social progress is apparent, also see progress at the subnational level

More in-depth analysis in four focus countries – Chile, Ghana, Indonesia, and Peru – reveals that social progress in MDCs is filtering down to the regional level. Looking at the progress of mining-dependent regions (MDRs) in these four countries we see that they have advanced on at least three-quarters of the socio-economic metrics analysed in this report.

The greatest socio-economic progress occurred in the MDRs of Ghana and Indonesia, where 83 per cent of social progress metrics improved over the two decades examined. In Peru, progress is being seen across 80 per cent of metrics, and in Chile 75 per cent.

'Improvements at the subnational level are particularly strong in terms of SDG1: No poverty; SDG2: Zero hunger; SDG4: Quality education; and SDG10: Reduced inequalities'

3. While Indonesia is a HDC, it has 34 provinces with a mix of resource dependencies and 10 provinces are MDRs. This provides a good basis for regional comparison across different resource types. The other reason for including Indonesia is because its mineral share of resource exports has grown in importance over time.

This appears to confirm that social progress in MDCs is not confined to the national level.

Improvements at the subnational level are particularly strong in terms of SDG1: No poverty; SDG2: Zero hunger; SDG4: Quality education; and SDG10: Reduced inequalities, which noticeably outperform the average for MDCs. These findings suggest that in the four countries analysed, a dependency on mining correlates with positive social progress for host populations across metrics.

Similar to the analysis at a national level, the relative performance of MDRs was also measured against the most socially advanced regions in each country using the same 'distance-to-frontier' approach.

Overall, MDRs score better than non-resource-dependent regions, outperforming across all SDG dimensions except SDG5: Gender equality, SDG6: Clean water and sanitation and SDG7: Affordable and clean energy (Figure E6). This is contrary to the national-level analysis where MDCs on average (without accounting for income) lagged non-RDCs on socio-economic development. The distance between regions is also narrowing, with more than 80 per cent of MDRs closing the gap on the most socially advanced region in their country. In Ghana and Peru, 93 per cent of MDRs managed to close the gap. In Indonesia and Chile, 80 per cent and 60 per cent of MDRs closed the gap respectively.

Conclusion

This research looks beyond economic performance to understand social progress and the findings are encouraging. Most MDCs have improved their performance significantly across various socio-economic indicators since 1995, and more than 80 per cent of MDCs have also managed to close the socio-economic gap on global best performers. Overall, better governed MDCs fare better overall in terms of improvements in socio-economic performance since 1995 which suggests that governance clearly matters.

This encouraging trend is echoed at the subnational level. MDRs in the four sample countries of Chile, Ghana, Peru and Indonesia managed to advance on at least three-quarters of the socio-economic progress indicators in recent years, although the improvement relative to non-RDRs varies by country.

In line with national-level findings, more than 80 per cent of MDRs also managed to close the gap to the best regional performers in each country, although the drivers of overall progress differ at subnational and national levels.

The findings have a number of potential implications for governments and resource companies globally. From a public-sector perspective, this research offers an alternative to the widely-held perception that extractive industries are likely to impede economic progress (and by extension, the well-being of host populations), both at the national and regional levels.

Using a data-driven approach, the research shows that the overall socio-economic development and progress of MDCs and MDRs are comparable – and in some cases better – than the progress in those that are not reliant on mining. At the same time, it is obvious that mining countries improve their socio-economic situation at varying rates.

While further research is required governments need not await the outcomes to sharpen their policies to promote socio-economic well-being. A useful starting point may be to focus on areas where progress to turn the SDGs into practice has so far been weak. Overall, for MDCs this has been in SDG16: Peace, justice, & strong institutions; SDG5: Gender equality; and SDG8: Decent work & economic growth.

From a resource company perspective, this research should reaffirm the potentially positive role that mining can play to shape socio-economic development. The observed gaps in the socio-economic performance of MDCs could help mining companies identify priorities for engaging and supporting host governments, communities, and civil society.

Introduction

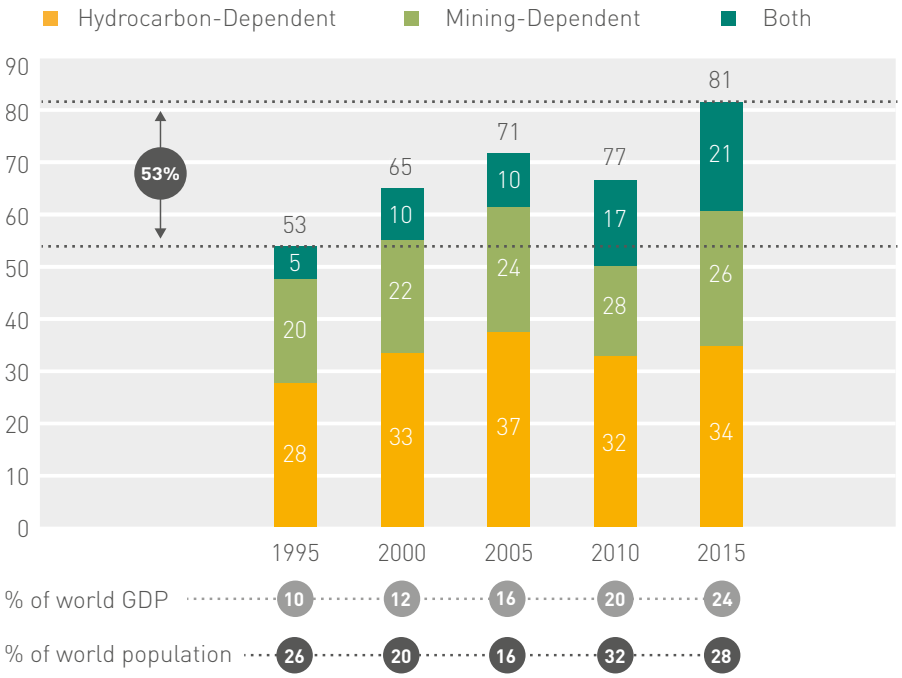
Resource-dependent countries include some of the world's poorest nations. They are home to almost 30 per cent of the global population with 230 million people living in extreme poverty on less than $1.90 a day.[4]

The number of countries that rely on their resource wealth for growth is steadily growing (Figure 1). The number of resource-dependent countries (RDCs) has increased by more than 50 per cent to 81 over the past two decades, in part fuelled by the growth of commodities demand in China and India. Mining-dependent countries (MDCs), which export large amounts of minerals and metals, are driving the overall increase in the number of RDCs.[5] MDCs now make up more than half of all RDCs and are the focus of this report.

There has been much research on the correlation between a country's resource endowment and its economic performance, with many concluding that resource wealth does not always translate into higher economic growth. While the empirical evidence remains mixed and the theory debated, the idea

The number of RDCs has increased by over 50% since 1995

Figure 1: Number of resource-dependent countries* over time, by resource categories**



* We define resource-dependent countries using two criteria: (1) resources are more than 20 per cent of exports by value; and (2) resource rents are more than 10 per cent of GDP. Where data were not available, we estimated based on the nearest year's data. See Box 1 for more detail.
** 'Hydrocarbon-Dependent' defined as more than 75% of resource exports being in energy; 'Mining-Dependent' defined as more than 75% of resource exports being in metals and minerals; and 'Both' is defined as all other resource-dependent countries falling between these thresholds. Based on 2015 data.

Note: Numbers may not sum due to rounding. **Source: UNCTADstat; IMF; World Bank**

4. According to the World Bank definition of extreme poverty, based on the purchasing power parity of 2011. See: http://www.worldbank.org/en/topic/poverty/lac-equity-lab1/poverty. Population figures calculated by AlphaBeta using World Bank's PovcalNet database.

5. These countries include mining-dependent countries, which generate more than 75 per cent of their resources export revenue with minerals and metals, and countries whose resources export revenue is derived from a mix of minerals, metals, and hydrocarbons (oil, gas, coal, and other fossil fuels) – labelled 'Both' in Figure E1.

1

of a 'resource curse' has gained wide traction in recent decades. The resource curse implies that an abundance of natural resources may impede economic development, rather than enhance it.

These studies have tended to ignore the level of social progress in countries with resource wealth; meaning little is known about its relationship with a country's access to food, life expectancy, health, education, as well as access to water, sanitation and other social indicators. The Africa Progress Report 2013, for example, concludes that there is no general relationship between resource wealth and human development. While some governments have successfully used resource revenues to reduce child mortality and expand education opportunities, others have been unable (or even unwilling) to do so, according to the report.[6]

McMahon and Moreira (2014) provided evidence that most low- and middle-income MDCs have avoided the resource curse in the twenty-first century, and that mining sector growth has been important in the overall growth of many countries. This growth has not come at the expense of human development, although its impact on governance has been mixed.[7]

Other studies have examined the extent of job creation from mining activities. The International Council on Mining and Metals (ICMM) Role of Mining in National Economies: 3rd edition finds that while direct mine employment accounts for only 1 to 2 per cent of employment, indirect and induced employment have the potential to bring the total employment to 3 to 5 per cent.[8] A finding supported by a recent study by Deloitte that shows that the mining sector contributes to over 484,000 direct jobs in Australia and over 600,000 indirect jobs. In total, mining supports some 10 per cent of employment in Australia.[9]

Beyond this existing research, the impact of mining on social progress relatively unexplored. This report aims to close this research gap. While many existing studies focus only on a select group of countries or subnational regions, or a limited subset of socio-economic indicators, this report goes further. It adopts a more holistic approach to understanding the impacts on socio-economic development by examining trends across a broad set of socio-economic indicators for all countries with a recent history of mineral dependence.[10] Core to the analysis are the United Nations' Sustainable Development Goals (SDGs), a set of targets that aim to make the world a fairer and more liveable place for people globally.[11]

More than 30 metrics were used in this report to measure how all countries in the world fared between 1995 and 2015 across the following 11 SDG areas: SDG1: No poverty; SDG2: Zero hunger; SDG3: Good health & well-being; SDG4: Quality education; SDG5: Gender equality; SDG6: Clean water & sanitation; SDG7: Affordable & clean energy; SDG8: Decent work and economic growth; SDG9: Industry, innovation, & infrastructure; SDG10: Reduced inequalities; SDG16: Peace, justice, & strong Institutions. The criteria that guided the selection of metrics are outlined in the Appendix.

To ensure consistency, our analysis only covers countries that have been resource-dependent over the entire 20-year period. The analysis focuses on MDCs due to their prominent role as the driving force of the worldwide growth in extractive industries: the number of resource-dependent countries globally has increased by more than 50 per cent since 1995, and countries exporting large amounts of minerals and metals – either exclusively or in combination with hydrocarbons – account for more than three-quarters of that increase.

6. Africa Progress Panel (2013). *Africa Progress Report 2013. Equity in Extractives – Stewarding Africa's natural resources for all.*

7. McMahon G., and Moreira S (April 2014). *The contribution of the mining sector to socioeconomic and human development.* Extractives Industries for Development Series #30.

8. ICMM (October 2016). *The role of mining in national economies, third edition.*

9. Deloitte (2017) *Mining and METS: engines of economic growth and prosperity for Australians.*

10. The concept of resource dependence captures the extent to which a country's economy relies on resource rents. In this report, a country is considered resource-dependent if (1) resources account for more than 20 per cent of its total exports by value and (2) resource rents (ie the difference between revenues and extraction costs) amount to more than 10 per cent of GDP. See Appendix for further details.

11. For more information on the Sustainable Development Goals (SDGs), see: http://www.un.org/sustainabledevelopment/sustainable-development-goals/

Introduction continued

BOX 1: Defining resource-dependent countries

Countries that are 'resource-dependent' are economies where the mineral sector, and the oil and gas sector play a dominant role. It is important to note that not all resource-rich countries are resource-dependent. China and the United States, for example, are large and important resource producers, but their overall economic performance does not depend on resources – to the same extent – as the countries analysed in this report.

A country was defined as 'resource-dependent' when either:

1. **Resources account for more than 20 per cent of exports; or**
2. **Resource rents are more than 10 per cent of economic output.**

This approach allows for a more comprehensive analysis of resource-dependence than approaches used in past studies, which typically focus on just one of the measures (for example, resource share of exports).

Trade data provided by UNCTAD was used to identify countries where resource exports account for more than 20 per cent of total exports. Others, including the IMF, use a similar threshold to identify resource-driven countries.[12] Standard International Trade Classifications (SITC) were used to isolate the trade of non-renewable resources. SITCs 27, 28, 68, 321, 322, 325, 333, 334, 335, 342, 343, 344, 355, 667 and 971 were included in the analysis. This method of defining resources is similar to the one used by the Oxford Policy Management group (OPM), although the trade of electric current was removed from our definition of resources.[13] Our definition also excludes primarily resource 're-exporters' and countries that import and then export resources without undertaking any value-adding activities.

World Bank data on oil, gas, and mineral rents as a share of GDP is used to measure the contribution of resources to overall economic output.[14] Resource rents are the surplus profits generated (revenue above economic costs) through the extraction of resources. Given the lack of comprehensive data on economic value-add by sector, resource rents serve as a reasonable proxy measure of the importance of resources to overall economic output. Fiscal revenue is not used as a criterion due to a lack of a comprehensive historical data.[15]

The most comprehensive data goes back to 1995, and the latest available data is 2015. The set of sample countries is restricted to those that have been resource-dependent throughout the period of historical analysis (1995-2015). Some RDCs, including Brazil, only met our criteria at a later date, while others (such as Liberia) met the criteria in 1995, but not at later dates. As such, these countries were removed from the analysis.

The 53 countries that met our criteria for being 'resource-dependent' are shown opposite. To split the 53 RDCs into comparable groups, we used the following classification:

a. **Hydrocarbon-dependent** countries are defined as countries that generate more than 75 per cent of their resources export revenue with hydrocarbons, such as oil, gas and coal

c. **Mining-dependent countries** generate more than 75 per cent of their resources export revenue with minerals and metals

e. **Countries labelled** 'Both' because their resources export revenue is derived from a mix of minerals, metals, and hydrocarbons (oil, gas, coal and other fossil fuels).

For our analysis, countries labelled 'both' are grouped together with MDCs, as our main research objective is to examine social progress in countries that are significantly dependent on mining.

12. The IMF used average data from 2006 to 2010 to identify countries where at least 20 per cent of total exports were natural resources. See *Macroeconomic policy frameworks for resource-rich developing countries*, IMF, August 2012.

13. OPM used slightly different criteria, identifying resource-dependent countries as those where resources account for more than 25 per cent of merchandise exports. See Dan Haglund, *Blessing or curse? The rise of mineral dependence among low- and middle-income countries*, Oxford Policy Management, December 2011.

14. The changing wealth of nations: *Measuring sustainable development in the new millennium*, World Bank, 2011. 49. The most robust estimate is from the IMF and only available from 2012. See *Macroeconomic policy frameworks for resource-rich developing countries*, IMF, August 2012.

15. The most robust estimate is from the IMF and only available from 2012. See *Macroeconomic policy frameworks for resource-rich developing countries*, IMF, August 2012.

1

List of resource-dependent countries (1995-2015)

	Criterion		
Country	Export	GDP	Type
Sub-Saharan Africa			
Angola	I	I	Hydrocarbons
Botswana	I		Mining
Cameroon	I		Hydrocarbons
Central African Republic	I		Mining
Congo, Dem. Rep.	I		Mining
Congo, Rep.	I	I	Hydrocarbons
Equatorial Guinea	I	I	Hydrocarbons
Gabon	I	I	Hydrocarbons
Ghana	I		Mining
Guinea	I		Mining
Libya	I	I	Hydrocarbons
Mauritania	I		Mining
Namibia	I		Mining
Niger	I	I	Mining
Nigeria	I		Hydrocarbons
South Africa	I		Mining
Togo	I		Mining
Trinidad and Tobago	I		Hydrocarbons
Zambia	I		Mining
Latin America			
Bolivia	I		Mining
Chile	I		Mining
Colombia	I		Hydrocarbons
Ecuador	I		Hydrocarbons
Guyana	I		Mining
Jamaica	I		Mining
Peru	I		Mining
Suriname	I		Mining
Venezuela	I	I	Hydrocarbons

	Criterion		
Country	Export	GDP	Type
Asia			
Australia	I		Both
Brunei Darussalam	I	I	Hydrocarbons
Indonesia	I		Hydrocarbons
Kazakhstan	I		Both
Mongolia	I	I	Mining
Papua New Guinea	I	I	Both
Turkmenistan	I	I	Hydrocarbons
Uzbekistan	I		Both
Middle East and North Africa (MENA) & Others			
Algeria	I		Hydrocarbons
Armenia	I		Mining
Azerbaijan	I	I	Hydrocarbons
Bahrain	I		Both
Egypt	I		Hydrocarbons
Georgia	I		Mining
Iran	I	I	Hydrocarbons
Iraq	I		Hydrocarbons
Kuwait	I	I	Hydrocarbons
Norway	I		Hydrocarbons
Oman	I	I	Hydrocarbons
Qatar	I	I	Hydrocarbons
Russia	I		Hydrocarbons
Saudi Arabia	I	I	Hydrocarbons
Syrian Arab Rep.	I	I	Hydrocarbons
United Arab Emirates	I	I	Hydrocarbons
Yemen	I	I	Hydrocarbons

1

Introduction continued

This report seeks to answer five key questions:

1. Have mining-dependent countries (MDCs) improved their social performance between 1995 and 2015?
2. How does their performance compare to countries that are not dependent on resources?
3. How do mining-dependent countries measure up against the global best performing countries in terms of social progress?
4. Are mining-dependent countries closing the gap to the best performers?
5. In countries where social progress is apparent, is it evident at the regional level?

Two important caveats apply to this report:

Firstly, this analysis provides an approach to quantify, contextualise, and compare socio-economic progress across and within countries. While the economic impact of mining activity and the social policies of mining companies are likely to contribute to social progress (through employment, income, and social programmes), this research does not claim to attribute causality between mining and social progress.

There are other factors in play – including government policies and capacity, the quality of governance, economic activity in other sectors, and the effectiveness of social programs (run by the government, the private sector, or NGOs). Further research must be done to isolate mining's impact on a country's overall well-being.

This report provides an initial fact base that can hopefully guide the efforts of future research to dig deeper into remaining unanswered questions. Some of these research questions are highlighted in the final chapter.

Secondly, the purpose of this work is not to make country-specific policy recommendations, especially given the global focus of the report. It reaffirms the need for governments and mining companies to broaden and deepen cooperation in order for social progress to be sustained.

The rest of the report is organised as follows:

Section 2 explores the level of socio-economic progress in MDCs; examining the percentage of 32 SDG-aligned metrics that improved since 1995, by assessing differences during the periods before and during commodity booms, and by comparing findings with hydrocarbon-dependent countries.

The analysis also investigates whether socio-economic progress changes in relation to a country's income level. It is important to put the results into perspective. For that reason, the absolute socio-economic performance of MDCs is also compared with the absolute performance of hydrocarbon-dependent countries (HDCs) and countries that do not depend heavily on resources.

In a second step, we also investigate whether a country's socio-economic development remains meaningful when compared to the progress of best performing countries globally. This relative performance analysis is based on a new and purpose-built socio-economic index.[16] This allows us to measure the gap between individual MDCs and the most socially advanced country globally over time.

Section 3 delves deeper into the subnational level. It examines the socio-economic progress of mining-dependent regions in four countries: Indonesia, Peru, Chile, and Ghana. Using a similar approach as for the national-level analysis, it evaluates the percentages of SDG-aligned metrics that improved in recent periods in the mining-dependent regions (MDRs) and non-resource-dependent regions (non-RDRs) of each focus country. This deep analysis is driven by the desire to understand if observed socio-economic trends at the national level are consistent with trends at the regional level (subnational). A review of existing academic literature provided the necessary context to understand to what degree new findings confirm or contradict past research results.

We also compare the performance of MDRs and non-RDRs in 2015, and examines the proportion of MDRs that have closed the gap on socio-economic best performers in their respective countries in recent periods. These results are analysed both as an aggregate of the four countries, as well as for each individual country. The section concludes by assessing the RGI scores of these four countries to shed light on the results.

Section 4 concludes with the main findings, elaborates the implications for governments and resource companies, and makes suggestions for further research.

16. The overall index score for a country is the average of scores across 11 SDG dimensions. A country's overall score can range from 0 to 1 (0 being the worst and 1 being the best) where the difference between 1 and its score can be seen as the gap between the country's overall socio-economic development and the global best performers. Each SDG dimension is the average of normalised 'distance-to-frontier scores' of the metrics considered under that dimension. See the Appendix for detailed methodology of how the 'distance-to-frontier' metric scores are calculated.

2

NATIONAL LEVEL ANALYSIS

National level analysis

Life for people in mining-dependent countries is improving. Various metrics indicate that MDCs have made substantial social progress over the past two decades. Today, people in these countries are generally healthier, wealthier, and better educated.

These achievements are encouraging not just in absolute terms, but also in relative terms. More than half of all mining-dependent countries perform below the overall global average when their socio-economic development is measured relative to that of the world's best performing countries. However, more than 80 per cent of all mining-dependent countries have managed to close this global gap over the 20-year period.

Have mining-dependent countries improved their socio-economic performance?

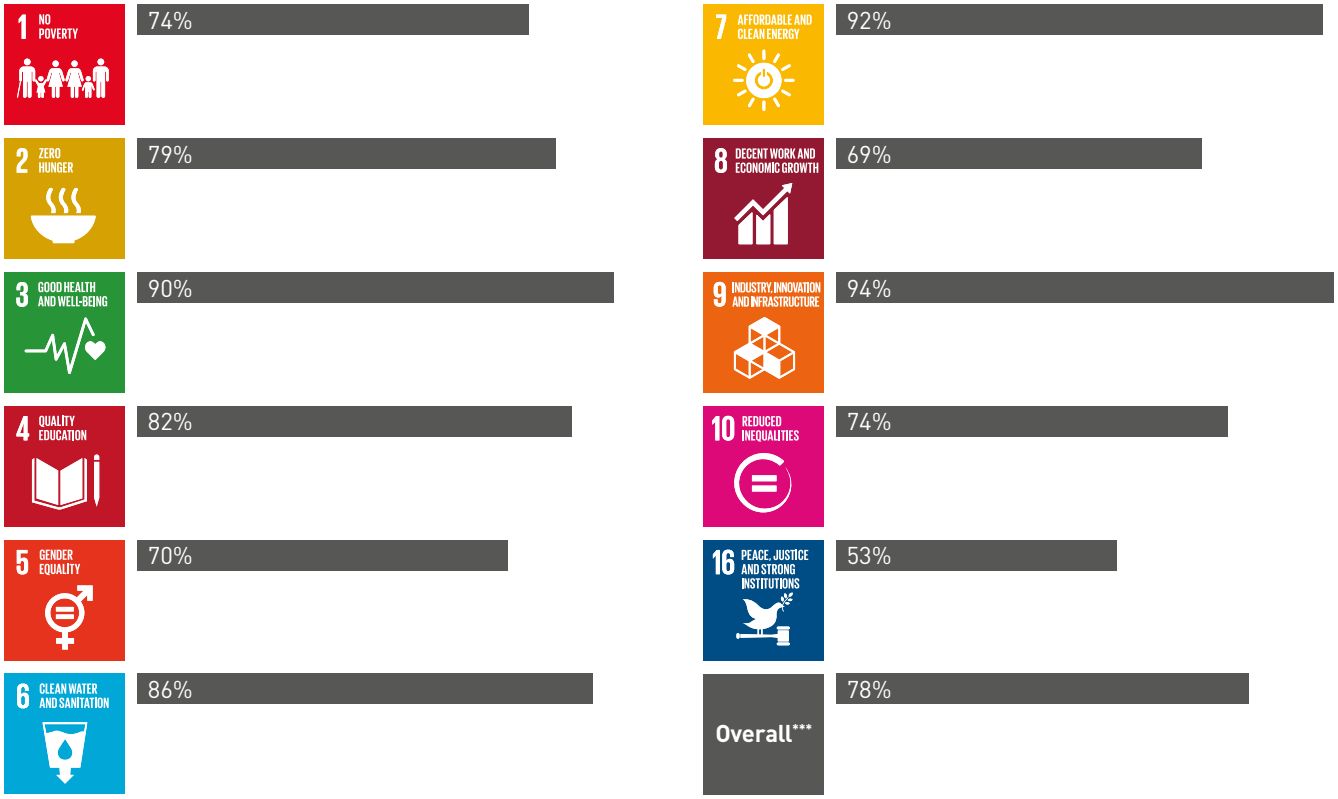
Encouragingly, socio-economic well-being has increased in all MDCs since 1995. As seen in Figure 3, MDCs advanced in absolute terms on most metrics used to measure social progress under the United Nations Sustainable Development Goals The average MDC improved across 78 per cent of the indicators (Figure 3).

MDCs have made the greatest progress in providing people with improved access to SDG9: Industry, innovation, & infrastructure (specifically ICT infrastructure and access to finance); SDG7: Affordable & clean energy; and SDG3: Good health and well-being between 1995 and 2015:

- Internet and mobile penetration rates increased universally across all MDCs. However, there are still

The majority of metrics considered under each SDG dimension improved in absolute terms since 1995 across the MDCs

Figure 3: Share of metrics that improved since 1995 by SDG dimension* (mining-dependent countries only)**

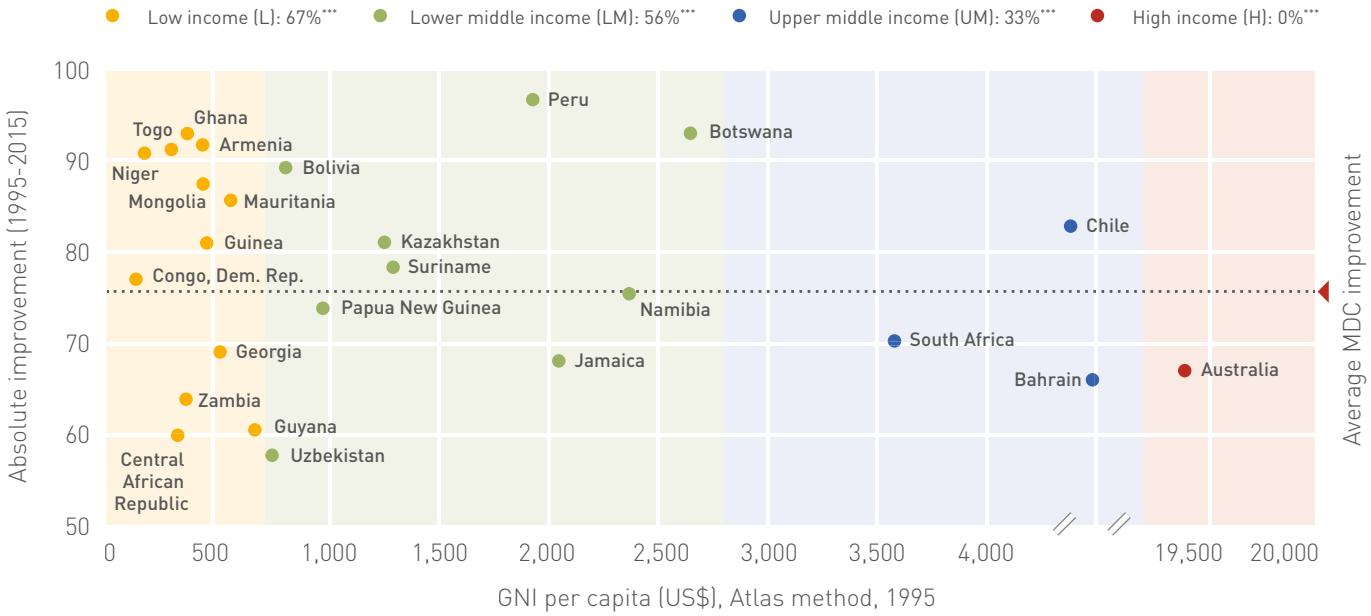


* Share of all available metrics (For example, there are 4 metrics under health and well-being for each of the 25 MDCs, the number of available metrics under consideration is 4*25=100) under each dimension that improved on absolute terms.
** Considers 25 mining-dependent countries from 1995-2015. Includes countries that are both mining and hydrocarbon dependent.
*** Based on a simple average of the SDG areas.

2

A higher percentage of low income MDCs beat the average improvement in socio-economic performance in absolute terms

Figure 4: Absolute performance of countries by income levels* (mining-dependent countries only)**



* Average improvement across 11 SDG dimensions based on share of metrics under respective dimensions which improved in absolute terms. Income classifications are based on World Bank data.
** Considers 25 mining-dependent countries from 1995-2015. Includes countries that are both mining and hydrocarbon dependent.
*** Percentage of countries that beat the average improvement in absolute terms at the particular income level.

significant laggards such as DR Congo, Niger, and Guinea where internet penetration is still less than 5 per cent of population.

- More than 80 per cent of MDCs have a higher share of population with accounts at a financial institution. Chile improved the most, up from 42 per cent to 63 per cent.
- Access to electricity improved from an average of around 54 per cent to almost 69 per cent. However, only 12 per cent of the population in Central African Republic has access to electricity and much more needs to be done.
- Access to clean cooking fuel increased from an average of almost 45 per cent to over 55 per cent. Despite some improvement, less than 10 per cent of population in Togo and Guinea still have no access to clean cooking fuel.
- Child mortality rates declined across all MDCs surveyed; improvements were less universal across maternal mortality and non-communicable disease rates. Among the best MDC performers on the health dimensions are Niger and Kazakhstan. In Niger, there was a sharp decline of under-5 mortality, while in Kazakhstan, NCD mortality fell significantly.

Progress was weakest across metrics that measured fairness (SDG16: Peace, justice, and strong institutions), gender equality (SDG5: Gender equality), and creating better income opportunities (SDG8: Decent work and economic growth):

- Only 52 per cent of MDCs improved anti-corruption measures; the average score of MDCs on the World Governance Indicators corruption control index even declined slightly from -0.31 to -0.32 over the 20-year period, signalling efforts to fight corruption have slowed in many mining-dependent countries.[17] Results were worst in Mauritania, a mineral-rich country in western Africa, whose corruption control score has fallen from -0.01 to -0.91 since 1995.[18]

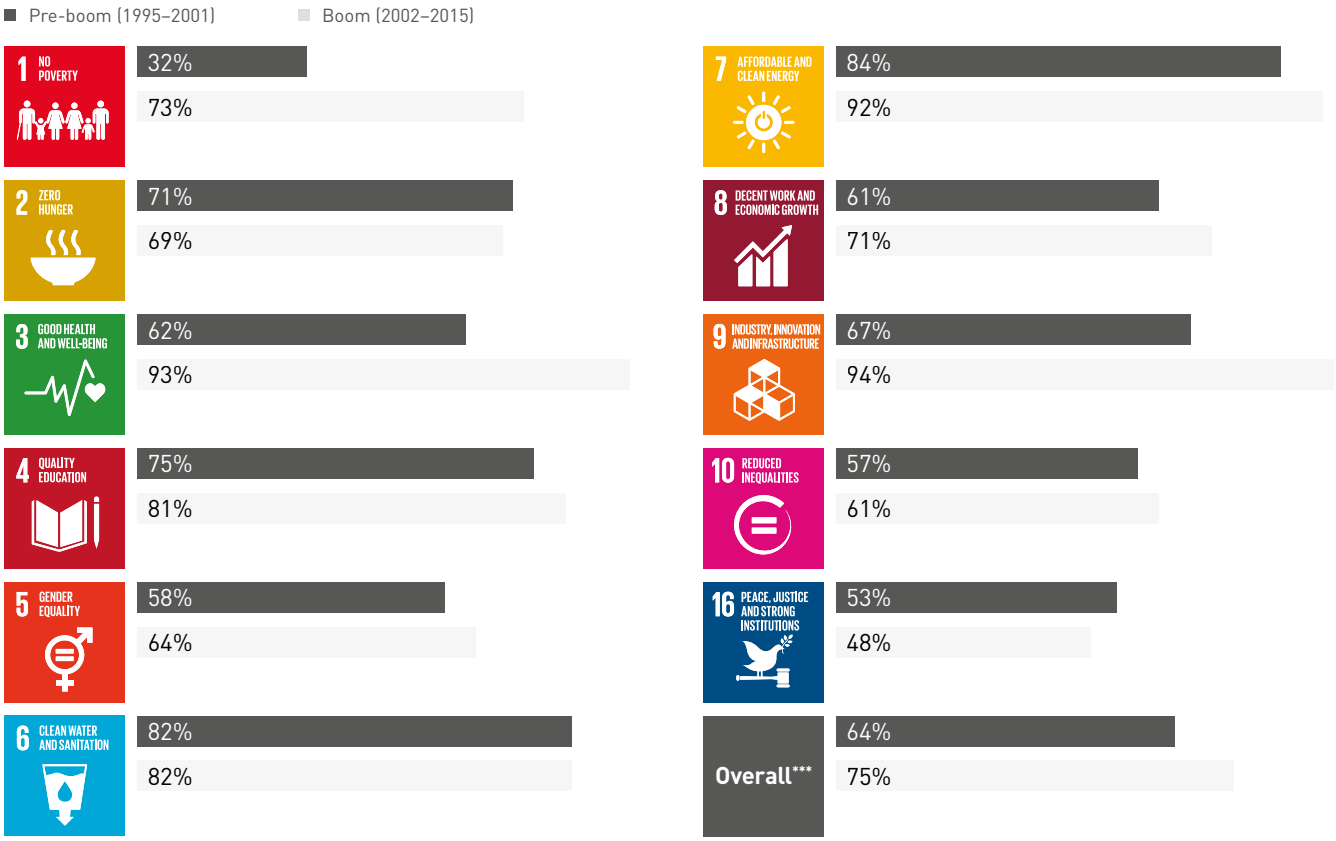
17. Progress measured by the 'Worldwide Governance Indicators' research project, run by The World Bank and the Brookings Institution. For more information see Appendix.

National level analysis continued

- Only 48 per cent of MDCs have managed to increase the political rights and civil liberties of their population. Armenia and Bahrain were amongst the underperformers, with worsening scores on a widely used index on the state of human freedom in the world.[19]
- Overall, people in MDCs are better educated, with strong improvements in the mean years of schooling and secondary school education. However, a certain gender bias remains, as education opportunities still appear to favour boys over girls. For example, in the South American country of Guyana, whose economy largely relies on exports of bauxite and gold, the educational gap between women and men is widening. UN data show that men in Guyana are 15 per cent more likely to have at least some secondary school education than women, up from 7 per cent in 1995.
- Youth unemployment has increased in almost half the MDCs over the observed period. The worst performer was South Africa where youth unemployment rose from 33 per cent to 50 per cent.

MDCs improved more in absolute terms across most SDG dimensions during the resource boom period, particularly on reducing poverty

Figure 5: Per cent of metrics that improved boom vs pre-boom* by SDG dimension (mining-dependent countries only)**



* Share of all available metrics (For example, there are 4 metrics under health and well-being for each of the 25 MDCs, the number of available metrics under consideration is 4*25=100) under each dimension that improved on absolute terms.
** Considers 25 mining-dependent countries from 1995-2015. Includes countries that are both mining and hydrocarbon dependent.
*** Based on a simple average of the SDG areas.

18. Estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, ie ranging from approximately -2.5 to 2.5.

19. Progress measured by the 'Freedom in the World' index, produced annually by the US-based non-governmental organisation Freedom House. For more information see Appendix.

2

Poorer countries achieved social progress across a greater number of metrics than wealthier ones, with the notable exception of Chile (which despite being an upper-middle income country also experienced strong gains in social progress since 1995).

As seen in Figure 4, the most broad-based improvements over the 20-year period occurred in mining-dependent countries where the average person earns just between US$766 and US$3,035 per year (lower middle-income countries) or even less, below US$766 per year (low-income countries). Some of the MDCs with the strongest progress include Peru (97 per cent of metrics have improved since 1995), Ghana (93 per cent) and Botswana (93 per cent). On the flipside, Uzbekistan (58 per cent), Central African Republic (60 per cent) and Guyana (60 per cent) showed the weakest improvements.

It is also notable that poorer MDCs improved by 57 per cent in absolute terms on SDG16: Peace, justice, and strong institutions, while MDCs with upper and high incomes improved by just 33 per cent. This difference may reflect the lower starting point of low and lower-middle income MDCs on this dimension.

Socio-economic progress of MDCs was generally more pronounced (Figure 5) during the commodity boom period (2002-15) than during the years prior (1995-2001). A possible reason is that a boost in income during the boom years led to lower poverty rates in MDCs, which could serve as evidence for the important relationship between economic growth and socio-economic progress.

Still, as the analysis later in this chapter shows, income differences between countries are an incomplete explanation for the differences in socio-economic performance between MDCs and other countries. This suggests that a sole focus on strengthening economic growth in MDCs will not be sufficient to drive improvements in socio-economic development.

Governance metrics, particularly those relating to corruption control, notably trailed the achievements of the pre-boom period. This is perhaps not surprising as resource booms often overwhelm institutions and challenge a nation's governance.

Past academic research has demonstrated how a reliance on resource rents can limit incentives for governments to build robust and efficient domestic institutions and bureaucracies. In extreme circumstances, it can even lead to civil war.[20] However, overall across the 20-year period, MDCs improved on a broader set of governance indicators than non-MDCs (see Figure 6).

20. See, for example, Paul Collier, Anke Hoeffler, and Dominic Rohner (January 2009). 'Beyond greed and grievance: Feasibility and civil war,' Oxford Economic Papers, volume 61, issue 1.

National level analysis continued

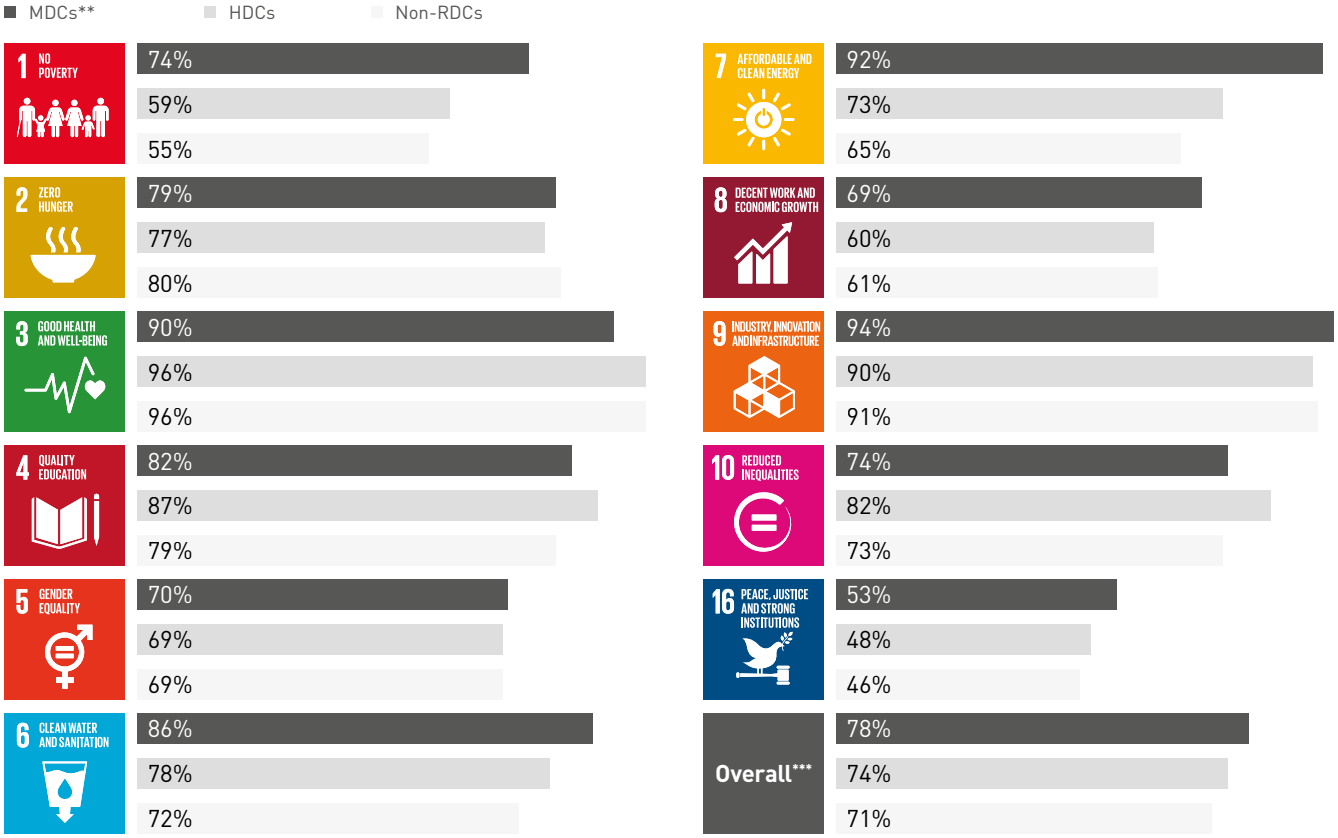
How does the absolute performance of MDCs compare to other countries?

The observed socio-economic progress in mining-dependent countries is strong, even when compared with the progress in other countries around the world. For example, mining-dependent countries managed to improve across a larger number of socio-economic metrics than hydrocarbon-dependent countries and countries with no resource reliance between 1995 and 2015 (Figure 6).

This outperformance is most notable across metrics that reflect progress in providing clean and affordable energy to people. The average MDC improved across 92 per cent of the metrics in this area, while the average non-RDC improved across only 65 per cent of these metrics. Other areas where MDCs outperform include poverty reduction, education, gender equality, access to clean water and sanitation, provision of decent jobs, access to ICT and financial infrastructure, and overall governance. However, despite their strong performance, MDCs lag the absolute progress of HDCs and non-RDCs when it comes to improving the overall health of a population. This lag should not be over-stated as MDCs saw an improvement of 90 per cent across the four health metrics.

A higher percentage of metrics improved in absolute terms in MDCs than in HDCs, with the greatest improvement in energy and infrastructure access

Figure 6: Percentage of metrics that improved since 1995* by SDG dimension and country groups



* Share of all available metrics (For example, there are 4 metrics under health and well-being for each of the 25 MDCs, the number of available metrics under consideration is 4*25=100) under each dimension that improved on absolute terms.
** Considers 25 mining-dependent countries from 1995-2015. Includes countries that are both mining and hydrocarbon dependent.
*** Based on a simple average of the SDG areas.

2

Comparing country performances at the income and geographical level may provide some additional insights on social progress.

Socio-economic improvements were generally found to be higher in low-income countries, particularly in Sub-Saharan Africa, where 80 per cent of the metrics measured across the SDGs improved since 1995.[21]

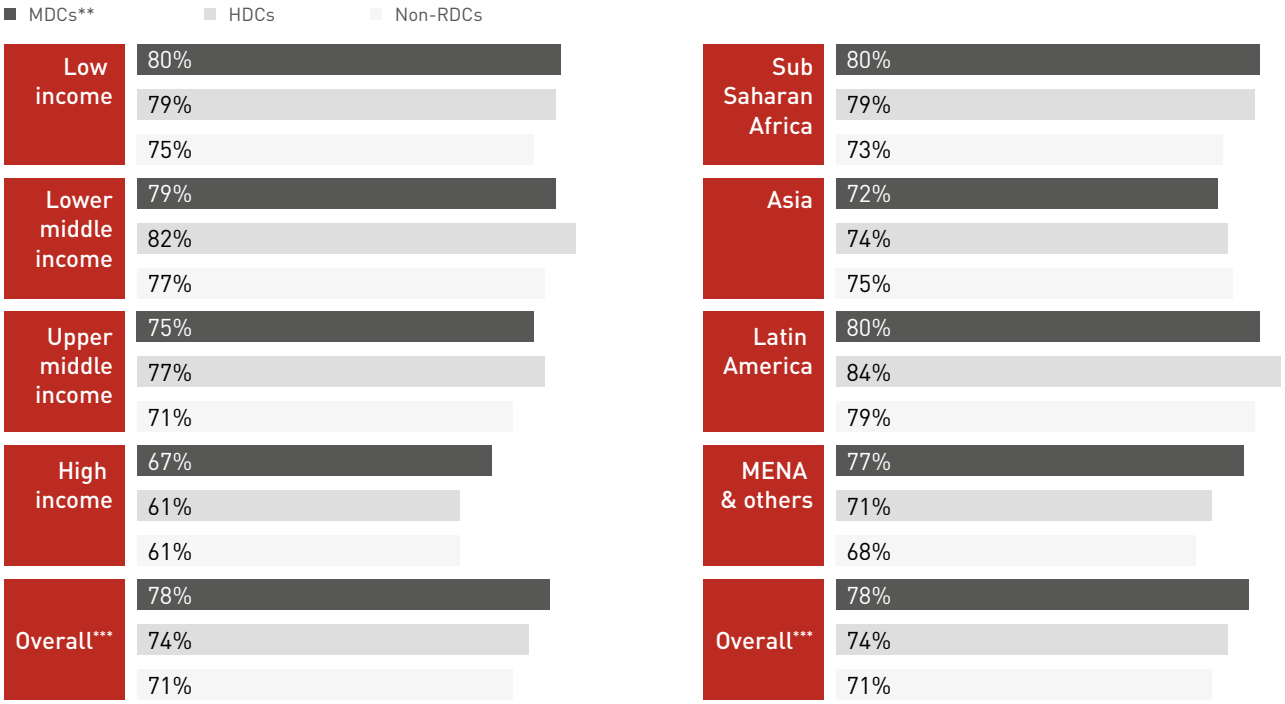
Poorer mining-dependent countries fared better than poorer hydrocarbon-dependent countries, as well as poorer countries with no resource dependence.[22] At higher income levels, the differences between MDCs and other countries were less pronounced (Figure 7).

MDCs outperformed non-RDCs in all regions except Asia. A possible explanation could be the extraordinary industrialisation and economic transformation process in Asia since 1995 which has supported the development of non-resource-dependent countries such as China, Singapore, Korea, and Taiwan.

Still, it remains surprising that mining-dependent countries in Asia underperform their peers in other regions quite substantially. Future research could shed some light on this issue. More robust analysis would also be needed on how national income and geography-specific factors interact to influence overall social progress.

A higher percentage of metrics improved in absolute terms in MDCs than in HDCs, however relative performance varies significantly by income

Figure 7: Per cent of metrics that improved since 1995* by SDG dimension



* Share of all available metrics under each dimension that improved on absolute terms. Sorted by respective groups. (For example, there are 4 metrics under health and well-being for each of the 12 low income MDCs, the number of available metrics under consideration is 4*12=48)
** Considers 25 mining-dependent countries from 1995-2015. Includes countries that are both mining and hydrocarbon dependent.
*** Based on a simple average of the SDG areas under each country grouping.

21. While this study does not aim to attribute causality, a possible reason for the greater improvement in low-income countries is that progress in these countries starts off a lower base ('low base effect'). Another possibility is that low-income countries in Sub-Saharan Africa are main recipients of global aid, and donors typically focus on improving key socio-economic areas such as health, hunger, poverty, and education.

22. Again, low base effects could be at play as poorer MDCs are likely to be less developed than non-RDCs of similar income levels. Comparing poorer MDCs to HDCs, one possible reason for the former's better performance is that hydrocarbon-related activities are more capital intensive and do not allow for artisanal and small-scale mining (ASM) type activities, which have benefited many miners (despite health and safety hazards), particularly in the poorest countries.

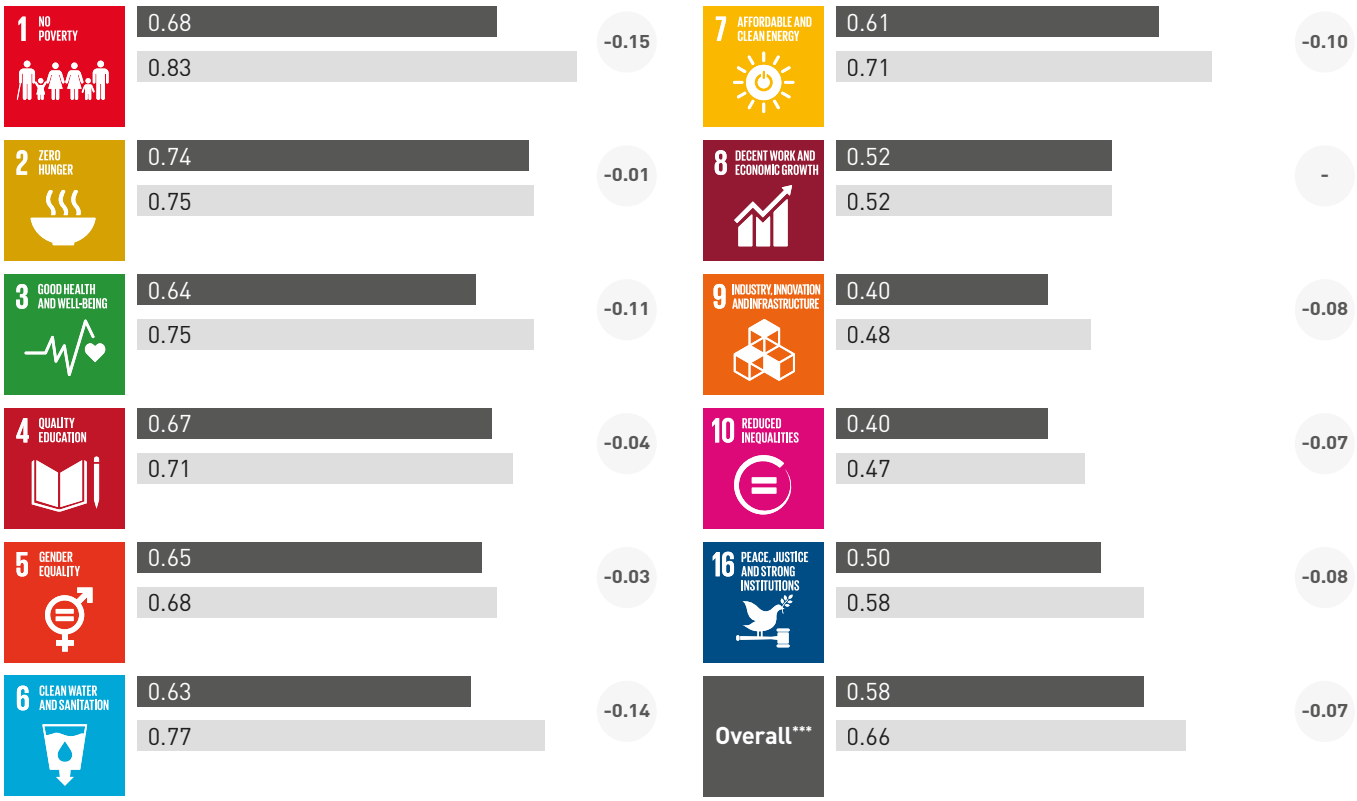
National level analysis continued

On average, how do MDCs measure against the global best performing countries in terms of social progress?

It is also important to understand if MDCs have improved compared to leading global peers, and how this relative development stacks up against non-RDCs. To answer this question, we created a socio-economic index that allows us to measure the gap between a country and its most socially advanced global peer (on a specific indicator) over time. The index is constructed using a 'distance-to-frontier' approach where each country's overall socio-economic development in a particular year can be scored on a scale of 0 to 1, with 0 being the worst and 1 being the best outcome.[23] The difference between a country's score and the best outcome (a score of 1) marks the gap between the country's overall socio-economic development and the most socially advanced country globally. The detailed methodology is explained in the Appendix.

MDCs lag non-RDCs on the majority of socio-economic dimensions

Figure 8: Average country score across the socio-economic performance index components* (index (0–1); 2015)



* Metrics in each SDG area are given equal weighting. Indicators are normalised to 1 where 1 represents the best performing country on a given metric.
** MDCs also include countries in the 'both' category (those dependent on both mining and hydrocarbons).
*** Difference in average index scores between MDCs and non-RDCs. Positive numbers indicate higher average performance by MDCs. Numbers may not sum due to rounding.
**** Based on a simple average of the SDG areas.

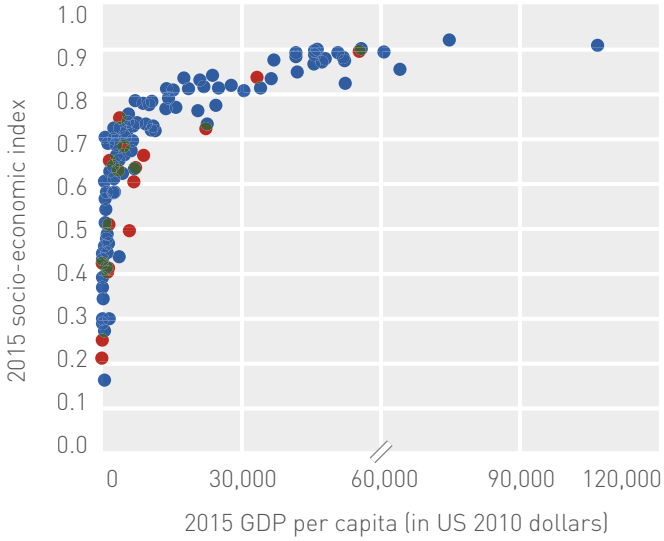
23. This is done at the metric-level using a 'distance-to-frontier' approach. The best and worst performing country on a metric is attributed with a score of 1 and 0 respectively. The performance of all other countries is then measured relative to these two countries. A country's score in each SDG dimension is calculated using a simple average of metrics scored under the dimension. Its overall socio-economic performance index score is calculated as a simple average of the 11 SDG dimension scores. See the Appendix for detailed methodology of how the 'distance-to-frontier' metric scores are calculated.

2

Socio-economic performance gaps are less evident when comparing countries with similar income levels

Figure 9: Overall socio-economic performance and income, 2015

● Mining-dependent countries (MDCs) ● Non resource-dependent countries (non-RDCs)



Average socio-economic performance score by income bracket*		
GDP per capita (US$2010)	MDCs**	Non-RDCs
0–1,000	0.33	0.39
1,000–3,000	0.52	0.56
3,000–5,000	0.70	0.66
5,000–10,000	0.62	0.72
10,000–20,000	0.79	0.78
20,000–40,000	0.73	0.81
40,000+	0.90	0.88

* Based on a simple average of country scores in same income range.
** MDCs also include countries in the 'both' category (those dependent on both mining and hydrocarbons).

Figure 8 shows that MDCs lagged non-RDCs across all SDG areas in 2015 with the exception of SDG8: Decent work and economic growth. In terms of overall socio-economic development, Figure 8 shows that MDCs lag non-RDCs by about 7 per cent. However caution is required when interpreting this result, as income differences can play a large role in shaping a country's socio-economic performance.

When comparing countries of similar income levels, differences in the socio-economic performance tend to be less evident. Figure 9 provides evidence for the strong positive correlation between a country's income and its relative socio-economic performance, comparing mining-dependent and non-resource-dependent countries.

Comparing MDCs and non-RDCs of similar income levels shows closer levels of socio-economic status, although country scores vary between different income groups. For example, in 2015, poorer mining-dependent countries with average per-capita incomes of US$3,000–US$5,000 had higher socio-economic scores than non-RDCs with similar income levels. On the other hand, in countries with average incomes of US$5,000–US$10,000 per capita, non-RDCs had higher socio-economic scores than the MDCs.

In fact, we estimate that income differences drive approximately 80 per cent of the difference in relative socio-economic development between countries that are mining-dependent and those that are not

National level analysis continued

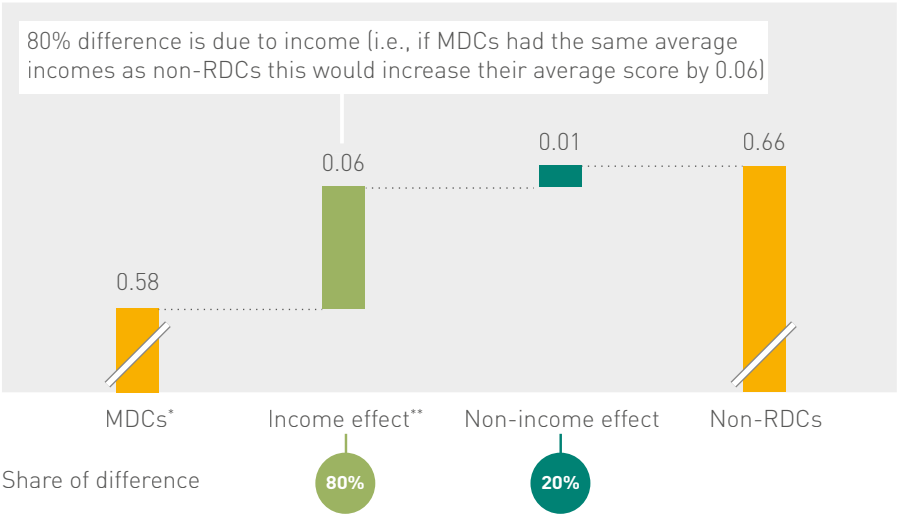
(Figure 10). The income effect is based on the overall socio-economic score for MDCs if they had the same income distribution as non-RDCs.

Figure 11 confirms that gaps in the socio-economic development between MDCs and non-RDCs are generally much smaller when only low and lower-middle income countries are compared.[24] In this context of low and lower-middle income countries, MDCs trail non-RDCs by an overall score of just 2 per cent. This is driven by a relative outperformance on SDG4: Quality education, SDG5: Gender equality, SDG8: Decent work and economic growth, and SDG10: Reduced inequalities. In contrast, when not controlling for poorer incomes, MDCs trail non-RDCs in these four SDG areas (Figure 8).

This section concludes by looking at how MDCs compare with HDCs in terms of relative socio-economic performance. At first glance, countries that rely on mineral exports have lower socio-economic development than countries that rely on oil and gas. However, after adjusting for inherent income biases, MDCs actually outperform HDC's on the socioeconomic index (see Figure 12 and footnotes for an explanation).

Lower average incomes in MDCs account for ~80% of the difference in social progress between these countries and non-RDCs

Figure 10: Average country score across the socio-economic performance index components* (index (0–1); 2015)



* MDCs also include countries in the 'both' category (those dependent on both mining and hydrocarbons).
** The income effect is based on the overall socio-economic score for MDCs if they had the same income distribution as non-RDCs. This accounts for the fact that MDCs have lower average incomes than non-RDCs on average. The calculation is done by using the non-RDC country breakdown across 4 income categories used by the World Bank (low income; lower-middle income; upper-middle income; and high income), and multiplying this by the average MDC score in each of those income categories.

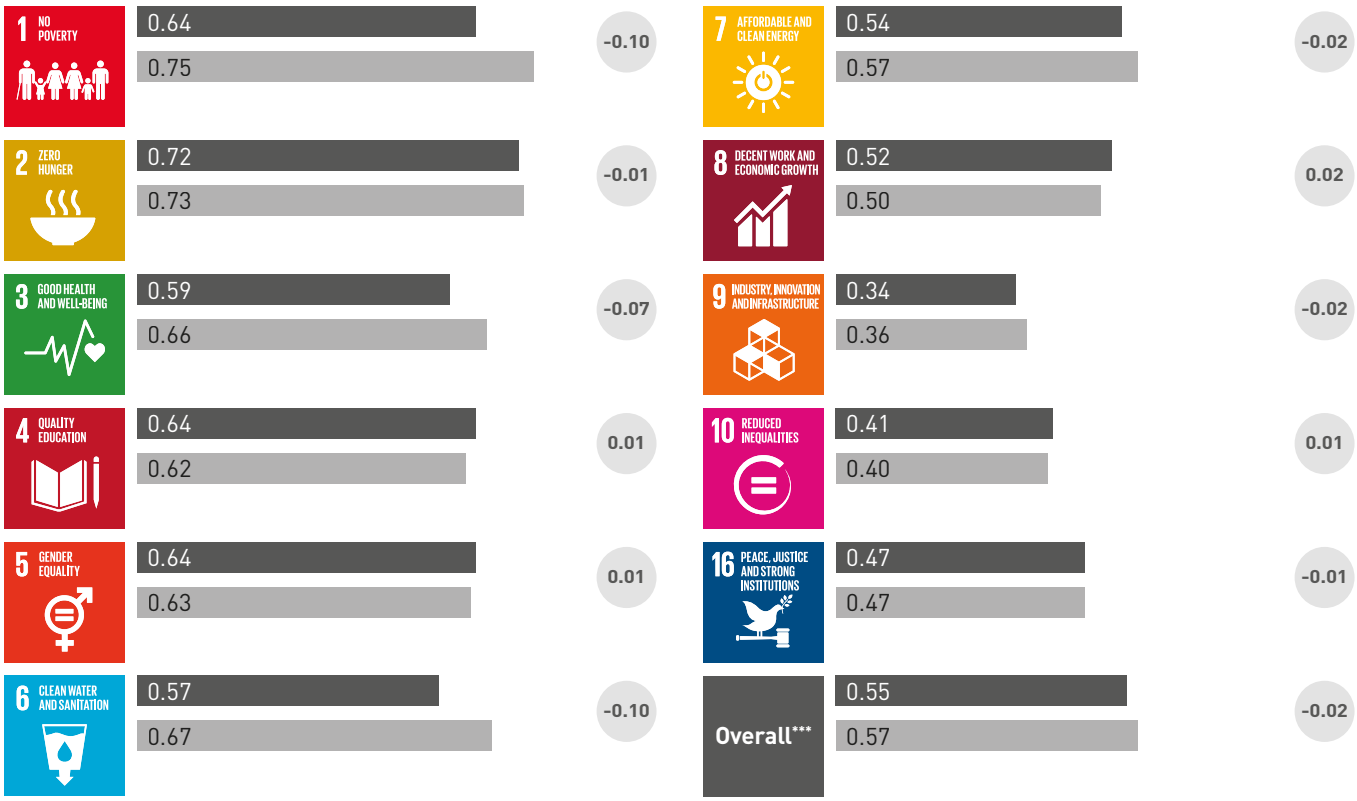
24. Based on income classifications by the World Bank.

2

Gaps between MDCs and non-RDCs narrow considerably across all SDG areas when only low-income & lower-middle income countries are compared

Figure 11: Average country score across the socio-economic performance index components* (index (0–1); 2015)

■ Low and lower middle income MDCs** ■ Low and lower middle income non RDCs x Difference in scores***



* Metrics in each SDG area are given equal weighting. Indicators are normalised to 1 where 1 represents the best performing country on a given metric.
** MDCs also include countries in the 'both' category (those dependent on both mining and hydrocarbons).
*** Difference in average index scores between MDCs and non-RDCs. Positive numbers indicate higher average performance by MDCs. Numbers may not sum due to rounding.
**** Based on a simple average of the SDG areas.

2

National level analysis continued

Are MDCs closing the gap to the world's best performers?

Having examined the socio-economic gap between MDCs and other countries, it is important to assess the degree to which MDCs have been catching up with global best performing countries over time.

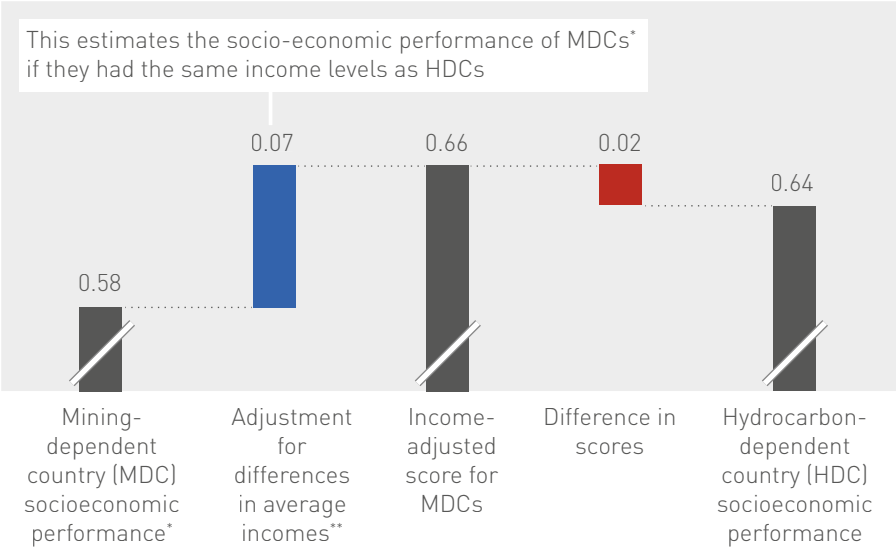
The socio-economic index can help shed light on this question, where the difference between a country's overall socio-economic score in 1995 and 2015 represents the degree of catch-up to global best performers over the two decades (a positive difference indicates that the country has closed the global gap, while a negative difference indicates the gap has widened).

To recap, the average socio-economic performance of mining-dependent countries lagged that of non-resource-dependent countries by around 7 per cent in 2015. In other words, mining-dependent countries were on average 7 per cent further away from the world's best performers on the socio-economic scale than other countries.

Figure 13 shows that 56 per cent of all mining-dependent countries had overall socio-economic performances that were below the global average in 1995, but 84 per cent of them were able to close the gap on the global leaders since 1995. In comparison, only 69 per cent of non-RDCs closed the gap over the same period. MDCs with the biggest relative improvements include Bolivia, Ghana, and Peru. These countries have been rapidly catching up to the best socio-economic performers globally. 'Star performers' include countries such

Adjusting for differences in average income levels, MDCs actually outperform HDCs

Figure 12: Average country score across the socio-economic performance index components* (index (0–1); 2015)

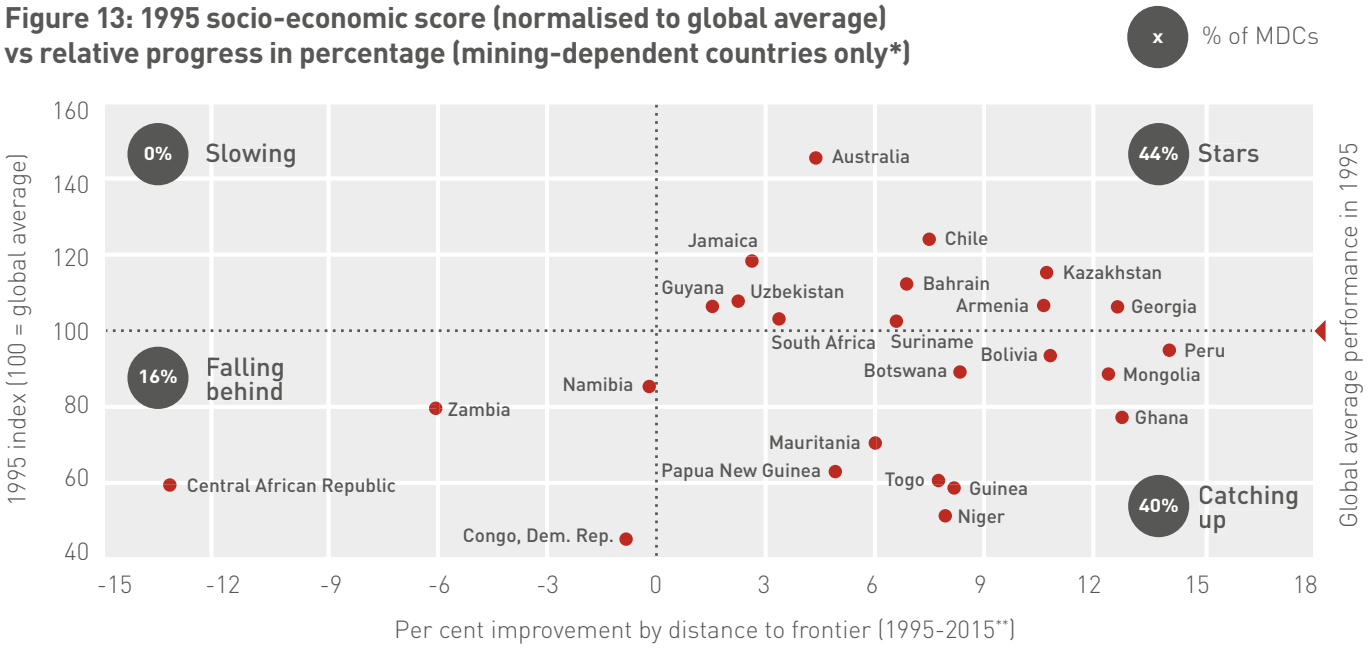


* MDCs also include countries in the 'both' category (those dependent on both mining and hydrocarbons).
** The income effect is based on the overall socio-economic score for MDCs if they had the same income distribution as non-RDCs. This accounts for the fact that MDCs have lower average incomes than non-RDCs on average. The calculation is done by using the non-RDC country breakdown across 4 income categories used by the World Bank (low income; lower-middle income; upper-middle income; and high income), and multiplying this by the average MDC score in each of those income categories.

National level analysis continued

Over half of MDCs underperformed the global average socio-economic score in 1995, but 84% of all MDCs have closed the gap since then

Figure 13: 1995 socio-economic score (normalised to global average) vs relative progress in percentage (mining-dependent countries only*)



* Considers 25 mining-dependent countries from 1995-2015. Includes countries that are both mining and hydrocarbon dependent.
** Difference in socio-economic scores between 1995 and 2015, expressed in percentage.

as Australia, Chile, and Kazakhstan, where socio-economic scores were already above the global average in 1995 and have improved further since.

Overall, only four MDCs – the Central African Republic, Zambia, Namibia, and the Democratic Republic of the Congo – have fallen further behind in their socio-economic development relative to the world's best performers over the 20-year period. And even these four countries have improved across the majority of socio-economic metrics in absolute terms.

As established previously, income is a key factor in socio-economic development. But does a socio-economic lens provide different insights from an economic (income) lens? Figure 14 repeats the analysis, but using gross national income per capita – not the socio-economic index – as the metric to assess the relative progress of MDCs. Figure 14 shows that a much larger share of MDCs (92 per cent) had GNIs below the global average in 1995 compared to the share of underperformers on socio-economic development (56 per cent).

While the share of MDCs that closed the global income gap is the same as the share of MDCs that closed the socio-economic gap (both 84 per cent), improvements are generally slower when observed through the income lens than through the socio-economic lens.

There are two implications here. First, despite large income disparities, MDCs are less unequal compared to global best performers in socio-economic development terms. Second, catch-up in income terms is correlated with a larger degree of catch-up in socio-economic terms.

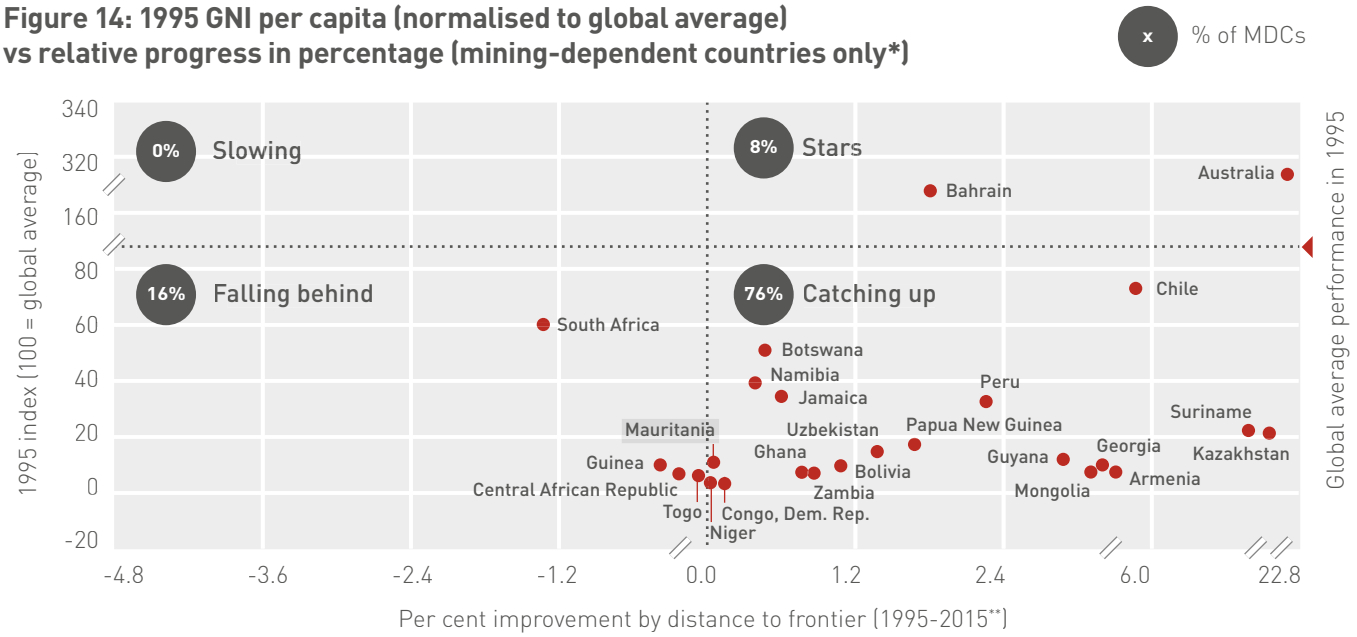
Given the relatively weak gains in governance in MDCs, does it still matter?

There is an implicit and well-accepted link between socio-economic progress and well-governed RDCs: this is the basis for much of the work of organisations like the Natural Resource Governance Institute (NRGI), the Extractive Industries Transparency Initiative (EITI) and development assistance lending from multilateral and bilateral agencies to RDCs.

The findings at the national level show that despite relatively weak improvements in SDG16, socio-economic progress on a range of metrics has still been positive. This raises the question of whether the governance of MDCs really matters for socio-economic progress.

Over 90% of MDCs had per capita incomes below the global average in 1995; while a large number are catching up, the degree of catch up is quite slow

Figure 14: 1995 GNI per capita (normalised to global average) vs relative progress in percentage (mining-dependent countries only*)



* Considers 25 mining-dependent countries from 1995-2015. Includes countries that are both mining and hydrocarbon dependent.
** Difference in normalised GNI per capita (current US$) by distance to frontier method, between 1995 and 2015, expressed in percentage.

A deeper consideration of some of the metrics specific to natural resource governance is needed to answer the question. The Resource Governance Index (RGI) developed by the NRGI provides a rich source of information. The latest RGI from 2017 measures the quality of resource governance in 81 countries. Each country's resource sector (oil and gas, mining, or both) is allocated a composite score based on assessments in three categories: i) value realisation; ii) revenue management; and iii) enabling environment, with each category consisting of multiple sub-components.[25]

Of the 81 countries in the 2017 RGI, 34 are identified as either mineral dependent (26) or dependent on oil, gas, and mining (8). This includes 17 of the 25 MDCs covered by this report. Table 1 shows that five (62 per cent) of the eight mining/oil and gas countries rated as good or satisfactory by RGI are defined as MDCs in this study. Seven (54 per cent) of the 13 mining/oil and gas countries rated as weak by RGI qualify as MDCs.[26] Only five (38 per cent) of the 13 mining/oil and gas countries rated as poor or failing by RGI are MDCs. In terms of mineral resources governance, the MDCs included in this study are overrepresented in the good/satisfactory and weak categories, and underrepresented in the poor/failing category. This may help explain their relatively positive performance in socio-economic progress.

Further insight can be gained by comparing the position of the 17 MDCs covered by the RGI (see Table 1) with their per cent improvement between 1995 and 2015, relative to the most socially advanced country (Figure 13). This shows that MDCs that appeared below the global average in socioeconomic performance in 1995 and in the top

25. Value realisation covers the governance of allocating extraction rights, exploration, production, environmental protection, revenue collection and state-owned enterprises. Revenue management covers national budgeting, subnational resource revenue sharing and sovereign wealth funds. The enabling environment component of the index is comprised of the six Worldwide Governance Indicators (voice and accountability; political stability and lack of violence; government effectiveness; regulatory quality; rule of law; and control of corruption) and a seventh open data subcomponent, comprised of the Global Open Data Index, Open Data Barometer, and Open Data Inventory.

26. RGI defines weak countries as having a mix of strong and problematic areas of governance. While resource extraction can help society, it is likely that the eventual benefits are weak.

National level analysis continued

Table 1: Scores of the 17 MDCs that are covered by the Resource Governance Index (RGI)

Mining-Dependent Countries (MDCs)	Composite RGI scores	Components of RGI scores			Total no. of mining countries with RGI scores in this category*
		Value realisation	Revenue management	Enabling Environment	
Chile	81	74	81	90	8 (Good or satisfactory)
Australia (Western)	71	65	51	96	
Mongolia	64	63	54	73	
Peru	62	68	57	62	
Botswana	61	40	62	81	
South Africa	57	50	40	80	13 (Weak)
Ghana (mining)	56	61	37	70	
Kazakhstan	56	53	54	61	
Niger	54	55	60	47	
Bolivia	54	61	51	49	
Zambia	50	58	35	58	
Papua New Guinea	47	50	50	40	
Bahrain	39	27	26	63	13 (Poor or failing)
Guinea	38	53	24	37	
DRC (mining)	33	52	35	12	
Uzbekistan	29	40	25	22	
Mauritania	29	41	10	36	

* While only 17 countries meet our criteria for 'mining-dependent', 34 of the 81 countries in the 2017 Resource Governance Index (RGI) are identified as either mining dependent or dependent on mining and oil and gas.

≤75

Good

A country has established laws and practices that are likely to result in extractive resource wealth benefiting citizens, although there may be some costs to society.

60-74

Satisfactory

A country has some strong governance procedures and practices, but some areas need improvement. It is reasonably likely that extractive resource wealth benefits citizens, but there may be costs to society.

45-59

Weak

A country has a mix of strong and problematic areas of governance. Results indicate that resource extraction can help society, but It is likely that the eventual benefits are weak.

30-44

Poor

A country has established some minimal procedures and practices to govern resources, but most elements necessary to ensure society benefits are missing.

<30

Failing

A country has almost no governance framework to ensure resource extraction benefits society. It is highly likely that benefits flow only to some companies and elites.

2

Table 2: Scores of the 25 HDCs that are covered by the Resource Governance Index (RGI)

Hydrocarbon-Dependent Countries (HDCs)	Composite RGI scores	Components of RGI scores			Total no. of oil & gas countries with RGI scores in this category*
		Value realisation	Revenue management	Enabling Environment	
Norway	86	77	84	97	7 (Good or satisfactory)
Colombia	71	59	85	67	
Indonesia	68	64	76	65	
Trinidad and Tobago	64	64	57	71	
Cameroon	54	59	70	33	16 (Weak)
Ecuador	54	51	58	52	
Kuwait	54	44	51	67	
Oman	50	32	43	76	
Azerbaijan	47	49	43	49	
Russia	45	47	40	47	
Qatar	43	33	19	77	24 (Poor or failing)
United Arab Emirates	42	32	16	78	
Nigeria	42	50	44	31	
Egypt	39	45	30	41	
Iraq	38	52	47	16	
Iran	38	36	45	34	
Gabon	36	18	47	44	
Saudi Arabia	36	23	24	60	
Angola	35	50	31	25	
Algeria	33	40	25	35	
Venezuela	33	48	34	17	
Yemen	30	50	28	11	
Equatorial Guinea	22	29	18	17	
Libya	18	27	20	6	
Turkmenistan	11	11	0	21	

* While only 25 countries meet our criteria for 'hydrocarbon-dependent' (see bottom of page 6), 47 of the 81 countries in the 2017 Resource Governance Index (RGI) are identified as primarily hydrocarbon-dependent.

2

National level analysis continued

third of all 81 countries covered by the RGI in 2017 (such as Mongolia, Peru, Ghana, Botswana and Niger) achieved higher overall improvements relative to the most socially advanced country (of 6–15 per cent).

In contrast, countries that appeared below the global average in 1995 and feature lower down the RGI index (such as DRC, Uzbekistan and Zambia) achieved lower or negative improvements relative to the most socially advanced country (of -6 – 3 per cent).

On that basis, it appears that governance clearly matters. For the most part, better governed MDCs fared better overall in terms of improvements in socio-economic performance over the past 20 years. That effect is more marked for countries that were below the global average in terms of socio-economic performance in 1995, as opposed to countries that were above the global average (such as Australia and Chile).

Concluding remarks

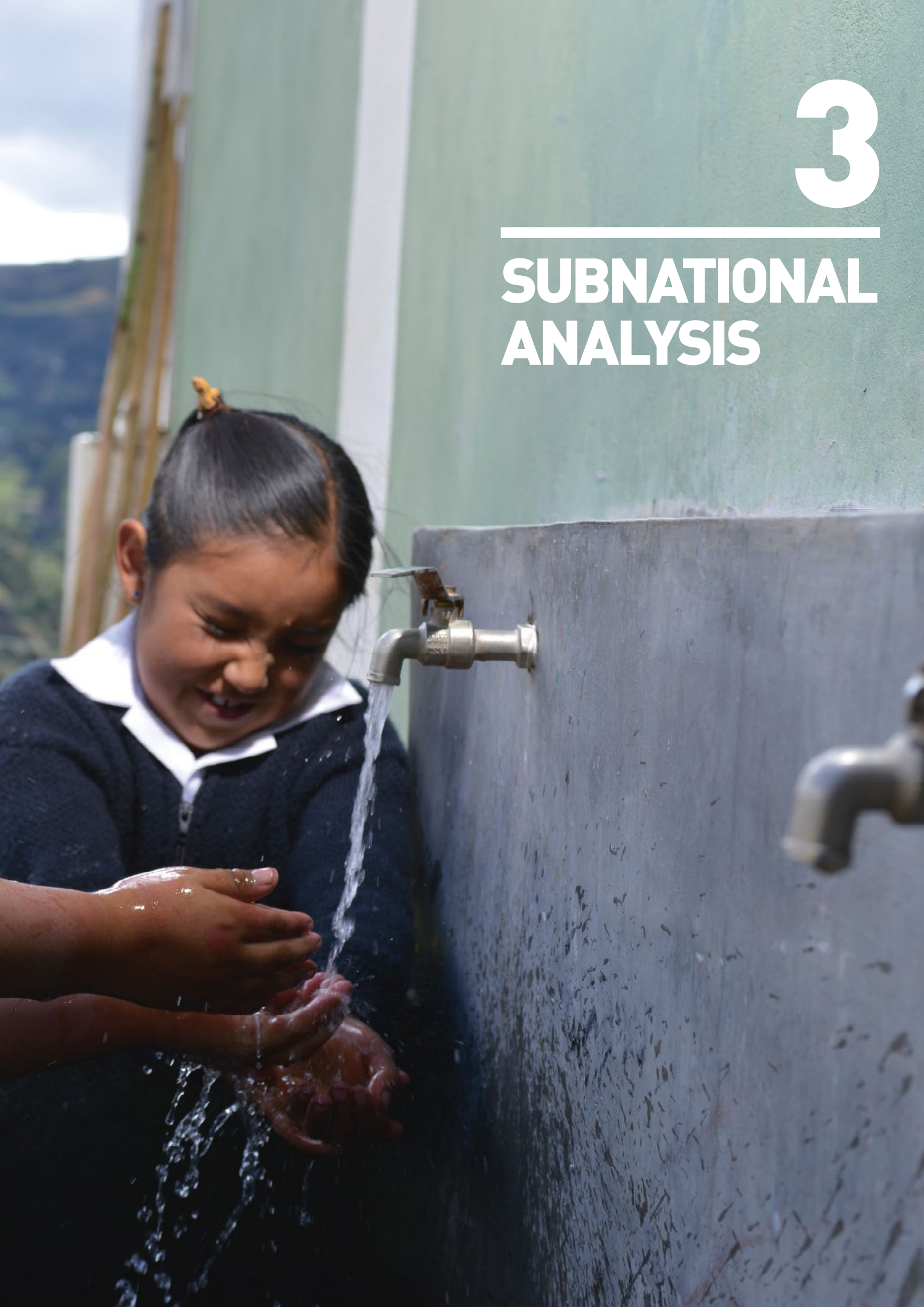
MDCs have improved broadly across various dimensions of socio-economic development. The majority have also closed the gap to the global best-in-class performers. There are further indications that global socio-economic development is converging, led by poor mining-dependent countries where social progress over the past 20 years has been most prominent, enabling them to catch up significantly. This trend has been notable in low-income countries, such as Mongolia and Armenia, as well as in lower-middle income countries, such as Peru and Botswana.[27]

Many challenges remain. Although mining-dependent countries made encouraging social progress, their level of socio-economic development is still considerably below that of countries with no resource dependence. Caution is required when interpreting this relative performance gap, as much of it can be driven by income differences – and mining-dependent countries typically do have lower incomes than other countries. Non-income factors should not be overlooked, but more attention is needed to identify and quantify the non-income related drivers of these differences in socio-economic performance.

Contributing to the existing debate, the results of this report show that being endowed with natural resources is not inevitably a curse, at least when examining countries through a socio-economic lens. Most resource-dependent countries from Africa to Asia have advanced substantially over the past 20 years, with people in mining-dependent areas experiencing a significantly higher quality of life. However, large developmental differences remain between resource-dependent countries, suggesting that the question over whether resources promote progress or become a curse is conditional on how a country harnesses the benefits of mineral wealth.

Very often this is a function of country-specific political institutions and societal constraints. The quality of local governance and policy formulation is a major factor in achieving socio-economic progress. The next section will take a closer look at the mining-dependent regions (MDRs) in four focus countries: Indonesia, Peru, Chile, and Ghana.

27. This analysis is conducted from a socio-economic lens but it is important to also be mindful of the economic conditions in countries, which could be very different or may have started to deteriorate, in part, due to government mismanagement of mineral wealth. For example, socio-economic conditions may have improved considerably over the years in Mongolia but the country was plunged into financial crisis in recent times due to the sharp decline in global commodity prices and weaknesses in the country's macroeconomic management. The long-term social consequences of crises like these remain to be seen and are not captured in this research.



3

SUBNATIONAL ANALYSIS

Subnational analysis

Further analysis in four focus countries – Chile, Ghana, Indonesia[28], and Peru – reveals that the social progress in mining-dependent countries has been widespread, and that in general, mining-dependent regions (MDRs) have improved significantly in both absolute and relative terms in recent years.[29]

In absolute terms, MDRs in these four countries have advanced on at least three-quarters of the socio-economic progress indicators irrespective of any country-specific differences. Mining-dependent regions in different countries develop at various degrees relative to non-RDRs. For example, MDRs in all four countries managed to improve their overall socio-economic performance in absolute terms across a broad range of indicators. But while MDRs in Peru and Ghana improved across more metrics than non-RDRs, the social progress of MDRs in Indonesia and Chile occurred across fewer metrics than in non-resource-dependent regions.

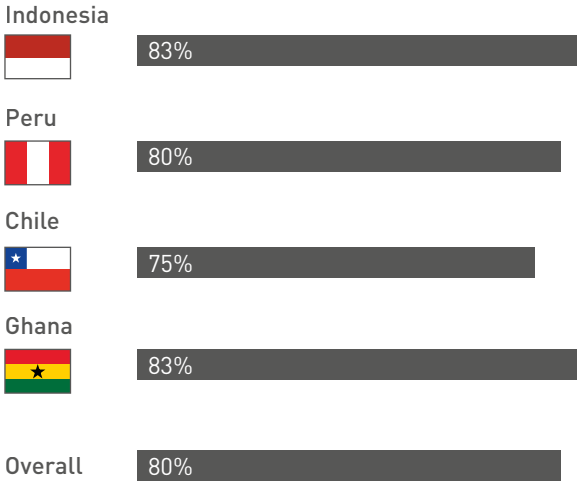
An assessment of the socio-economic gap between mining-dependent regions and regional leaders in each country (using the same 'distance-to-frontier' method as in the national analysis) finds that 93 per cent of MDRs in Peru, 100 per cent of MDRs in Ghana, 80 per cent of MDRs in Indonesia and 80 per cent of MDRs in Chile managed to close the gap to the best performers over the observed periods.

Have mining-dependent regions improved their socio-economic performance over the observed time period?

Overall, the most broad-based socio-economic progress at the subnational level occurred in Indonesia and Ghana, where 83 per cent of the metrics in MDRs improved during the period examined. In Peru, 80 per cent of socio-economic metrics improved, in Chile 75 per cent of them strengthened, albeit from a higher base than in the other three countries (Figure 15). These

MDRs improved their socio-economic performance significantly in absolute terms over time period analysed

Figure 15: Per cent of metrics that improved on absolute terms across SDG dimensions* (by country) (mining-dependent regions only)**



* Calculated as the average percentage of metrics that have improved in absolute terms under each of the 11 SDG dimensions in the respective time periods observed. ie 2003-2015 for Indonesia, 2007-2015 for Peru, 2006-2015 for Chile and 1998-2015 for Ghana.
** MDRs also include regions in the 'both' category (those dependent on both mining and hydrocarbons). There are 10 in Indonesia, 14 in Peru, 5 in Chile and 2 in Ghana.

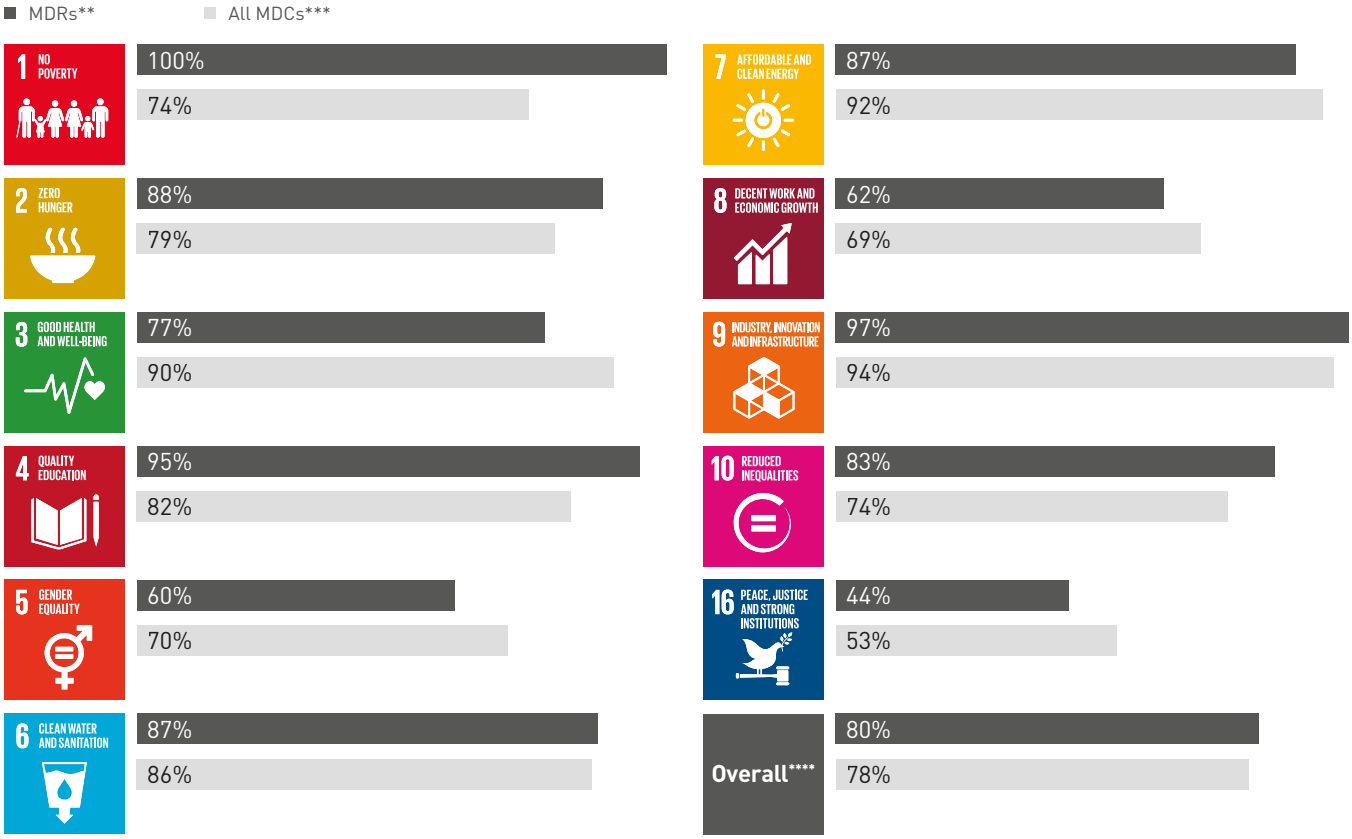
28. While Indonesia is a HDC, it has 34 provinces with a mix of resource dependencies and 10 provinces are MDRs. This provides a good basis for regional comparison across different resource types. The other reason for including Indonesia is because its mineral share of resource exports has grown in importance over time.

29. The observed periods are different in the four countries: 2003-2015 for Indonesia, 2007-2015 for Peru, 2006-2015 for Chile and 1998-2015 for Ghana. The basis for the selection of these countries is in the Appendix.

3

The majority of metrics considered under each SDG dimension improved in absolute terms across MDRs in the four countries

Figure 16: Share of metrics that improved over observed period* by SDG dimension



* Average share of all available metrics under each dimension that improved on absolute terms across MDRs in the 4 countries. (For example, there are 4 metrics under health and well-being in 5 MDRs in Chile, the number of available metrics under consideration is 4*5=20.) Time periods: 2003-2015 for Indonesia, 2007-2015 for Peru, 2006-2015 for Chile and 1998-2015 for Ghana.
** MDRs also include regions in the "both" category (those dependent on both mining and hydrocarbons). There are 10 in Indonesia, 14 in Peru, 5 in Chile and 2 in Ghana.
*** Considers 25 mining-dependent countries from 1995–2015. Includes countries that are both mining and hydrocarbon dependent.
**** Based on a simple average of the SDG areas in the 4 countries.

subnational results differ slightly from national-level results where Peru experienced the largest absolute social progress, but its mining-dependent regions improved across fewer metrics than those in Indonesia and Ghana.

Regional and national results are broadly in line. Improvements seen at the subnational level are particularly strong in terms of SDG1: No poverty, SDG2: Zero hunger, SDG4: Quality education, and SDG10: Reduced inequalities, which all noticeably outperformed the MDC national average. While in contrast, SDG3: Good health and wellbeing, SDG5: Gender equality, and SDG16: Peace, justice and strong institutions underperformed compared with the national average (Figure 16).

As Figure 18 illustrates the difference in social progress between MDRs and non-MDRs across SDG3, SDG5, and SDG16 are roughly similar indicating that disparities between data for MDRs and MDCs may be more indicative of national shortcomings than regional weaknesses.

3

Subnational analysis continued

How do mining-dependent regions fare against other regions?

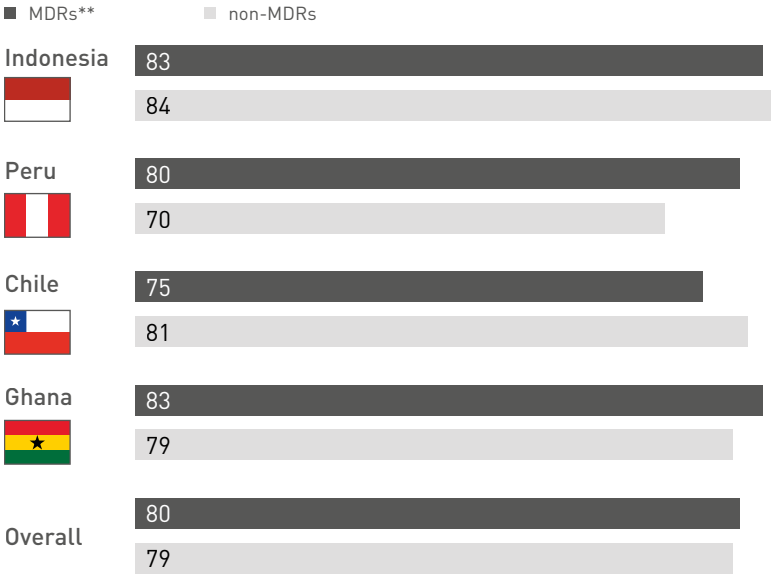
Overall, in recent years, mining-dependent regions in the four sample countries experienced larger socio-economic improvements in absolute terms (80 per cent of metrics improved in absolute terms) than non-resource-dependent regions (79 per cent metrics improved in absolute terms).

However, absolute regional progress differs by country: in Peru and Ghana, the socio-economic performance of mining-dependent regions outstripped that of non-mining regions. The opposite was true in Indonesia and Chile (Figure 17).

The country-specific performance in absolute terms is illustrated in the second half of this chapter.

In Peru and Ghana, socio-economic progress was more broad-based in mining-dependent regions vs other regions, but not in Indonesia and Chile

Figure 17: Share of metrics that improved in absolute terms across SDG dimensions* by resource-dependency groups



* Calculated as the average percentage of metrics that have improved in absolute terms under each of the 11 SDG dimensions in the respective time periods observed. ie 2003-2015 for Indonesia, 2007-2015 for Peru, 2006-2015 for Chile and 1998-2015 for Ghana.
** MDRs also include regions in the 'both' category (those dependent on both mining and hydrocarbons). There are 10 in Indonesia, 14 in Peru, 5 in Chile and 2 in Ghana. There are no regions categorised as HDRs in Chile and Ghana.

Subnational analysis continued

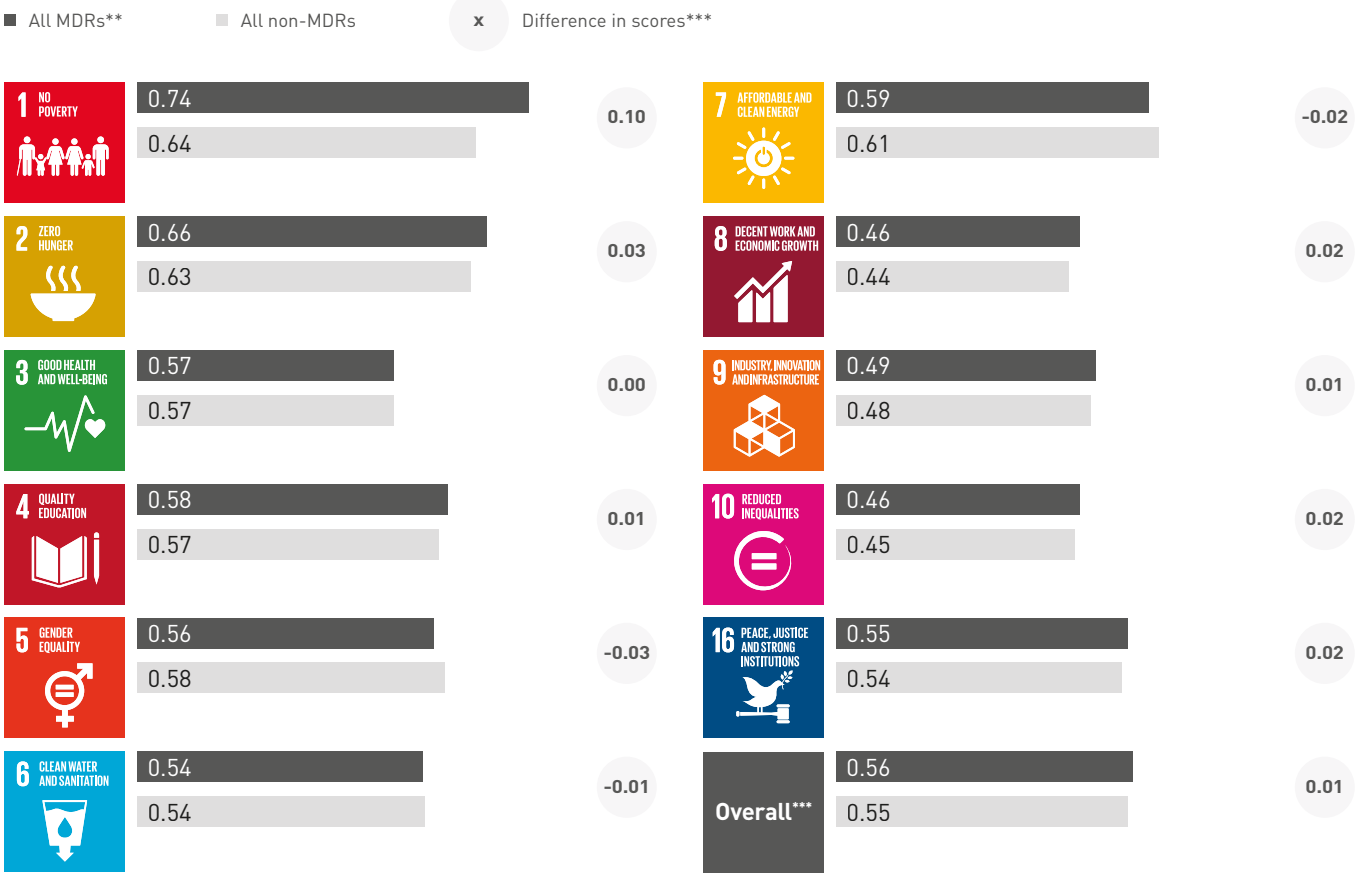
On average, how do mining-dependent regions measure against the most socially advanced regions in their country?

To measure the relative performance of mining-dependent regions against the most socially advanced regions in each country, the same 'distance-to-frontier' approach was used as in the national-level analysis. Regions were scored across the different metrics based on their gap from the best performing regions nationally. Each region was then scored based on an average of metrics in each SDG dimension. Finally, each region was given an overall socio-economic score, based on its average score across all 11 SDG dimensions together (refer to Appendix for more details on methodology).

Figure 18 shows the average performance of mining-dependent regions compared to regions that are non-resource-dependent. Overall, MDRs score better than non-RDRs on the relative index, outperforming across all SDG dimensions except SDG5: Gender equality, SDG6: Clean water and sanitation and SDG7: Affordable and clean energy. This is contrary to the national-level analysis where MDCs on average (without accounting for income) lag non-RDCs on socio-economic development.

On average, mining-dependent regions (MDRs) marginally outperformed non-resource-dependent regions (non-RDRs) in the four countries

Figure 18: Average regional score across the socio-economic performance index components* (index (0–1);2015)



* Metrics in each SDG area are given equal weighting. Indicators are normalised to 1 where 1 represents the best performing region on a given metric.
** MDRs also include countries in the 'both' category (those dependent on both mining and hydrocarbons).
*** Difference in average index scores between MDRs and non-RDRs. Positive numbers indicate higher average performance by MDRs. Numbers may not sum due to rounding.
**** Based on a simple average of the SDG areas across the four countries for each regional grouping.

3

Have mining-dependent regions managed to close the gap to the most socially advanced regions in their country?

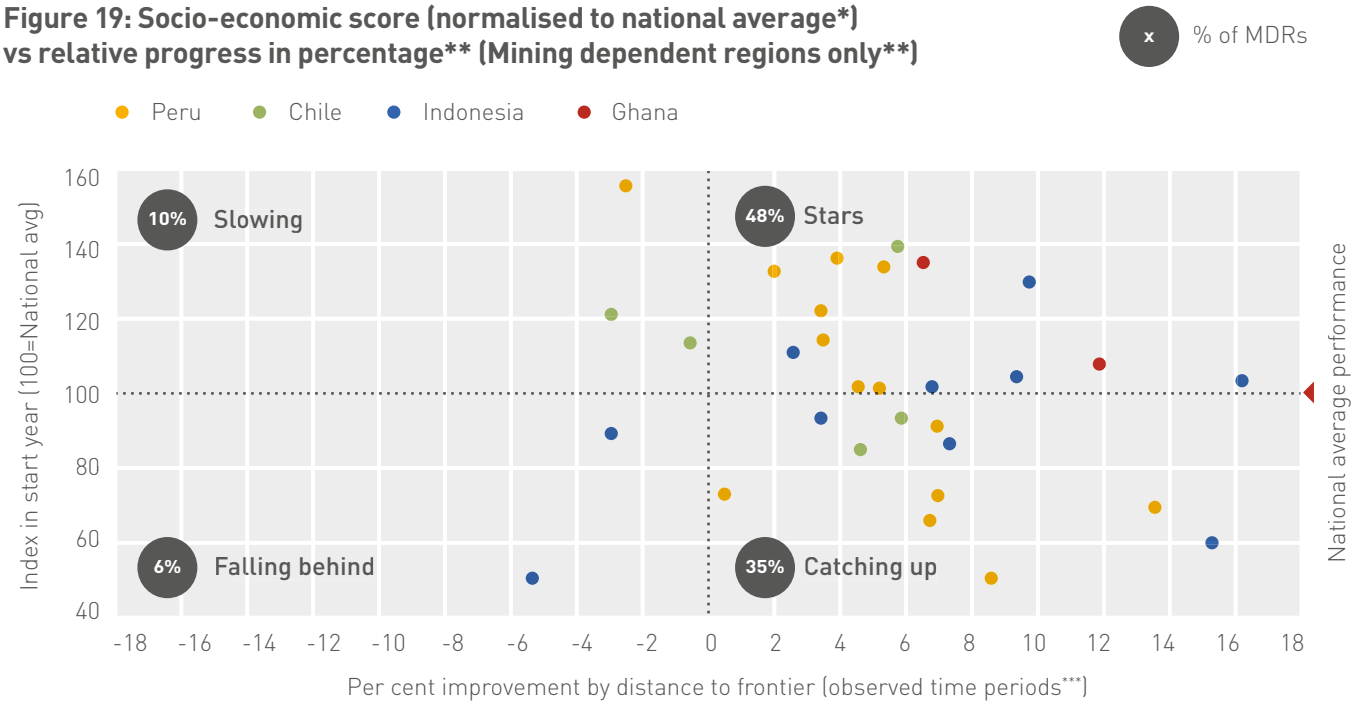
More than 80 per cent of mining-dependent regions have been able to close the gap to the socially most advanced region in their country (Figure 19).

Mining-dependent regions in Peru (Figure 28) and Ghana (Figure 38) were most successful in catching up to regional best performers in their respective countries. 93 per cent of mining-dependent regions in Peru and both mining-dependent regions in Ghana managed to close the gap. The relative social progress of MDRs in Indonesia (Figure 23) and Chile (Figure 33) was slightly weaker, although there was still considerable improvement: 80 per cent and 60 per cent of mining-dependent regions in Indonesia and Chile closed the gap respectively.

The subnational results for each of the four countries are discussed in detail later in this chapter.

More than 80% of mining-dependent regions have closed the gap on socio-economic best practices in their respective countries

Figure 19: Socio-economic score (normalised to national average*) vs relative progress in percentage (Mining dependent regions only**)**



* Normalised to respective national averages of the start year of the observed time period.
** MDRs also include regions in the 'both' category (those dependent on both mining and hydrocarbons). There are 10 in Indonesia, 14 in Peru, 5 in Chile and 2 in Ghana.
***Difference in socio-economic scores across observed time periods, expressed in percentage. Time periods: 2003-2015 for Indonesia, 2007-2015 for Peru, 2006-2015 for Chile and 1998-2015 for Ghana. Expressed in percentage.

3

Subnational analysis continued

Indonesia results

Subnational socio-economic progress in Indonesia was analysed between 2003 and 2015, in line with data availability. Ten out of the 34 official regions in Indonesia were identified to be mining-dependent (seven purely mining-dependent and three dependent on both minerals and hydrocarbons). Four regions were classified as hydrocarbon-dependent, and the remaining 20 considered non-resource-dependent. Figure 20 shows the categorisation of regions in the country. Further information on the methodology used to classify the regions can be found in the Appendix. Box 2 reviews some of the recent literature on mining's impact at the subnational level in Indonesia. It is meant to provide some context, but does not serve as a base for comparison with findings in this section of the report due to differences in focus and methodology.[30]

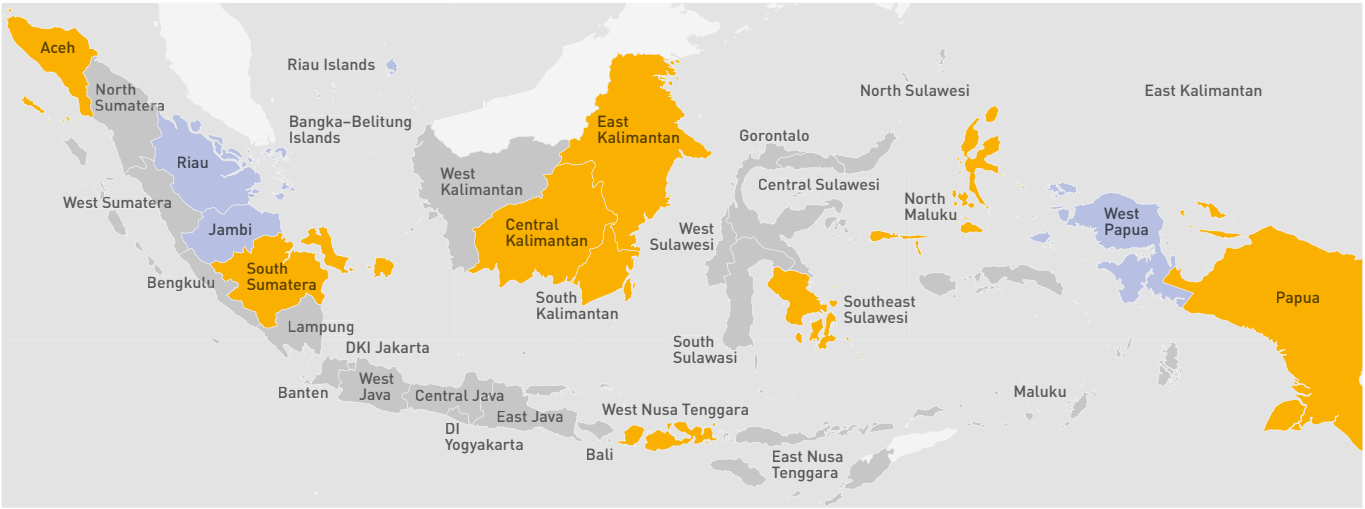
10 mining-dependent regions, 4 hydrocarbon-dependent regions, and 20 non-resource-dependent regions

Figure 20: Map of Indonesia

Indonesia

Region classifications*

Non-resource-dependent region Mining-dependent region Hydrocarbon-dependent region



* Mining-dependent regions (MDRs) defined as mining & quarrying representing >10% of regional GDP, and the minerals share of mining and quarrying being >75%; Hydrocarbon-dependent regions (HDRs) defined as mining & quarrying representing >10% of regional GDP, and the hydrocarbon share of mining and quarrying being >75%; regions that are both MDRs and HDRs are where mining & quarrying represents >10% of regional GDP, but neither minerals or hydrocarbons represent >75% of mining and quarrying. These regions were also classified as mining-dependent regions for the purposes of the analysis.
Source: CEIC, Central Bureau of Statistics

30. The methodology in this report is non-econometric and focuses on a much broader set of questions unlike academic studies which tend to focus on more targeted questions (eg impact of anti-malaria programme on health outcomes within 5km radius of a mine). Hence, caution must be exercised when relating findings in this report to past literature.

Subnational analysis continued

Since 2003, both MDRs and non-RDRs in Indonesia improved their overall socio-economic well-being in 83 per cent of metrics across the 11 SDG areas. However, the source of improvement varies significantly between MDRs and non-MDRs. MDRs outperformed most under SDG5: Gender equality but underperformed vis-à-vis non-RDRs most under SDG16: Peace, justice, and strong institutions (Figure 21).

Comparing performance relative to the top performing subnational region on each metric, performance varies more between MDRs and non-RDRs. MDRs have a 4 percentage points lower score than non-RDRs on average in 2015 (Figure 22). The SDG area accounting for the largest share of underperformance is SDG16: Peace, justice, and strong institutions.

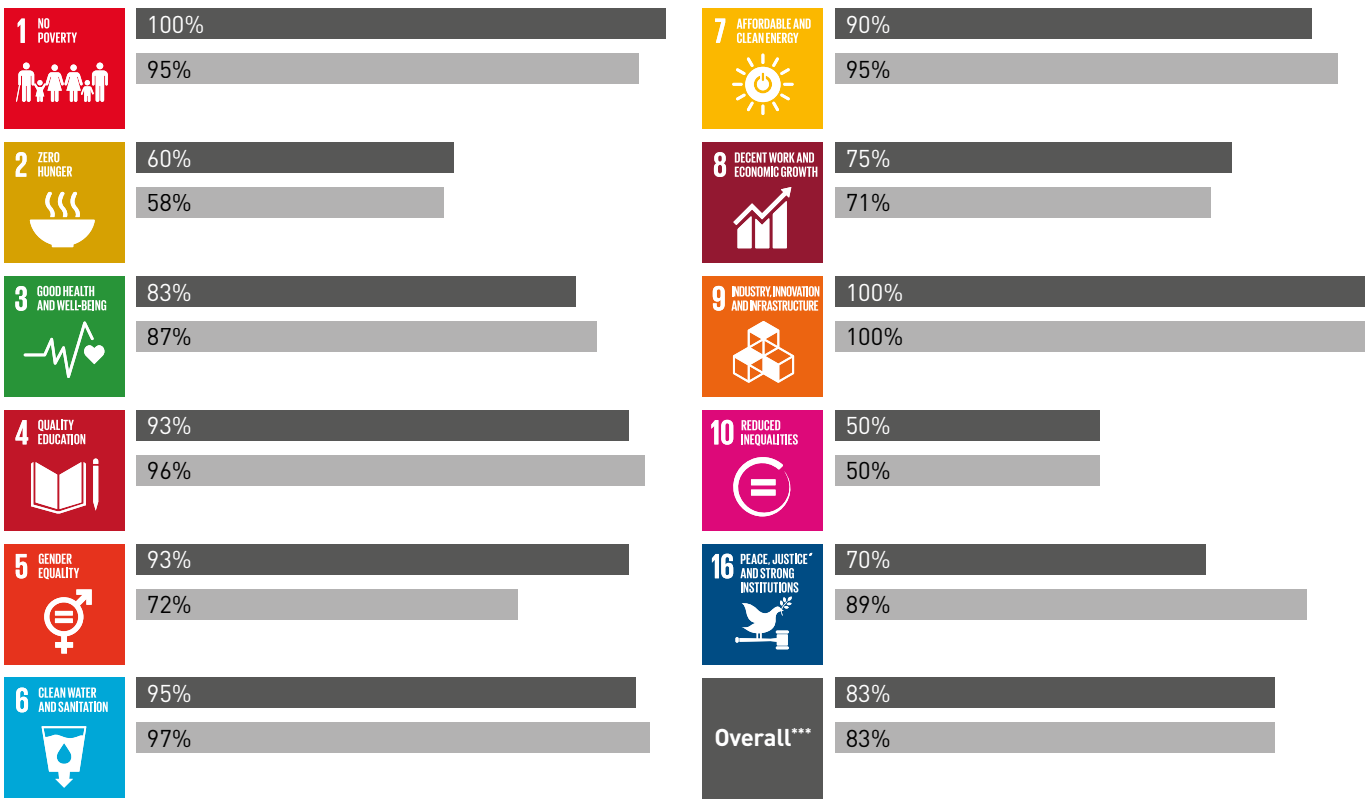
Encouragingly, 80 per cent of Indonesia's MDRs have closed the gap on socio-economic best performers in the country since 2003 (Figure 23). The MDRs which closed the gap the most are Bangka–Belitung Islands and West Nusa Tenggara.

At the metric level within the socio-economic index, MDRs perform best on basic education metrics and worst on financial and internet access metrics in 2015 (Figure 24).

MDRs and non-RDRs in Indonesia achieved the same level of absolute improvement but progress varies significantly across SDG dimensions

Figure 21: Share of metrics that improved 2003-2015* by SDG dimension

Indonesia



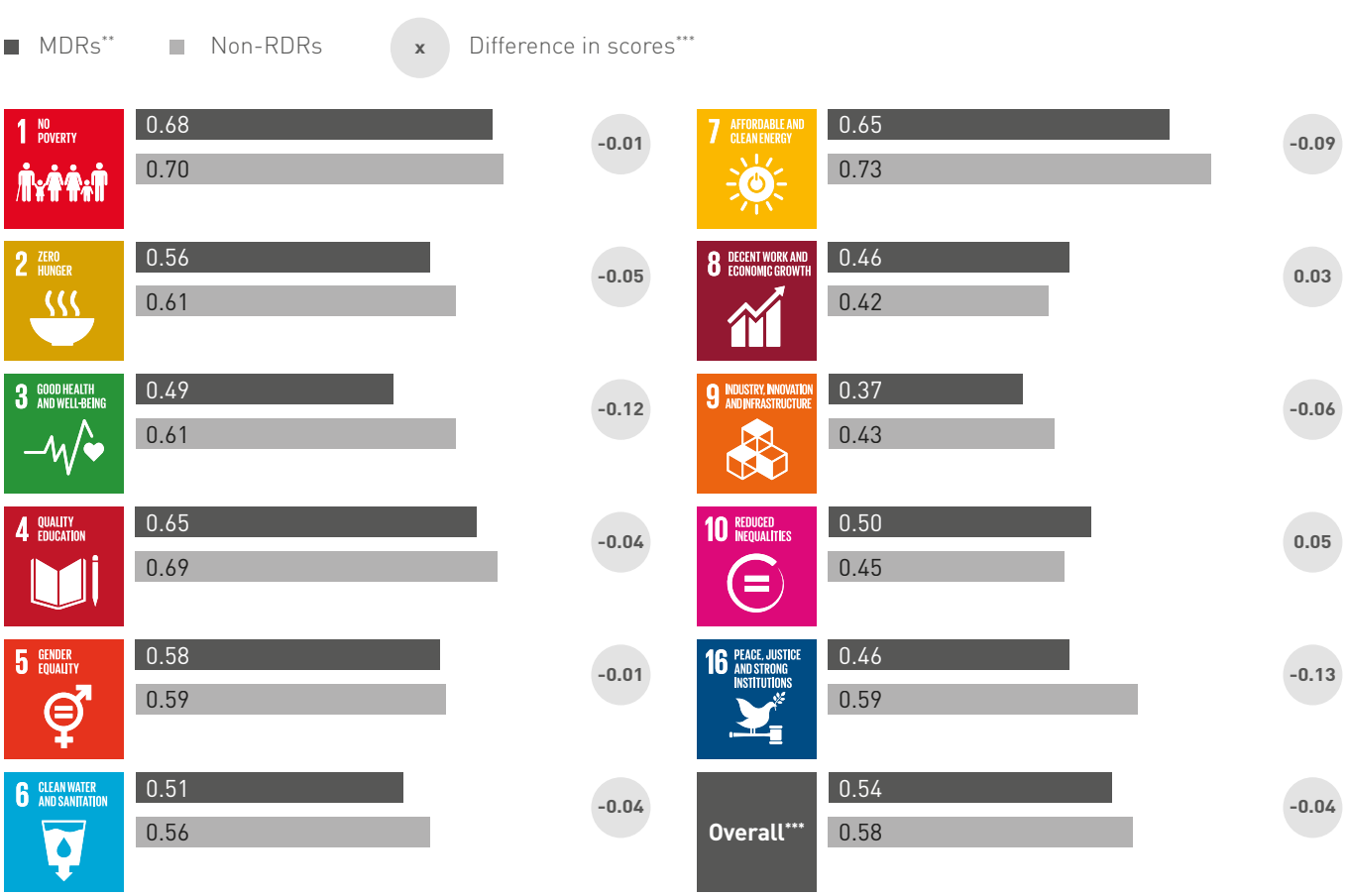
* Average share of all available metrics under each dimension that improved on absolute terms across MDRs in Indonesia. (For example, there are 4 metrics under health and well-being in 10 MDRs in Indonesia, the number of available metrics under consideration is 4*10=40.)
** MDRs also include regions in the 'both' category (those dependent on both mining and hydrocarbons). There are 10 MDRs in Indonesia.
*** Based on a simple average of the SDG areas.

3

Mining-dependent regions (MDRs) lag non-resource-dependent regions (non-RDRs) on relative socio-economic performance in Indonesia

Figure 22: Average regional score across the socio-economic performance index components* (Index (0-1); 2015)

Indonesia

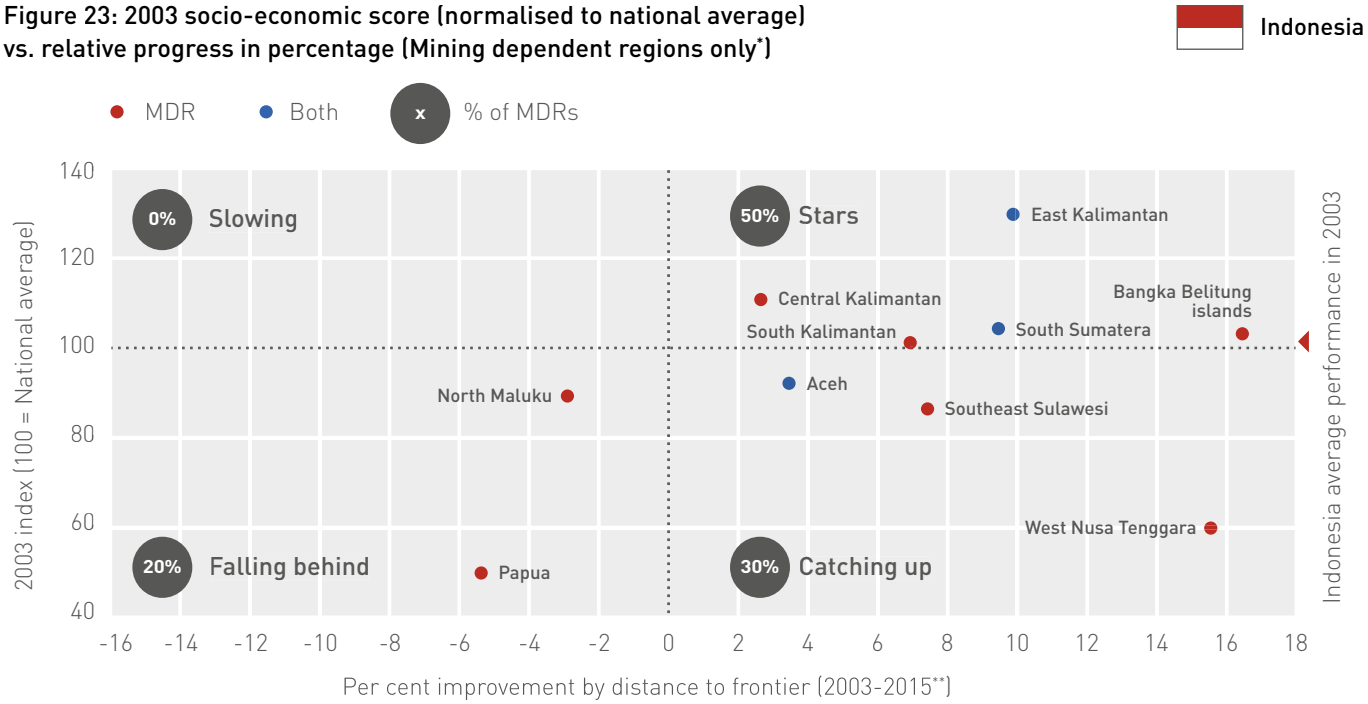


* Metrics in each SDG area are given equal weighting. Indicators are normalised to 1 where 1 represents the best performing region on a given metric. Where 2015 data is not available for a given metric, the nearest available year is used.
** MDRs also include regions in the 'both' category (those dependent on both mining and hydrocarbons).
*** Difference in average index scores between MDRs and non RDRs. Positive numbers indicate higher average performance by MDRs.
**** Based on a simple average of the SDG areas.

Subnational analysis continued

80% of mining-dependent regions in Indonesia closed the gap on socio-economic best practices in the country since 2003

Figure 23: 2003 socio-economic score (normalised to national average) vs. relative progress in percentage (Mining dependent regions only*)



* Considers 10 regions that generate more than 10% of GDRP from mining and quarrying activities in 2010. MDRs also include regions in the 'both' category (those dependent on both mining and hydrocarbons).
** Difference in socio-economic scores between 2003 and 2015, expressed in percentage.

3

At the metric level, MDRs perform best on basic education metrics and worst on financial and internet access metrics in 2015

Indonesia

Figure 24: MDRs* socio-economic metrics by rank**

Top 5 highest performing indicators (2015)	1. Net enrolment ratio: primary 2. Household access to electricity 3. Literacy rate (15+ years old) 4. Difference in literacy rates between men and women (15+ years old) 5. Difference in per capita expenditure: Urban vs Rural
Greatest relative improvement (2003-2015)* **	1. Households with clean cooking fuel 2. Under 5 mortality rate 3. Household access to electricity 4. Percentage difference of men and women with secondary and above education 5. Infant mortality rate
Top 5 lowest performing indicators (2015)	1. Commercial and rural bank loans, per capita 2. Monthly per capita household health expenditure 3. Household per capita expenditure 4. Household that accessed the internet in the past 3 months 5. Percentage of population with secondary or higher education
Weakest relative improvement (2003-2015)* **	1. Unemployment rate 2. Labour force participation 3. Prevalence of underweight (% children under 5) 4. Percentage difference of men and women who worked in the last 12 months and is currently employed 5. Indonesian Democracy Index

* MDRs also include regions in the 'both' category (those dependent on both mining and hydrocarbons).
** Based on the MDRs' average scores for each metric ranked by the 'distance-to-frontier' method.
*** Represents the indicator where the gap to the frontier has been closed the most since 2003. Where data is not available for a given metric in a given year, the nearest available year is used.

Subnational analysis continued

BOX 2: Review of past literature on social progress in Indonesia (subnational level)

Literature on the socio-economic impact of mining in Indonesia at a subnational level is relatively scarce. Soelistijo, Wibowo and Aswandi (2015) found that nickel mining contributed considerably to socio-economic progress in Southeast Sulawesi both directly and indirectly. However, the economic multiplier effects of nickel mining were found to be weaker than in sectors such as construction and services.[31]

Nurtjahya and Agustina (2015) assessed the socio-economic impact of artisanal tin mining on Bangka Island in the Bangka-Belitung province.[32] They found that the majority of the people in this province had higher wealth due to tin mining, and more were able to afford cars and motorcycles as their household incomes rose. The authors also noted increased social conflicts at mining sites between locals and migrant workers from adjacent islands.

Citing Erman (2013), the paper further documented the negative impact of mining on education: the region of Bangka-Belitung, for example, was found to have the second highest school drop-out rate in Indonesia in 2011, as students chose work in the mines over finishing school.[33]

Meisanti, Ali, Jusoff, Salman and Rukmana (2012) evaluated the social, economic, and environmental impacts of gold mining on the Bombana district in the Southeast Sulawesi province. The paper found that the discovery of gold in 2008 generated revenues worth billions of dollars, while making scant social contribution to local communities. Many farmers suffered from the environmental degradation and changing power structures associated with the mining activities.[34]

Suhartini and Abubakar (2017) found that artisanal and small-scale gold mining had positive social impacts in Sekotong, West Lombok, and West Nusa Tengara. In these districts, mining was found to have created jobs, increased incomes, and reduced poverty, allowing many residents to own houses of better quality and other assets.[35]

31. Ukar Wijaya Soelistijo, Aryo Prawoto Wibowo, La Ode Aswandi (2015). *Study on Socio Economic Benefit of Nickel Mining Industry in Southeast Sulawesi Province Indonesia and It's Impact on Local Economy.* American Journal of Environmental Engineering and Science. Vol. 2, No. 6, 2015, pp. 77-86.

32. Nurtjahya, Eddy and Agustina, Fournita (2015). *Managing the socio-economic impact of tin mining on Bangka Island, Indonesia – preparation for closure.* The 10th International Conference on Mine Closure, Vancouver.

33. Erman, E. (2013). *Dampak penambangan timah dan respon masyarakat local.* ITRI Indonesia Tin Forum, Pangkalpinang, Indonesia, 11 December 2013.

34. Meisanti, M. Saleh S. Ali, Kamaruzaman Jusoff, Darmawan Salman, Didi Rukmana (2014). *The Impacts of Gold Mining on the Farmer's Community.* American-Eurasian Journal of Sustainable Agriculture.

35. Suhartini and Abubakar, (April 2017). *Socio economic impacts and policy of artisanal small-scale gold mining in relation to sustainable agriculture: a case study at Sekotong of West Lombok.* Journal of Degraded and Mining Lands Management.

3

Peru results

Subnational socio-economic progress in Peru was analysed between 2007 and 2015, in line with data availability. More than half (14) of the 25 official regions in Peru were identified as mining-dependent (13 purely mining-dependent and one dependent on both minerals and hydrocarbons); three as hydrocarbon-dependent; and the remaining eight as non-resource-dependent. Figure 25 shows the categorisation of regions in the country. Further information on the methodology used to classify the regions can be found in the Appendix. Box 3 reviews some of the recent literature on mining's impact at the subnational level in Peru. It is meant to provide some context, but does not serve as a base for comparison with findings in this section of the report due to differences in focus and approach.

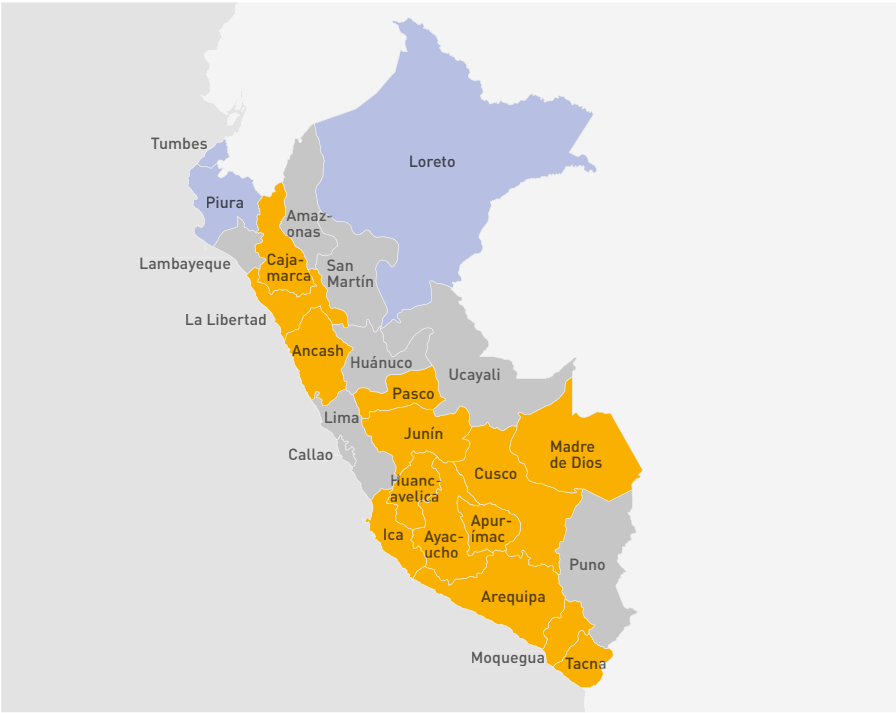
14 mining-dependent regions, 3 hydrocarbon-dependent regions, and 8 non-resource- dependent regions

Figure 25: Map of Peru

Peru

Region classifications*

- Non-resource-dependent region
- Mining-dependent region
- Hydrocarbon-dependent region



* Mining-dependent regions (MDRs) defined as the extractive industry and related services representing >10% of regional GDP, and an assessment of whether mining activities were taking place in the region; Hydrocarbon-dependent regions (HDRs) defined as the extractive industry and related services representing >10% of regional GDP, and an assessment of whether hydrocarbon activities were taking place in the region; regions that are both MDRs and HDRs are where the extractive industry and related services represent >10% of regional GDP, and both mining and hydrocarbon activities are taking place in the region. These regions were also classified as mining-dependent regions for the purposes of the analysis.
Source: National Society of Mining, Oil and Energy, Ministry of Energy and Mines of Peru, Perupetro S.A.

Subnational analysis continued

Since 2007, MDRs in Peru improved performance on 80 per cent of socio-economic metrics; compared to non-RDRs which improved performance on 72 per cent of metrics (Figure 26). Improvement under each of the 11 SDG areas was broadly similar across the two groups of regions, except in SDG2: Zero hunger and SDG6: Clean water and sanitation, where MDRs outperformed non-RDRs considerably.

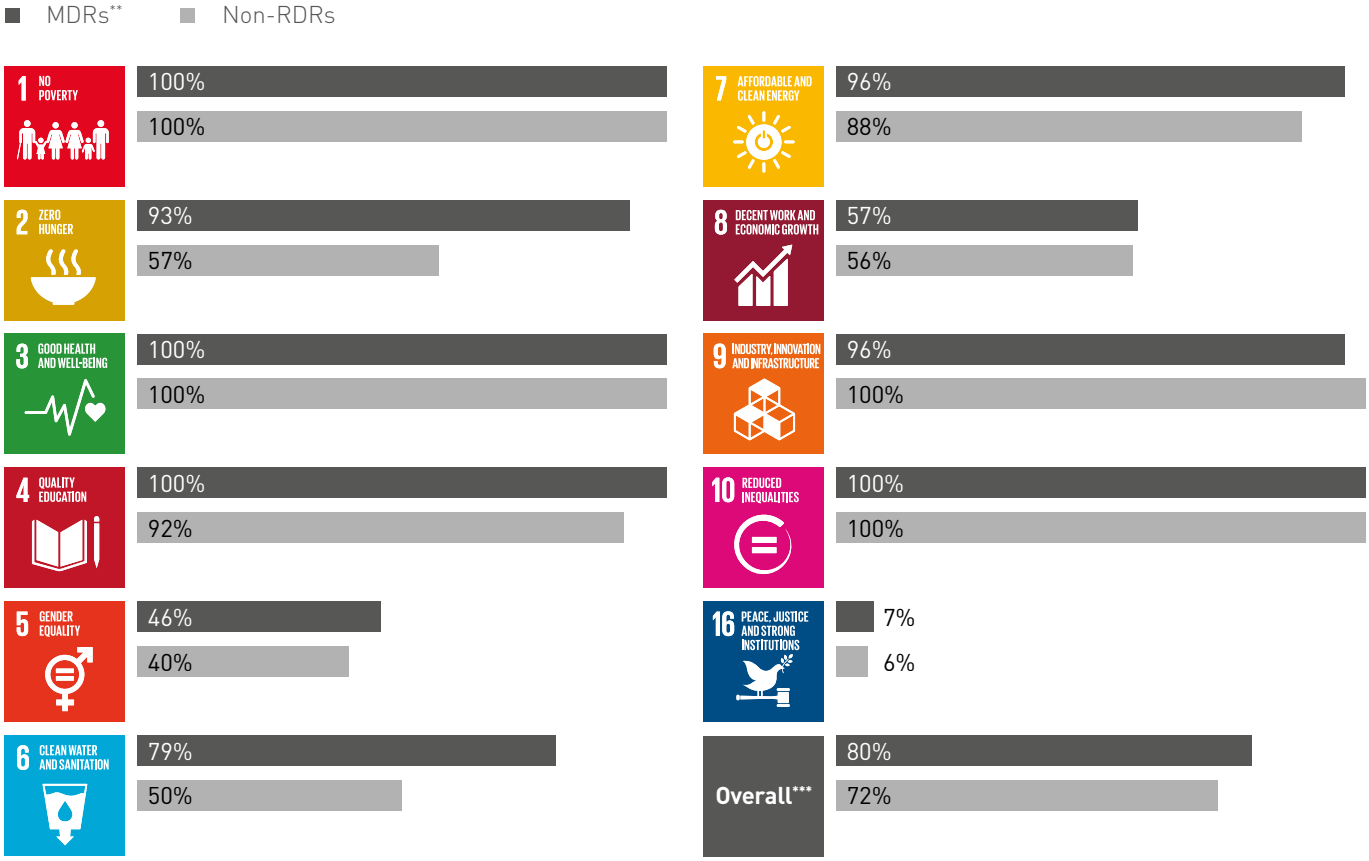
Comparing performance relative to the top performing subnational region on each metric, MDRs also outperform non-RDRs by 4 percentage points in 2015 (Figure 27). The SDG area accounting for the largest share of outperformance is SDG3: Good health and well-being.

Encouragingly, 93 per cent of Peru's MDRs have closed the gap on socio-economic best performers in the country since 2007 (Figure 28). The MDRs which closed the gap the most are Apurímac and Huancavelica. At the metric level within the socio-economic index, MDRs perform best on poverty reduction and health metrics, and worst on equality and jobs related metrics in 2015 (Figure 29).

Mining-dependent regions (MDRs) in Peru have improved performance on 80 per cent of socio-economic metrics

Figure 26: Share of metrics that improved 2007-2015* by SDG dimension

Peru



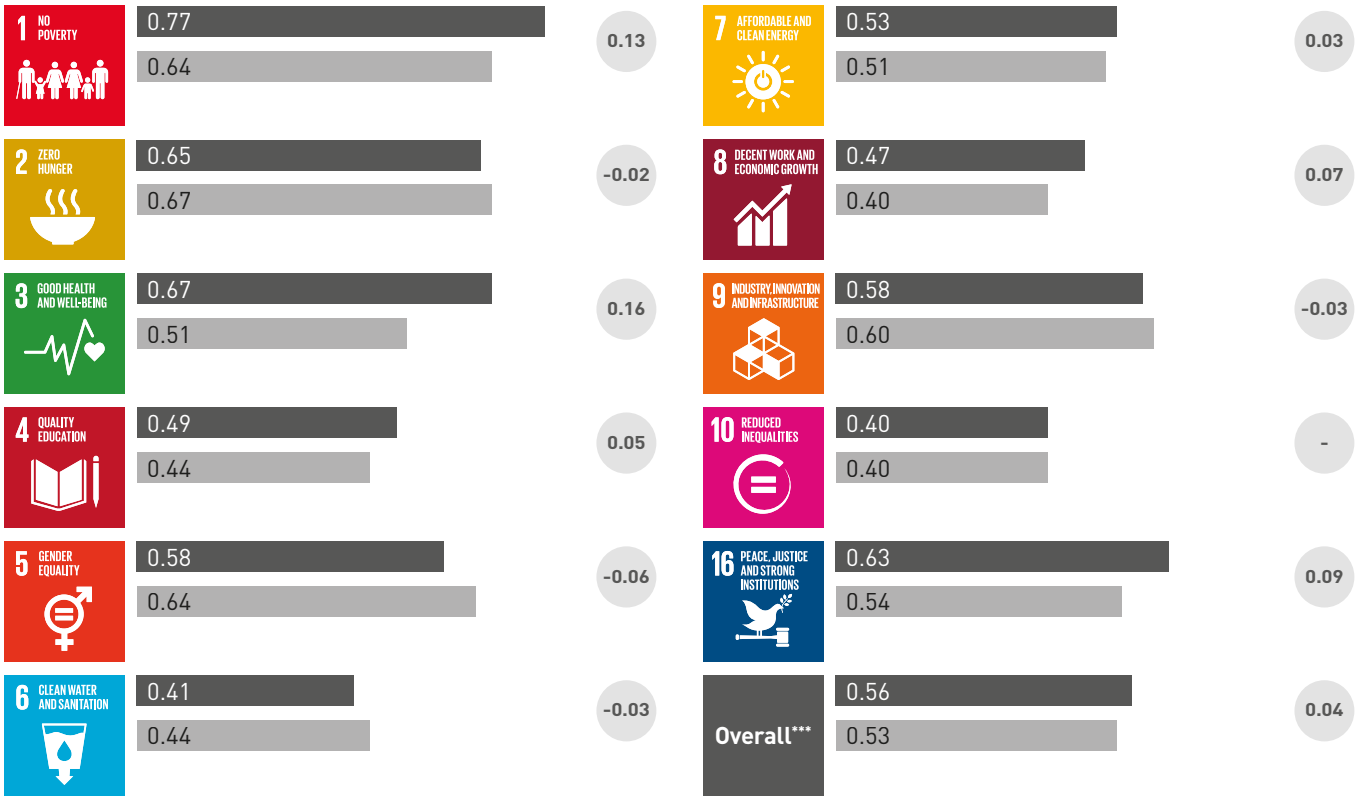
* Average share of all available metrics under each dimension that improved on absolute terms across MDRs in Peru. (For example, there are 4 metrics under health and well-being in 14 MDRs in Peru, the number of available metrics under consideration is 4*14=56.)
** MDRs also include regions in the 'both' category (those dependent on both mining and hydrocarbons). There are 14 in Peru.
*** Based on a simple average of the SDG areas.

3

Mining-dependent regions (MDRs) outperform non-resource-dependent regions (non-RDRs) on relative socio-economic performance in Peru

Figure 27: Average regional score across the socio-economic performance index components* (Index (0-1); 2015)

Peru



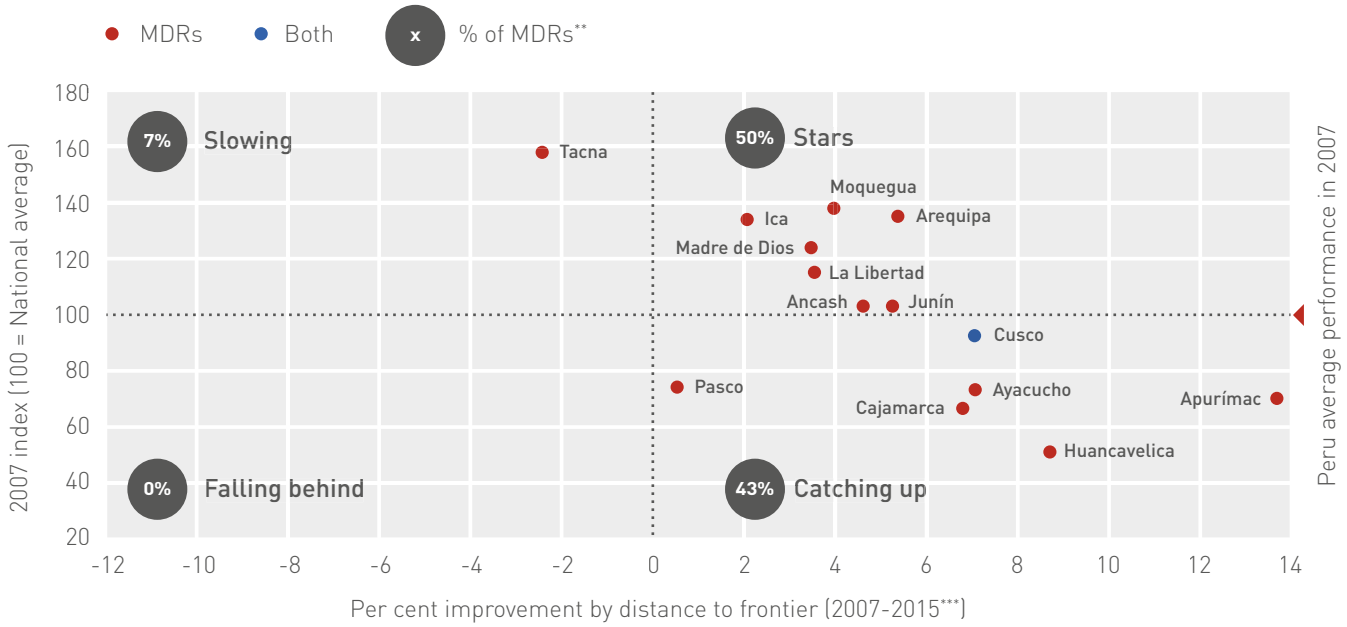
* Metrics in each SDG area are given equal weighting. Indicators are normalised to 1 where 1 represents the best performing region on a given metric. Where 2015 data is not available for a given metric, the nearest available year is used.
** MDRs also include Cusco from the 'both' category (dependent on both mining and hydrocarbons).
*** Difference in average index scores between MDRs and non RDRs. Positive numbers indicate higher average performance by MDRs.
**** Based on a simple average of the SDG areas.

Subnational analysis continued

93% of mining-dependent regions in Peru have closed the gap on socio-economic best practices in the country since 2007

Figure 28: 2007 socio-economic score (normalised to national average) vs. relative progress in percentage (Mining dependent regions only*)

Peru



* Considers 14 regions that generate more than 10% of GDRP from extraction of oil, gas, minerals and related services.
** MDRs also include Cusco which is in the 'both' category (dependent on both mining and hydrocarbons).
*** Difference in normalised socio-economic scores between 2007 and 2015, expressed in percentage.

3

At the metric level, MDRs perform best on poverty reduction and health metrics and worst on equality and jobs related metrics in 2015

Peru

Figure 29: MDRs* socio-economic metrics by rank**

Top 5 highest performing indicators (2015)	1. Number of inhabitants per nurse 2. Population with at least a basic need unsatisfied 3. Household with at least a member who has a cell phone 4. Difference in average monthly income between males and females 5. Crime reporting rate per 10,000 inhabitants
Greatest relative improvement (2007-2015)* **	1. Household with at least a member who has a cell phone 2. Population with at least a basic need unsatisfied 3. Public expenditure per pupil in primary education 4. Child mortality rate 5. Infant mortality rate
Top 5 lowest performing indicators (2015)	1. Average monthly income from work 2. Households using gas for cooking 3. Household exposed to water with residual chlorine dosing for human consumption 4. Population over 6 years old who uses the internet 5. Public expenditure per pupil in primary education
Weakest relative improvement (2007-2015)* **	1. Percentage difference of men and women (that are not in poverty) without own income 2. Unemployment rate 3. Number of inhabitants per doctor 4. Labour force participation 5. Difference in mean years of study between men and women aged 25 years and above

* MDRs also include Cusco in the 'both' category (dependent on both mining and hydrocarbons).
** Based on the MDRs' average scores for each metric ranked by the 'distance-to-frontier' method.
*** Represents the indicator where the gap to the frontier has been closed the most since 2007. Where data is not available for a given metric in a given year, the nearest available year is used.

Subnational analysis continued

BOX 3: Review of past literature on social progress in Peru (subnational level)

Loayza, Mier y Teran and Rigolini (2013) found evidence that mining districts have higher average living standards compared to other districts, although the positive impacts diminished with increasing administrative distance from a mine. The study found that mining increased inequality both within and across a district and is the source of social discontent and opposition against mining projects.[36]

A paper by Loayza and Rigolini (2015) partially attributes the inequality to an influx of better educated and better paid immigrants in mining regions.[37] Zambrano, Robles, and Laos (2014) found evidence that local poverty and inequality declined with the growing intensity of mining activity.[38]

Aragón and Rud (2013) examined whether natural resources could improve living conditions by investigating the local impact of the Yanacocha gold mine in Northern Peru. The study found that the increase in backward linkages and an increase in demand for local inputs led to a broad-based increase in real incomes.[39]

On the contrary, Dietsche, Stevens, Elliot and Jiwanji (2007) found no conclusive evidence of mining's contribution to poverty alleviation and variations to the Human Development Index at the regional level. The authors noted that the redistribution of revenues through the Canon Minero was often done in an inefficient way at the local government level.[40]

Oxfam America published a paper documenting intensifying and increasing conflicts over mining activity between local communities, governments, and companies with resource extraction operations in Peruvian regions.[41] The paper cited the violent protests in Northern Peru against the potentially harmful effects of copper mining on agriculture. They also examined a conflict in Southern Tacna where the government declared martial law following violent protests over the state's decision to reduce Canon Minero payments to Tacna.

According to Oxfam, tensions rose because a) communities, and particularly farmers, felt excluded from the economic benefits of mining; b) weak regulation of the mining industry had led to mistrust in the ability of local governments to address social and environmental concerns; and c) mining companies had failed to establish good working relationships with local communities.

36. Loayza, Norman; Mier y Teran, Alfredo and Rigolini, Jamele (2013). *Poverty, Inequality, and the Local Natural Resource Curse*. Technical Report, World Bank, 2013.

37. Loayza, Norman; Rigolini, Jamele (2015). *The local impact of mining on poverty and inequality: Evidence from commodity boom in Peru*. Peruvian Economic Association working paper, 2015.

38. Zambrano, Omar; Robles, Marcos and Laos, Denisse (2014). *Global boom, local impacts. Mining revenues and subnational outcomes in Peru 2007-2011*. Inter-American Development Bank, 2014

39. Arago´n, Fernando M., and Juan, Pablo Rud (2013). *Natural Resources and Local Communities: Evidence from a Peruvian Gold Mine*, American Economic Journal.

40. Dietsche, Evelyn; Stevens, Paul; Elliot, David; Jiwanji, Moortaza (2007). *Peru case study. The challenge of mineral wealth: using resource endowments to foster sustainable development*. International Council of Mining & Metals.

41. Oxfam America (March 2009). *Mining conflicts in Peru: Condition critical*.

3

Chile results

Subnational socio-economic progress in Chile was analysed between 2006 and 2015, in line with data availability. One-third (5) of the 15 official regions in Chile were identified as mining-dependent and 10 were considered non-resource-dependent. Figure 30 shows the categorisation of regions in the country. Further information on the methodology used to classify the regions can be found in the Appendix. Box 4 reviews some of the recent literature on mining's impact at the subnational level in Chile. It is meant to provide some context, but does not serve as a base for comparisons with findings in this section of the report due to differences in focus and approach.

5 mining-dependent regions and 10 non-resource-dependent regions

Figure 30: Map of Chile

Chile

Region classifications*

- Non-resource-dependent region
- Mining-dependent region

* Mining-dependent regions (MDRs) defined as mining representing >10% of regional GDP.
Source: National statistics offices

Subnational analysis continued

Since 2006, MDRs in Chile improved performance on 75 per cent of socio-economic metrics; compared to non-RDRs which improved performance on 84 per cent of metrics (Figure 31). The SDG area accounting for the largest share of underperformance is SDG16: Peace, justice, and strong institutions.

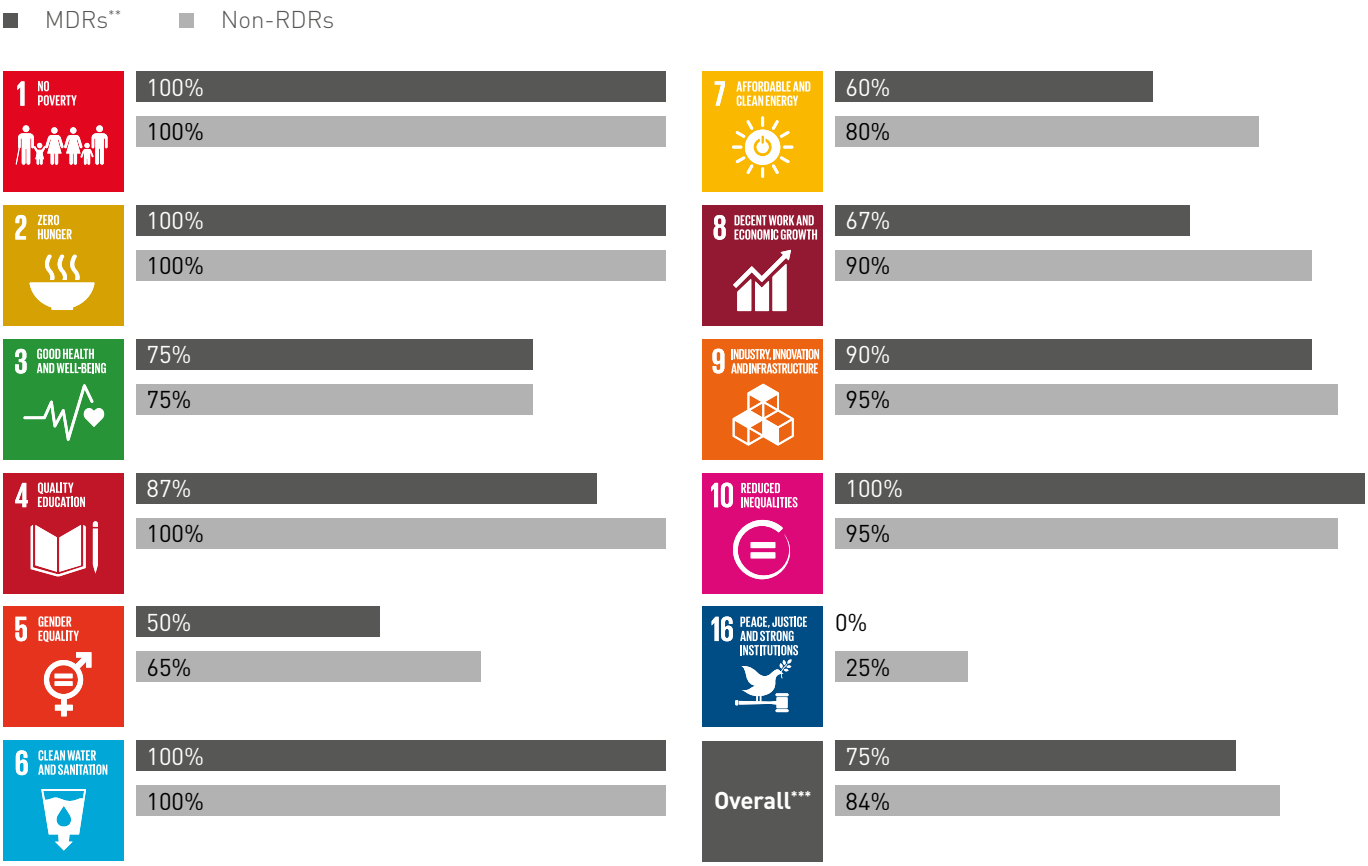
Comparing performance relative to the top performing subnational region on each metric, the results are reversed, with MDRs outperforming non-RDRs by 4 percentage points in 2015 (Figure 32). The SDG area accounting for the largest share of outperformance is SDG6: Clean water and sanitation.

Encouragingly, 60 per cent of Chile's MDRs have closed the gap on socio-economic best performers in the country since 2006 (Figure 33). The MDRs which closed the gap the most are Libertador Gral. Bernardo O'Higgins and Antofagasta. At the metric level, MDRs perform best on poverty reduction and income-related metrics and worst on gender equality and jobs-related metrics in 2015 (Figure 34).

Mining-dependent regions (MDRs) lag non-resource-dependent regions (non-RDRs) on improvement in socio-economic performance in Chile

Figure 31: Share of metrics that improved 2006-2015* by SDG dimension

Chile



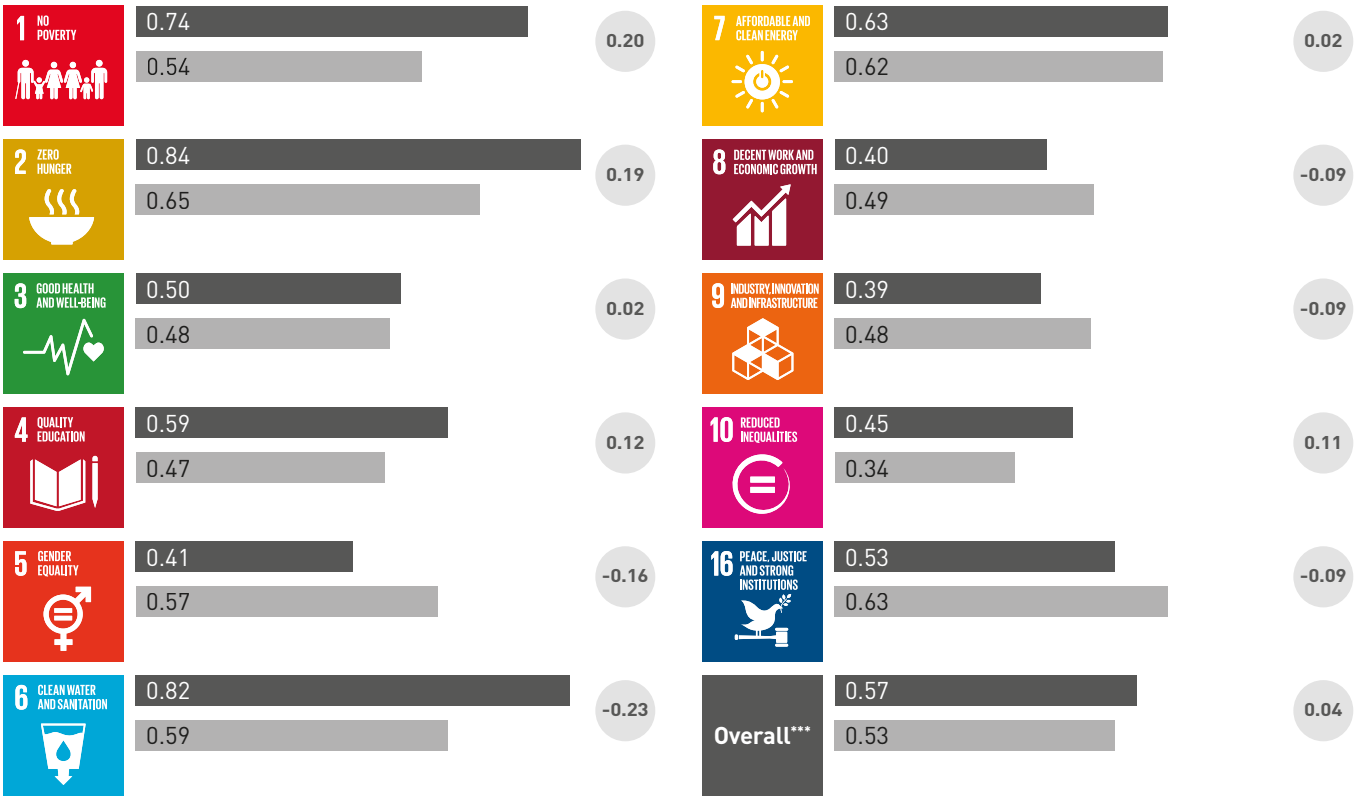
* Average share of all available metrics under each dimension that improved on absolute terms across MDRs in Chile. (For example, there are 4 metrics under health and well-being in 5 MDRs in Chile, the number of available metrics under consideration is 4*5=20.)
** There are 5 MDRs in Chile.
***Based on a simple average of the SDG areas.

3

Mining-dependent regions (MDRs) outperform non-resource-dependent regions (non-RDRs) on relative socio-economic performance in Chile

Figure 32: Average regional score across the socio-economic performance index components* (Index (0-1); 2015)

Chile



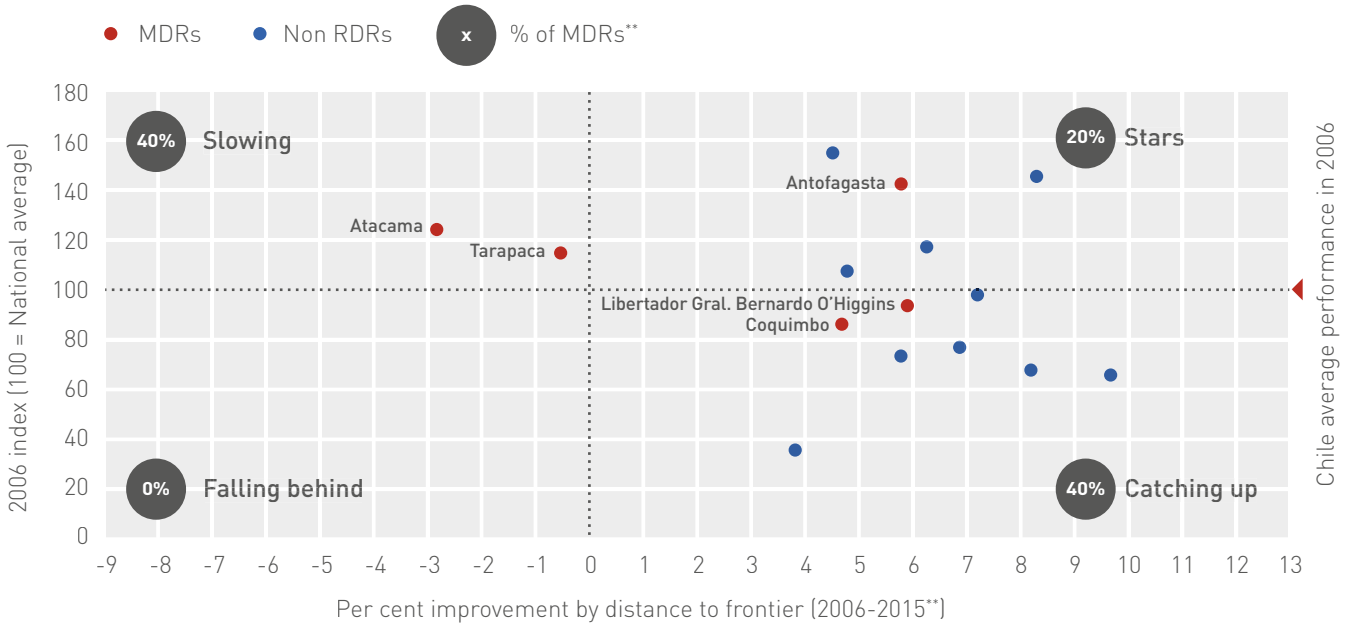
* Metrics in each SDG area are given equal weighting. Indicators are normalised to 1 where 1 represents the best performing region on a given metric. Where 2015 data is not available for a given metric, the nearest available year is used.
** MDRs comprise 5 regions where mining accounts for more than 10% of its respective GRDP.
*** Difference in average index scores between MDRs and non RDRs. Positive numbers indicate higher average performance by MDRs.
**** Based on a simple average of the SDG areas.

Subnational analysis continued

60% of mining-dependent regions in Chile have closed the gap on socio-economic best practices in the country since 2006

Figure 33: 2006 socio-economic score (normalised to national average) vs. relative progress in percentage (Mining dependent regions only*)

Chile



* MDRs consider 5 regions where mining accounts for more than 10% of its respective GDP.
** Difference in socio-economic scores between 2006 and 2015, expressed in percentage.

3

MDRs perform best on poverty reduction and income-related metrics and worst on gender equality and jobs-related metrics in 2015

Chile

Figure 34: MDRs* socio-economic metrics by rank**

Top 5 highest performing indicators (2015)	1. Percentage of indigent households 2. Percentage of households with deficit in sanitary conditions 3. Percentage of people living in poverty 4. Standardised mortality rate, 5 years old and below 5. Intentional homicide rate (per 100,000 inhabitants)
Greatest relative improvement (2006-2015)* **	1. Percentage of indigent households 2. Percentage of female-headed households 3. Disposable income per capita 4. Average monthly income 5. Percentage of people living in poverty
Top 5 lowest performing indicators (2015)	1. Difference in labour participation rates between males and females aged 15 years and above 2. Hospital bed rate (per 10,000 population) 3. PCT patent applications per million inhabitants 4. Unemployment rate 5. Difference in average monthly income between males and females
Weakest relative improvement (2006-2015)* **	1. Youth unemployment rate (aged 15-24 year old) 2. Voter turnout in general election 3. Share of household with no electricity access 4. Life expectancy at birth 5. Unemployment rate

* MDRs consider 5 regions where mining accounts for more than 10% of its respective GDP.
** Based on the MDRs' average scores for each metric of the socio-economic index ranked by the 'distance-to-frontier' method.
*** Represents the indicator where the gap to the frontier has been closed the most since 2006. Where data is not available for a given metric in a given year, the nearest available year is used.

Subnational analysis continued

BOX 4: Review of past literature on social progress in Chile (subnational level)

The majority of existing studies have found that mining generally has had a positive social impact in Chile. ICMM, UNCTAD, and the World Bank released a study confirming the positive socio-economic impact of mining at the regional level.[42] It also found that the economic growth rate and per-capita income in the Antofagasta Region, the heart of Chile's mining industry, were double the national average.

This has contributed to a steep decline in the region's poverty rates and led to improvements in other socio-economic indicators. For example, the Antofagasta Region has the highest literacy rates and average years of schooling of any Chilean region.

Another study commissioned by Collahuasi, the third largest copper producer by volume in the world, estimated the socio-economic impact of the company's operations in the Tarapacá Region. It found that mining led to positive socio-economic outcomes, including reducing poverty, doubling of monthly household incomes between 2006 and 2013, creating jobs and increasing the skills of local workers.[43]

Parra and Franks (2011) evaluated the economic and social progress (based on an aspirational reference point) in the two largest mining regions of Antofagasta and Tarapacá between 2000 and 2010 on five dimensions: socio-economic conditions, health, education, small and local communities and institutional development.[44] The study found that while both regions progressed well on various socio-economic metrics (poverty, inequality, gender equality), they scored poorly on the other four dimensions.

The result is due to the large gap between a dimension and its corresponding reference level. For example, both regions counted only 22.2 hospital beds per 10,000 people in 2010. Past trends suggest, however, that it will take the regions 200 years to reach the target level of 40 beds per 10,000 people (based on countries with similar income per capita) given the extremely low progress on this indicator over the last decade.

Some studies have focused more on understanding the negative effect of mining activity on the well-being of local communities. Rau, Reyes, and Urzúa (2013) examined the impact of mining-related lead pollution on the success of primary school and secondary school students in Arica – a city in northern Chile, which imported 20,000 tonnes of mineral waste between 1984 and 1989.

The study found a strong negative relationship between blood lead levels and education achievements, which also negatively impacted earnings prospects. For each extra microgramme of lead per decilitre of blood, the average income of a worker was found to decline by US$20 per month.[45]

42. ICMM (March 2007). Chile. *The challenge of mineral wealth: using resource endowments to foster sustainable development*. Available at: https://www.icmm.com/website/publications/pdfs/mining-parterships-for-development/278.pdf

43. Collahuasi (2016). *Collahuasi's socio-economic impact in the Tarapaca region of Chile*. Available at: http://www.collahuasi.cl/wp-content/uploads/2016/05/Collahuasi-Socio-Economic-Impact-revised-2016_FINAL.pdf

44. Parra, Cristian. and Franks, Daniel (October 2011). *Monitoring social progress in mining zones - the case of Antofagasta and Tarapaca, Chile*. 1st International Seminar Responsibility in Mining, Santiago, 19-21.

45. Rau, Tomás; Reyes, Loreto and Urzúa, Sergio (March 2013). *The long-term effects of early lead exposure: evidence from a case of environmental negligence*. National Bureau of Economic Research Working Paper Series.

3

Ghana results

Subnational socio-economic progress in Ghana is analysed between 1998 and 2015, in line with data availability. Two of the 10 official regions in Ghana were identified as mining-dependent and eight were considered non-resource-dependent. Figure 35 shows the categorisation of regions in the country. Further information on the methodology used to classify the regions can be found in the Appendix. Box 5 reviews some of the recent literature on mining's impact at the subnational level in Ghana. It is meant to provide some context, but does not serve as a base for comparison with findings in this section of the report due to differences in focus and approach.

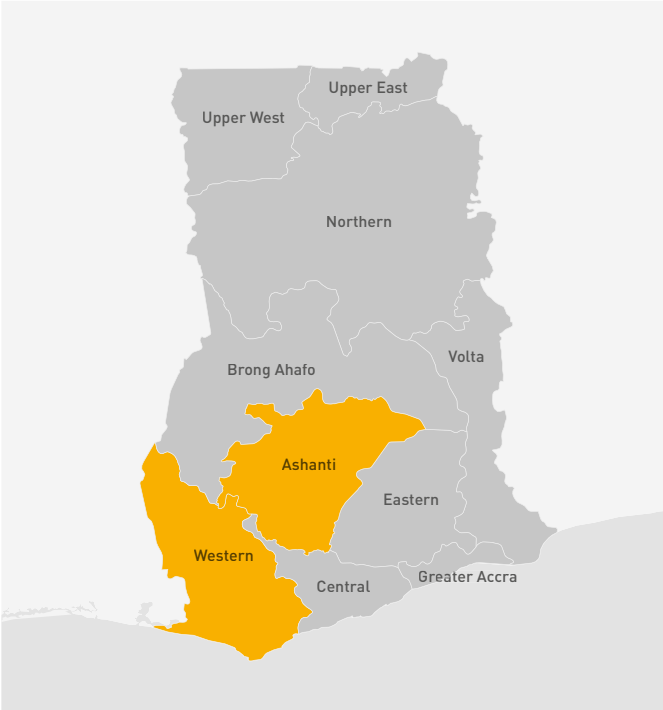
2 mining-dependent regions and 8 non-resource-dependent regions

Figure 35: Map of Ghana

Ghana

Region classifications*

- Non-resource-dependent region
- Mining-dependent region



* Mining-dependent regions (MDRs) defined based on contribution to local employment by mining. There are no hydrocarbon-dependent regions.
Source: National Industrial Census Report

Subnational analysis continued

Since 1998, MDRs in Ghana improved performance on 83 per cent of socio-economic metrics; compared to non-RDRs which improved performance on 81 per cent of metrics (Figure 36). The SDG area accounting for the largest share of outperformance is surprisingly SDG10: Reduced inequalities, an area where MDRs have traditionally underperformed.

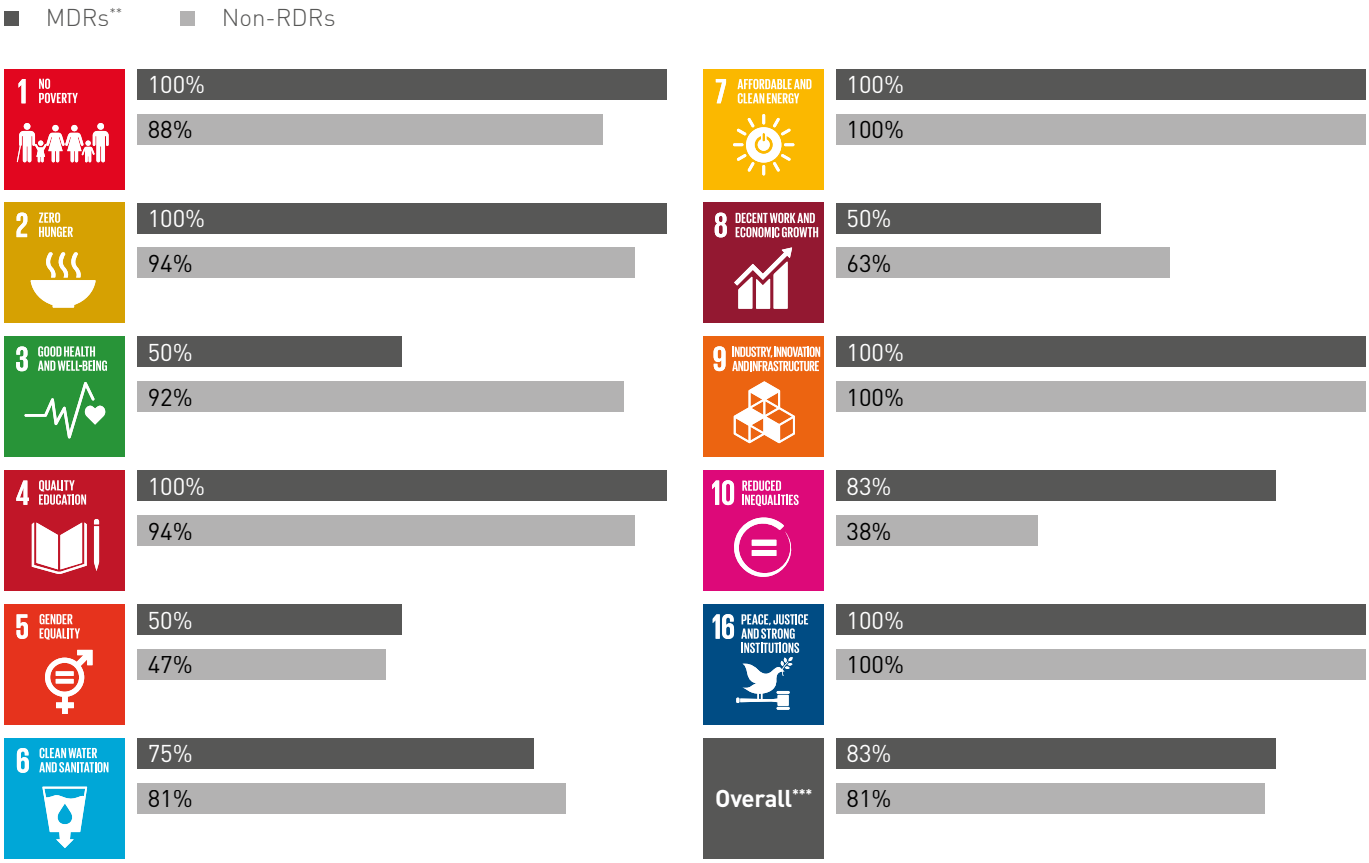
Comparing performance relative to the top performing subnational region on each metric, MDRs outperform non-RDRs by a substantial 17 percentage points in 2015 (Figure 37). The SDG area accounting for the largest share of outperformance is SDG4: Quality education.

Encouragingly, both the MDRs of Western and Ashanti have closed the gap on socio-economic best performers in the country since 1998 (Figure 38). At the metric level, MDRs perform best on education and poverty metrics and worst on health metrics in 2015 (Figure 39).

MDRs in Ghana have outperformed non-RDRs in terms of absolute improvement in socio-economic metrics since 1998

Figure 36: Share of metrics that improved 1998-2015* by SDG dimension

Ghana



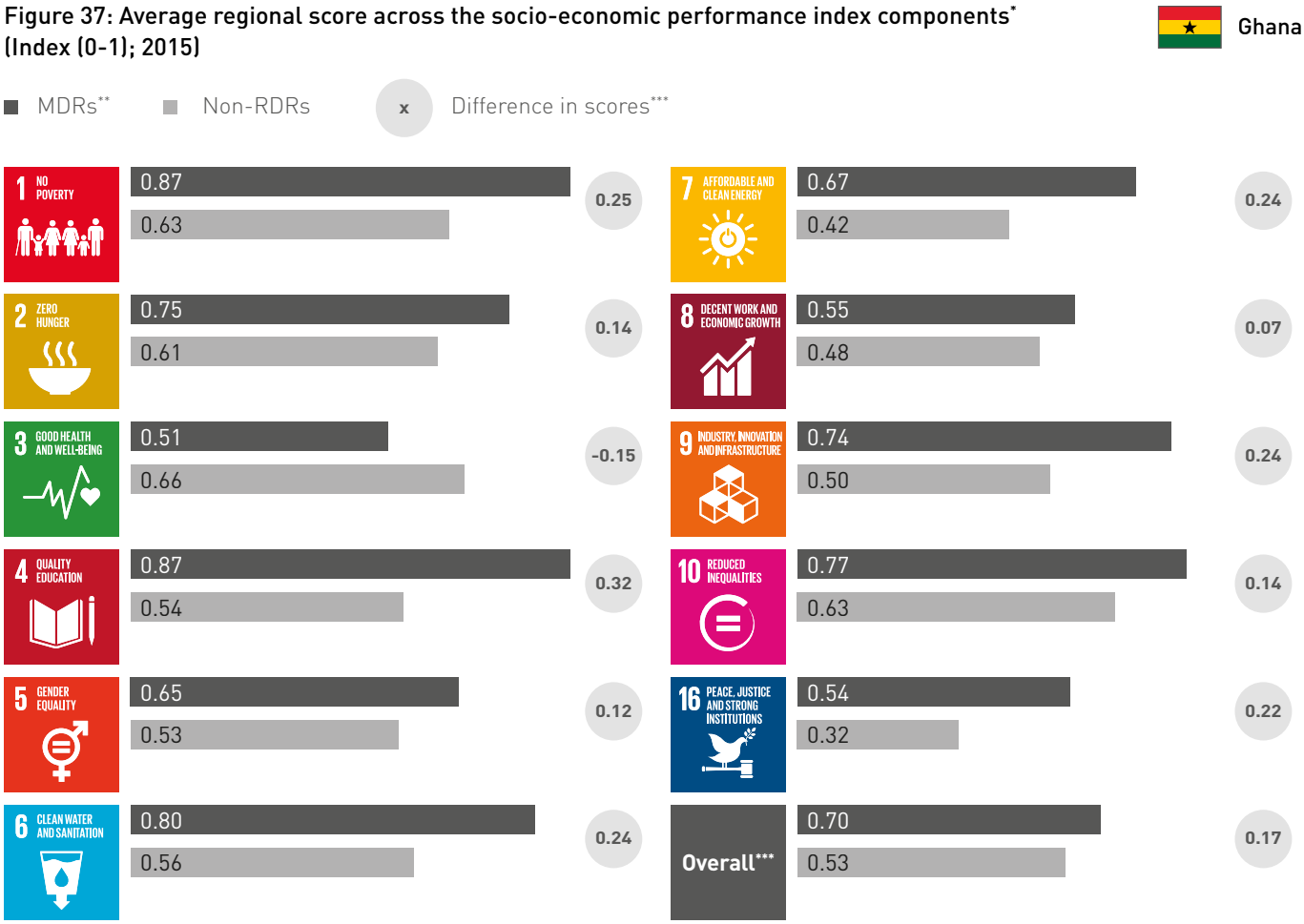
* Average share of all available metrics under each dimension that improved on absolute terms across MDRs in Ghana. (For example, there are 4 metrics under health and well-being in 2 MDRs in Ghana, the number of available metrics under consideration is 4*2=8.)
** There are 2 MDRs in Ghana.
*** Based on a simple average of the SDG areas.

3

Mining-dependent regions (MDRs) outperform non-resource-dependent regions (non-RDRs) on relative socio-economic performance in Ghana

Figure 37: Average regional score across the socio-economic performance index components* (Index (0-1); 2015)

Ghana



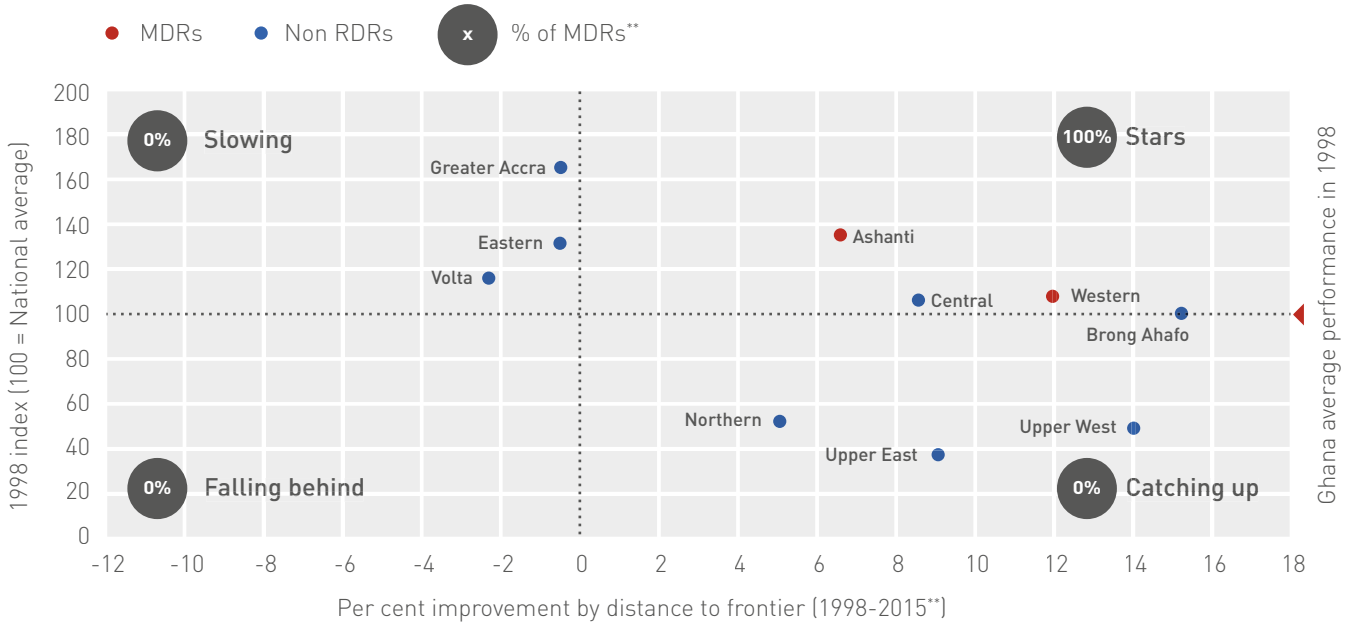
* Metrics in each SDG area are given equal weighting. Indicators are normalised to 1 where 1 represents the best performing region on a given metric. Where 2015 data is not available for a given metric, the nearest available year is used.
** MDRs consist of the Western and Ashanti regions.
*** Difference in average index scores between MDRs and non RDRs. Positive numbers indicate higher average performance by MDRs.
**** Based on a simple average of the SDG areas.

Subnational analysis continued

Both Ashanti and Western regions closed the gap on socio-economic best practices in the country since 1998

Figure 38: 1998 socio-economic score (normalised to national average) vs. relative progress in percentage (Mining dependent regions only*)

Ghana



* MDRs consist of the Western and Ashanti regions.
** Difference in socio-economic scores between 2006 and 2015, expressed in percentage.

3

At the metric level, MDRs perform best on education and poverty metrics and worst on health metrics in 2015

Ghana

Figure 39: MDRs* socio-economic metrics by rank**

Top 5 highest performing indicators (2015)	1. Percentage of households without toilet facilities 2. Difference in median years of studies completed between men and women 3. Extreme poverty incidence at national line (GH¢792.05) 4. School attendance rate (6-25 years old) 5. Literacy rate of population 15-49 years old
Greatest relative improvement (1998-2015)* **	1. Difference in unemployment rate between urban and rural 2. Percentage of children under 5 that are wasted 3. Difference in school attendance rate between men and women (6-25 years old) 4. Percentage of children under 5 that are stunted 5. Households with access to electricity
Top 5 lowest performing indicators (2015)	1. Difference in access to mass media between men and women 2. Neonatal mortality rate 3. Infant mortality rate 4. Households using clean energy for cooking 5. Mean annual per capita expenditure
Weakest relative improvement (1998-2015)* **	1. Neonatal mortality rate 2. Difference in access to mass media between men and women 3. Difference in percentage of men and women who worked in the last 12 months and are currently employed 4. Infant mortality rate 5. Unemployment rate

* MDRs consist of the Western and Ashanti regions.
** Based on the MDRs' average scores for each metric ranked by the 'distance-to-frontier' method.
*** Represents the indicator where the gap to the frontier has been closed the most since 1998. Where data is not available for a given metric in a given year, the nearest available year is used.

Subnational analysis continued

BOX 5: Review of past literature on social progress in Ghana (subnational level)

Chuhan-Pole, Dabalen, Land (2015) found little evidence of a 'resource curse' in Ghana.[46] They analysed the impact of mining on communities in Ghana, Mali, and Tanzania using a spatial-lag model and also examined spillover effects at the district level.

The study found that women in Ghana were 17 per cent more likely to be employed in the services sector at the closest proximity to active mines and that agricultural employment decreased in mining districts relative to non-mining ones. The study also found that total household income, asset accumulation (eg, radio ownership in Ghana) and children's health increased with growing proximity to mines.

In an earlier study focusing only on Ghana, Chuhan-Pole, Dabalen, Kotsadam, Sanoh and Tolonen (2015) found that women in active mining communities were more likely to be employed in services and retail sales, while men were more likely to find work in agriculture, services and in occupations that required less manual labour.[47]

Aragón and Rud (2014) examined the impact of large-scale gold mining in Ghana on the environment and the farming sector. The paper found that higher levels of pollution near mines lowered the total productivity of local farms by almost 40 per cent, contributing to higher rural poverty.[48]

Roe and Samuel (2007) used a bottom-up approach and found that regions with a high level of mining activity were typically less impoverished. Using Obuasi, a gold-mining region in Ghana, as a case study, they found that mining contributed significantly to economic development by creating jobs and facilitating the construction of infrastructure.

The paper acknowledged that mining activities can lead to a 'dependency culture', which can affect the long-term sustainability of a local community once a mining operation had ceased.[49]

Obiri et al (2016) focused on the environmental and socio-economic impact of artisanal gold mining on communities in the Tarkwa Nsuaem municipality in the western region of Ghana. The paper found that the average concentration of metalloids and heavy metals in water samples in the study area exceeded WHO guidelines. In a community survey, 90 per cent of respondents had environmental concerns, while more than 80 per cent revealed that mining has polluted their freshwater sources. More than 80 per cent also believed that they were economically better off before mining commenced in their region and restricted their farming activities.[50]

46. Chuhan-Pole et al. (June 2015). *Socioeconomic impact of mining on local communities in Africa.* World Bank Group.

47. Chuhan-Pole, Dabalen, Kotsadam, Sanoh and Tolonen (April 2015). *The local socioeconomic effects of gold mining. Evidence from Ghana.* World Bank Group.

48. Aragón, Fernando and Rud, Juan Pablo (2014). *Polluting Industries and Agricultural Productivity: Evidence from Ghana.* https://economics.ucr.edu/seminars_colloquia/2013-14/applied_economics/Aragon%20paper%20for%204%2023%2014%20seminar.pdf

49. Roe, Alan and Samuel, Jonathan (2007). *Ghana case study. The challenge of mineral wealth: using resource endowments to foster sustainable development.* International Council of Mining & Metals.

50. Obiri, Samuel; Mattah, Precious, Mattah, Memuna; Armah, Frederick; Osae, Shiloh; Adu-kumi, Sam and Yeboah, Philip (January 2016). *Assessing the environmental and socio-economic impacts of artisanal gold mining on the livelihoods of communities in the Tarkwa Nsuaem Municipality in Ghana.* International Journal of Environmental Research and Public Health.

3

Quality of governance in Indonesia, Peru, Chile, and Ghana

This chapter provides encouraging evidence that mining-dependent regions mostly performed well on socio-economic development on both absolute and relative measures. While an in-depth analysis of the specific mining policies and corporate behaviours that impacts these outcomes is beyond the scope of this research, some broad commonalities could be drawn from the manner that mining industries are managed and governed.

Drawing from the 2017 RGI as explored in the national level analysis, Indonesia (68), Peru (62), Chile (81) and Ghana (56) all had composite scores that were higher than the sample average of 48.

- On the value realisation component, which has an average score of 50, Indonesia (64), Peru (68), Chile (74), Ghana (61) all outperformed the average.
- On the revenue management component, which has an average score of 43, Indonesia (76), Peru (57) and Chile (81) were above average, while Ghana (37) underperformed.
- On the enabling environment component, Indonesia (65), Peru (62), Chile (90) and Ghana (70) were all significantly above the average of 49.

A few sub-components also stood out. First, all four countries have higher local impact scores (a sub-component of value realisation) than the overall value realisation scores, implying that these scores were strongly and positively influenced by local impacts. In essence, local impacts assess the degree to which extractive companies are required to produce environmental impact assessments (EIAs) and social impact assessments (SIAs), disclose these documents, comply with environmental regulations, and pay compensation to land owners or users who are negatively affected by project developments.

Second, it appears that Indonesia, Peru, and Ghana have relatively strong subnational transfer and disclosure practices (sub-components of revenue management), which guides the sharing of revenue from extractive resource development between central and subnational governments.

Third, regulatory quality, and voice and accountability were the key drivers of enabling environments in all four countries.

Clearly, the quality of resource governance could positively impact the overall socio-economic development of mining-dependent regions which then directly impacts progress at the national level. Our observations from the RGI are cursory however, they do indicate the potential for further research into these important areas.

Concluding remarks

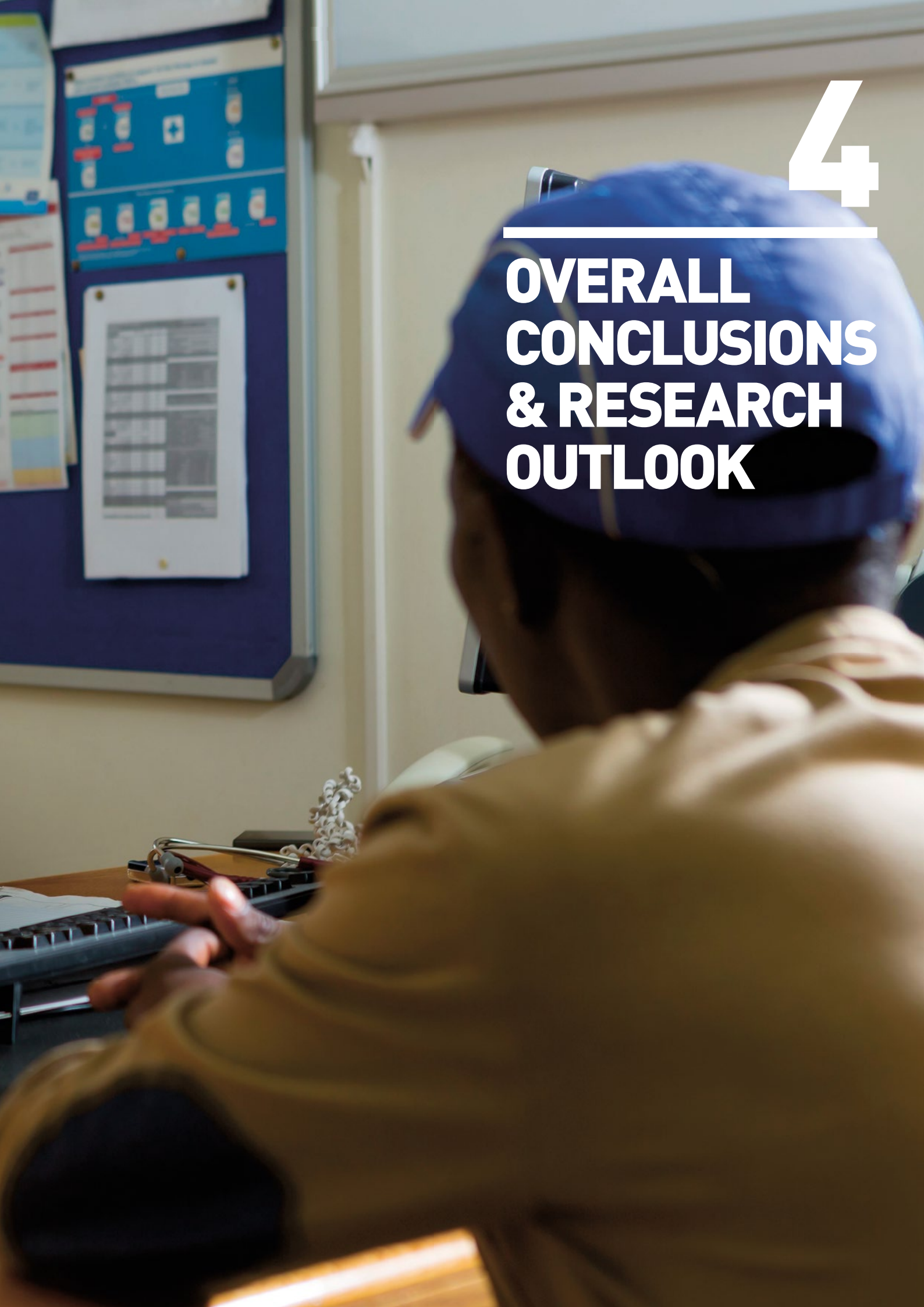
The deeper analysis in this section confirms that social progress in MDCs is not confined to the national level. Encouragingly, overall socio-economic performance scores were in most cases higher in MDRs than in non-RDRs (except for Indonesia) in 2015.

The majority of mining-dependent regions in the four sample countries has made positive progress by closing the socio-economic gap on the most progressive regions in their respective countries. This result is in line with the national-level analysis, which showed that most mining-dependent countries have managed to close the gap to the best performing countries globally.

The findings challenge the perception that extractive activities are always detrimental to the livelihoods of host populations. They also show that the overall social progress of mining-dependent countries and regions is similar to or even better than the social progress in countries and regions that are not dependent on mining.

Viewed from this perspective, resources and mining could promote a country's development if it helps to actively shape a policy agenda to avert subpar socio-economic performance. Resource companies can also play a role in promoting social progress. Performance gaps highlighted by this research provide a possible starting point for resource companies to think about new ways of engaging and supporting MDCs to improve the overall welfare of their people.

The concluding section will elaborate more on implications for governments, companies, and research outlook.



4

OVERALL CONCLUSIONS & RESEARCH OUTLOOK

Overall conclusions

The results in this research show encouraging signs of social progress in mining-dependent countries. Most MDCs have improved their performance significantly across various socio-economic indicators since 1995. Poorer mining-dependent countries have generally outpaced the socio-economic progress observed in other countries. More than 80 per cent of MDCs have also managed to close the socio-economic gap on global best performers.

This encouraging trend reverberates at the subnational level. Mining-dependent regions in four sample countries managed to advance on at least three-quarters of the socio-economic progress indicators in recent years, although the improvement relative to non-RDRs varies by country.

In line with national-level findings, more than 80 per cent of MDRs also managed to close the gap to the best regional performers in each country, although the drivers of overall progress differ at subnational and national levels.

The findings have a number of potential implications for governments and resource companies globally. From a public-sector perspective, this research offers an alternative angle to the usual commentary that extractive industries can impede the well-being of host populations, both at the national and regional levels.

Using a data-driven approach, it shows that the overall socio-economic development and progress of mining-dependent countries and regions are similar – and in some cases better – than the progress in those that are not reliant on mining.

At the same time, it is obvious that mining countries improve their socio-economic situation at varying speeds.

The findings in this research also provide some initial evidence to suggest that governments wishing to promote social progress should look beyond policies that simply boost incomes. Around 20 per cent of the performance gap between mining-dependent countries and non-RDCs is found to be unrelated to income, highlighting the need for a broader set of actions to target socio-economic development.

While further research is required to better understand the reasons, governments need not await the outcomes to sharpen their policies to promote socio-economic well-being. A useful starting point may be to focus on areas where progress to turn the SDGs into practice has so far been weak. Overall, for mining-dependent countries this has been in SDG16: Peace, justice, and strong institutions; SDG5: Gender equality; and SDG8: Decent work and economic growth.

From a resource company perspective, this research should reaffirm the large role that

mining activities can play to shape socio-economic development. The observed gaps in the socio-economic performance of mining-dependent countries could help mining companies identify priorities for engaging and supporting host governments, communities, and civil society.

Several questions remain and should spark further research on the relationship between mining activity and socio-economic progress. Since income and socio-economic progress is not a one-for-one relationship, understanding the different transmission channels from income to social progress is critical. Research is needed to better understand the policies that transform income into socio-economic development in a way that most efficiently and effectively meets country-specific needs.

A better understanding of the geographical context of MDCs and its impact on socio-economic performance is also needed. For instance, why do MDCs lag the development of peer countries in Asia and yet outperform that of peers in Sub-Saharan Africa and Latin America? A more in-depth study of country and region-specific progress will then allow governments and companies to collaborate more efficiently.

The impact of different time frames and country groupings also warrants further exploration. The methodology used in this report defines a country to be "resource-dependent" only if it was resource-dependent in 1995 and 2015 (start and end of period examined). How would our findings change if this condition was relaxed to account for a larger sample of countries?

RDCs often experience persistent fragility, conflict, and violence, and further studies could be conducted to better understand the impact of this on SDG dimensions and the impact on overall well-being. More research is also needed to understand the impact of resource activities on air, water, and soil contamination, which is a major source of conflict between resource companies and local communities.

One final area of further research is artisanal and small-scale mining (ASM), where the current paucity of data makes it difficult to assess its impact on well-being. Yet ASM is an integral component of the informal economy in many less developed countries such as Central African Republic, Zambia and India, and more needs to be done to understand its role in socio-economic development to produce appropriate policies to support and formalise the industry.

Our hope is that this research encourages others to try and answer these important questions, and to help catalyse more productive partnerships between resource companies, civil society, and governments to promote better socio-economic outcomes in resource-dependent countries.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Appendix: Detailed methodology

This appendix outlines key points on the methodology in the following sections:

1. Measuring socio-economic performance: national level
2. Measuring socio-economic performance: subnational level
3. Rationale for choosing the distance-to-frontier methodology

1. Measuring socio-economic performance: National level

Five criteria were used to guide the selection of metrics:

- **Relevant.** The metrics must be able to capture both economic and social outcomes, and aligned with relevant goals and targets of the SDG – for the mining industry.[51]
- **Outcome-focused.** Indicators that measure outcomes rather than inputs or enablers were preferred.
- **Robust.** Selected metrics need to be robust, leading to a preference for hard data over perception-based indexes. Metrics that could be skewed by 'noise' (factors other than those intended to be isolated and measured) were also excluded.
- **Uniquely insightful.** Metrics were only selected if they were not strongly correlated to other metrics already included.
- **Available.** Metrics needed sufficient data coverage across the set of resource-driven countries for a sufficiently long period of analysis.

Thirty-two metrics were selected to be representative of 11 relevant dimensions of the SDGs, namely:

1. No poverty. While the number of people living in extreme poverty (defined as living on less than US$1.90 a day) dropped by more than half between 1990 and 2015 from the original 1.9 billion people, there are still 841 million living in extreme poverty. One-third (33 per cent, or 275 million) of those 841 million live in RDCs.[52]

2. Zero hunger. 795 million people are estimated to be chronically undernourished as of 2014, and over 90 million children under the age of five are dangerously underweight.[53] RDCs represent over 14 per cent or 115 million people of those that are chronically undernourished. This dimension is captured using two metrics: 1) the proportion of the population which is undernourished (from the Food and Agriculture Organisation [FAO]) and 2) the depth of food deficit (FAO).

3. Good health & well-being. Preventable child deaths have declined by over 50 per cent globally since 1990. Maternal mortality has also fallen by 45 per cent worldwide. New HIV/AIDS infections fell by 30 per cent between 2000 and 2013, and over 6.2 million lives were saved from malaria.[54] Despite this progress, much remains to be done. RDCs account for 35 per cent of the 28 million children that die before their fifth birthday every year. This dimension is captured using four metrics: 1) neo-natal mortality rate (UNDP); 2) under-5 mortality rate (UNDP); 3) maternal mortality rate (UNDP); and 4) mortality from non-communicable diseases (WHO).

4. Quality education. Since 2000, the worldwide number of children out of school has dropped by almost half, and literacy rates have improved significantly. However much remains to be done. For example, children from the poorest households are up to four times more likely to be out of school than those of the richest households.[55] RDCs account for 33 per cent, or 18 million, of the children currently out of school. This dimension is captured using four metrics: 1) share of children out of school (UNESCO); 2) net primary enrolment rates (UNESCO); 3) average years of schooling (UNDP); and 4) share of population with at least a secondary level of education (UNDP).

51. We have built on the work by World Economic Forum and the United National Development Program which identified relevant SDG targets and indicators for the mining sector. In *Mapping mining to the sustainable development goals: an atlas*, WEF and UNDP, 2016.

52. This income-specific measure of poverty is a relatively narrow assessment of poverty. Broader measures, such as the global Multidimensional Poverty Index (MPI) have been developed to complement traditional income-based poverty measures by capturing other deprivations related to education, health and living standards. The income-specific measure of poverty is used for this dimension however in order to avoid overlap with the other metrics used in the other SDG-related dimensions. Figures calculated by AlphaBeta using World Bank PovcalNet database.

53–55. UN Sustainable Development Goals, 2015.

Appendix continued

5. Gender equality. This is measured across five metrics: 1) Difference in labour force participation rates between men and women (ILO); 2) Difference in share of population with at least some secondary education between men and women (UNESCO); 3) Difference in percentage of children out of school between males and females (UNESCO); 4) Difference in mean years of schooling between men and women (UNDP) and 5) Share of women in parliament (UNDP).

6. Clean water & sanitation. Even though 2.6 billion people have gained access to improved drinking water sources since 1990, more than 660 million people are still without it, and RDCs account for 35 per cent or 230 million of that total. Although 2.1 billion people have gained access to improved sanitation since 1990, 2.3 billion remain without access, and 22 per cent of those (510 million) live in RDCs. Two metrics were used to measure this: 1) Share of population with access to an improved drinking water source (WHO); and 2) Share of population with access to improved sanitation facilities (WHO).

7. Affordable & clean energy. Between 1990 and 2010, the number of people with access to electricity has increased by 1.7 billion, but still one in five people lack access to electricity – this accounts for around 1.1 billion in total as of 2014. RDCs account for 25 per cent or 270 million of those lacking access to electricity and as the demand continues to rise there needs to be a substantial increase in the production of renewable energy across the world. Two metrics were used to measure this: 1) Share of population with access to electricity (IEA); and 2) Share of population with access to clean energy source for cooking and heating (WHO).

8. Decent work & economic growth. According to the International Labour Organization, more than 198 million people aged 15 and above were unemployed in 2015 – 24 per cent of those or 47 million live in RDCs. Income inequality is also widening in many countries. Four metrics were used: 1) Labour force participation rates (ILO); 2) Share of youth employed (UNDP); 3) Employment rate (ILO); and 4) GDP per employed person (ILO).

9. Industry, innovation & infrastructure. More than 4 billion people still do not have access to the Internet, and 22 per cent are from RDCs. In addition, 3 billion people do not have access to bank account globally (27 per cent are from RDCs), but new mobile banking options are providing opportunities for financially empowering people. Three metrics were used: 1) Percentage of population that uses the internet (International Telecommunication Union [ITU]); 2) Mobile cellular telephone subscriptions per 100 people (ITU); and 3) Share of population with account at a financial institution (World Bank).

10. Reduced inequalities. Income inequality is rising globally, with the richest 10 per cent earning up to 40 per cent of total global income. The poorest 10 per cent earn only between 2 per cent and 7 per cent of total global income. In developing countries, inequality has increased by 11 per cent after taking into account the growth of the population.[56] Two metrics are used here: 1) Quintile income ratio (World Bank); and (2) Household final consumption (World Bank, OECD).

11. Peace, justice, & strong institutions. Peace, stability, human rights, and effective governance, are the foundation for sustainable development. A reliance on resource rents can limit incentives for governments to build robust and efficient domestic institutions and bureaucracies. Struggles to control these resource rents can lead to government instability and civil war. Global statistical evidence finds that the risk of civil war is increased by revenue from resource extraction (even after controlling for the rate of economic growth).[57] Three metrics were used:

1) Corruption Perception Index (World Bank); 2) Political stability and absence of violence (World Bank and Brookings) and 3) Freedom in the World Index (Freedom House).

There are 17 SDG areas, but some areas, such as 'sustainable cities and communities'; 'responsible consumption and production'; 'climate action'; 'life below water'; 'life on land'; and 'partnerships for the goals', while important, are either less relevant from the standpoint of local socio-economic development or lack measurable metrics to be quantified.

The list of selected metrics, grouped by the relevant SDGs is shown over page (Figure A1).

56. UN Sustainable Development Goals, 2015.

57. See for example, Paul Collier, Anke Hoeffler and Dominic Rohner (January 2009), 'Beyond greed and grievance: Feasibility and civil war,' *Oxford Economic Papers*, volume 61, issue 1.

Figure A1: National-level metrics

■ 80-100% of countries covered ■ 65-80% of countries covered ■ 50-65% of countries covered

Relevant SDGs	Metrics used	Time frame	Coverage	Data source
No Poverty	• Headcount: $1.9(2011 PPP) daily	• 1995-2015	■	World Bank
Zero Hunger	• Prevalence undernourished • Depth of food deficit	• 1995-2015 • 1995-2015	■ ■	FAO FAO
Good Health and Well-Being	• Neo-natal mortality • Under-5 mortality • Maternal mortality • NCD mortality	• 1995-2015 • 1995-2015 • 1995-2015 • 2000, 2005, 2010, 2015	■ ■ ■ ■	UNDP UNDP UNDP WHO
Quality Education	• % of children out of school • Net enrolment rate, primary • Mean years of schooling • Population with secondary level	• 1995-2015 • 1995-2015 • 1995 (every 5 years) • 1995 (every 5 years)	■ ■ ■ ■	UNESCO UNESCO UNDP UNDP
Gender Equality	• Labour participation rates • Enrolment rate, primary • Adult literacy • Mean years of schooling • Share of women in parliament	• 1995-2015 • 1995-2015 • 2000-2015 • 1995 (every 5 years) • 1995 (every 5 years)	■ ■ ■ ■ ■	ILO UNESCO UNESCO UNDP UNDP
Clean Water and Sanitation	• Improved water source (% with access) • Improved sanitation facilities (% with access)	• 1995-2015 • 1995-2015	■ ■	WHO WHO
Affordable and Clean Energy	• Access to electricity • Access to clean fuel for cooking	• 1995-2015 • 2000-2014	■ ■	IEA WHO
Decent Work and Economic Growth	• Labour force participation • Youth employment rate • GDP per employed (PPP terms) • Employment rate	• 1995-2015 • 1995 (every 5 years) • 1995-2015 • 1995-2015	■ ■ ■ ■	ILO UNDP ILO ILO
Industry, Innovation and Infrastructure	• Internet users (% population) • Account at financial institution (% population) • Mobile phone penetration	• 1995 (every 5 years) • 2011, 2014 • 1995-2015	■ ■ ■	UNDP World Bank ITU
Reduced Inequalities	• Income quintile ratio • Final household consumption per capita	• 1995-2014 • 1995-2015	■ ■	World Bank World Bank, OECD
Peace, Justice and Strong Institutions	• WGI: Control of Corruption Index • WGI: Political stability and absence of violence/terrorism • Freedom in the World Index: average of Civil Liberty and Political Rights scores	• 1995-2015 • 1996-2015 • 1995-2015	■ ■ ■	World Bank World Bank Freedom House

Appendix continued

The analysis was conducted on three levels:

a. **Individual metrics.** Performance on each of the individual metrics was analysed using two approaches.

First, we tried to understand the **absolute** change in performance on a metric. To avoid the complication of deriving a composite absolute improvement score across many fundamentally very different metrics later (by SDG areas and overall), a metric is assessed **purely on whether it has improved or not**. Second, we tried to understand the 'distance from frontier' in terms of performance **relative** to the best performing country (across all countries, not just RDCs). In other words, is the gap closing between a given country and the best performing country?

For this second method, the results were normalised into an index, with a score of 1 indicating the best performing country on that metric, and 0 for the worst performing country. For example, Norway has the highest share of people with an account at financial institutions (100 per cent) while Turkmenistan has the lowest percentage of population with an account at financial institutions (1.8 per cent). Norway and Turkmenistan thus served as benchmarks against which each other country's performance was then measured.

For example, Tanzania, where 19 per cent of people have access to a financial account, received a score of (19.0-1.8) / (100-1.8) = 0.18. For those metrics with outliers further than three standard deviations from the mean, a slight difference in methodology was used, and the index value of 0 or 1 was instead set at the three standard deviations limit, depending on the direction of the outlier. Countries beyond this limit were given 0 or 1 as appropriate.

b. **SDG area.** To understand **absolute** changes in performance, we measured the percentage of metrics that improved over the time period observed and compared them to other countries or country groups. A note clarifying percentages presented throughout the report on absolute improvement: for example, if MDCs improved by 90 per cent on SDG3 ('Good health and well-being'), this means that for all the available metrics examined under this SDG dimension (there are four metrics under SDG3 for each of the 25 MDCs, the total number of metrics under consideration is 25*4=100), 90 of them improved in absolute terms.

For measurements of the **relative** (distance-to-frontier approach) performance, metrics were aggregated into a score around the relevant SDG goal, based on a simple average of the normalised metrics. Where country data for a specific metric was missing, that metric was excluded from calculating the country's score. Data had to be available for at least half of the metrics in each dimension for countries to be assessed.

c. **Overall level.** To measure and compare overall absolute improvement, we take an average of all the percentage improvements across the 11 SDG dimensions. For the **relative** (distance-to-frontier approach), an overall score was obtained for each country also based on a simple average of its different SDG dimensions.

Appendix continued

2. Measuring socio-economic performance: Subnational level

Selecting countries for the analysis

Several criteria were used to select countries for the subnational analysis:

- **Representativeness.** There is coverage from different geographies (eg, Asia, Africa, etc)
- **Availability.** There needs to be sufficient data availability on the chosen metrics over a sufficiently long historical period for the analysis.
- **Comparability.** The chosen countries should have significant variation between sub-regions (ie, a mix of those which are resource-dependent versus those that are not).

The four countries selected for the subnational level analysis are:

1. **Ghana.** Ghana has 10 subnational regions with a decent mix of resource-dependencies. There are two regions that can be considered MDRs while the rest are non-resource-dependent.
2. **Indonesia.** Indonesia has 34 provinces with mix of resource-dependencies, and relatively good data availability which improves the robustness of our analysis. With 10 provinces that are either purely mining-dependent or 'both', and four provinces that are considered HDRs, Indonesia offers a good basis for a regional comparison across different resource groups.

While not strictly an MDC, we made an exception to include Indonesia, as its mineral share of resource exports has grown in importance over time. As an emerging economic player in Asia, the impact of extractive industries in Indonesia also attracts stronger interest from regulators, international

Figure A2: Criteria to define resource-dependent regions (RDRs) in Indonesia

Indonesia

Step 1
A region is considered resource-dependent if mining and quarrying's share of gross domestic regional product (GDRP) is more than 10%*

Step 2
Minerals share of mining and quarrying >75%, region considered mining-dependent; hydrocarbons share >75%, region considered hydrocarbon-dependent; region is dependent by both for shares in between**

Resource-dependent regions	Mining & quarrying share of GDRP >10%	Minerals share of mining and quarrying >75%	Hydrocarbons share of mining and quarrying >75%	Classification
Bangka Belitung	✓	✓	×	Mining
Central Kalimantan	✓	✓	×	Mining
South Kalimantan	✓	✓	×	Mining
Southeast Sulawesi	✓	✓	×	Mining
West Nusa Tenggara	✓	✓	×	Mining
North Maluku	✓	✓	×	Mining
Papua	✓	✓	×	Mining
Riau	✓	×	✓	Hydrocarbon
Jambi	✓	×	✓	Hydrocarbon
Riau Islands	✓	×	✓	Hydrocarbon
West Papua	✓	×	✓	Hydrocarbon
Aceh	✓	×	×	Both
South Sumatra	✓	×	×	Both
East Kalimantan	✓	×	×	Both

* Based on 2010 GDP as it is the earliest date with breakdown of GDRP by industries in the dataset. Export criteria not utilised due to lack of granular data to identify minerals and hydrocarbons exports at the regional level
** Minerals defined as metal ores, coal & lignite and others. Hydrocarbons defined as crude petroleum, gas and geothermal.
Source: CEIC, Central Bureau of Statistics

watchdogs and businesses than developments in other countries.

3. **Chile.** Chile was chosen because it offers subnational regions with a mix of resource dependencies, and data is readily available. Five out of the 15 regions are MDRs and there are no HDRs, as Chile is predominantly mining intensive. Chile attracts a significant level of interest and research regarding the impact of mining. Our research can contribute meaningfully to the discourse.
4. **Peru.** Peru has 25 subnational regions with a useful mix of resource dependencies. There are 17 RDRs, of which we can classify 14 as either purely mining-dependent or dependent on both mining and oil and gas. Three regions can be considered HDRs. Data is relatively well available and comprehensive.

Identifying MDRs in focus countries

Exhibits A2-A5 describe how the RDRs are identified in Indonesia, Peru, Chile, and Ghana based on available data. We identified 14 MDRs in Indonesia, 17 MDRs in Peru, five MDRs in Chile and two MDRs in Ghana.

Selecting metrics relevant to the

Figure A3: Criteria to define resource-dependent regions (RDRs) in Peru

Peru

Step 1
A region is considered resource-dependent if share of 'Extraction of petroleum, gas, minerals and related services' is more than 10% of gross domestic regional product (GDRP) in both 2007 and 2015*

Step 2
Based on official 2015 figures, a region is considered a) mining-dependent if it only produces basic and precious metals; b) hydrocarbon-dependent if it only produces hydrocarbons; and c) both if it produces both metals and hydrocarbons**

Resource-dependent regions	Extractive industry and related services >10% GDRP*	Production of minerals and metals	Production of hydrocarbon	Classification
Ancash	✓	✓	×	Mining
Apurímac	✓	✓	×	Mining
Arequipa	✓	✓	×	Mining
Ayacucho	✓	✓	×	Mining
Cajamarca	✓	✓	×	Mining
Huancavelica	✓	✓	×	Mining
Ica	✓	✓	×	Mining
Junín	✓	✓	×	Mining
La Libertad	✓	✓	×	Mining
Madre de Dios	✓	✓	×	Mining
Moquegua	✓	✓	×	Mining
Pasco	✓	✓	×	Mining
Tacna	✓	✓	×	Mining
Loreto	✓	×	✓	Hydrocarbon
Piura	✓	×	✓	Hydrocarbon
Tumbes	✓	×	✓	Hydrocarbon
Cusco	✓	✓	✓	Both

* Regions must satisfy the criteria in both years to be classified as a RDR. Export criteria not utilised due to lack of granular data to identify minerals and hydrocarbons exports at the regional level. There is no industry breakdown of GDRP data for Callao but our analysis shows that its economy is primarily driven by port activities and hence a non-RDR.
** No further production criteria is required for classification as production in Peru is very focused in each region, ie the only region with production in both minerals and hydrocarbons is Cusco.
Source: National Society of Mining, Oil and Energy, Ministry of Energy and Mines of Peru, Perupetro S.A.

Appendix continued

Figure A4: Criteria to define resource-dependent regions (RDRs) in Chile

Chile

Step 1
A region is considered resource-dependent if share of mining is more than 10% of gross domestic regional product (GDRP) in both 2013 and 2015*

Step 2
All RDRs in Chile are listed as mining-dependent regions (MDRs)**

Region number	Region name	Mining >10% GDRP*	Classification
I	Tarapacá	✓	Mining
II	Antofagasta	✓	Mining
III	Atacama	✓	Mining
IV	Coquimbo	✓	Mining
V	Valparaíso	×	Non resource
VI	O'Higgins	✓	Mining
VII	Maule	×	Non resource
VIII	Bío-Bío	×	Non resource
IX	Araucanía	×	Non resource
X	Los Lagos	×	Non resource
XI	Aysén	×	Non resource
XII	Magallanes y Antártica	×	Non resource
RMS	Santiago Metropolitan	×	Non resource
XIV	Los Rios	×	Non resource
XV	Arica y Parinacota	×	Non resource

* Regions must satisfy the criteria in both years to be classified as RDR. Export criteria not utilised due to lack of granular data to identify minerals and hydrocarbons exports at the regional level.
** Official statistics from the Central Bank of Chile do not provide a clear segmentation of hydrocarbons' share of GDP. Our analysis shows that the regions identified as resource-dependent are largely mining-dependent (copper accounts for around 90% of all mining activities in Chile). Regions that have some presence of oil and natural gas extraction such as Magallanes y Antártica do not qualify as RDRs based on the criteria set out in step 1.
Source: Central Bank of Chile

Figure A5: Criteria to define resource-dependent regions (RDRs) in Ghana*

Ghana

Step 1: By employment
The Western and Ashanti regions contributed to 75% of total employment and 95% of total output in Ghana's mining industry. Most of the remaining output (~5%) comes from Eastern, Central and Greater Accra regions.**

Step 2: Accounting for hydrocarbons
Oil and gas extraction was only commercialised and accounted for in official accounts from 2011, following the discovery of the Jubilee oil reserves in 2007***. Exclude hydrocarbons from the analysis.****

Step 3: Categorising Eastern, Central and Greater Accra regions based on employment
Mining accounts for less than 1% of total employed workers in Eastern, Central and Greater Accra. Categorise as non-RDRs.

Regions	Significant labour contribution to mining	Significant production of hydrocarbons since 1998****	Classification
Western	✓	×	Mining
Central	×	×	Non resource
Greater Accra	×	×	Non resource
Volta	×	×	Non resource
Eastern	×	×	Non resource
Ashanti	✓	×	Mining
Brong Ahafo	×	×	Non resource
Northern	×	×	Non resource
Upper West	×	×	Non resource
Upper East	×	×	Non resource

* This approach is adopted due to lack of GDP or export data at the regional and industry level. A combination of official data sources is used as appropriate.
** Based on 2003 National Industrial Census Report.
*** Based on available annual GDP data at the national level from 2006 to 2015.
**** 1998 is used as base year to analyse socio-economic conditions in Ghana regions as it allows for the longest stretch of time period with comparable and available data. Using 2011 as base year to account for hydrocarbon production would compromise this analysis.
Source: National Industrial Census Report

SDG dimensions

We endeavoured to ensure subnational metrics are as consistent as possible with the national metrics described earlier. However, it is much more challenging to find readily available and consistent data at the subnational level. As such, in some instances, proxy metrics had to be chosen to capture different elements of the impact of socio-economic development at the subnational level. Exhibits A7–A10 summarise the localised metrics used to construct the country-specific socio-economic indices. The construction of the subnational socio-economic index follows the methodology used at the national level. However, the subnational analysis is undertaken relative to a country's best performers, rather than global best performers.

3. Rationale for choosing

Figure A6: Set of localised metrics for Indonesia

Indonesia

Relevant SDGs	International metrics used	Sub-national proxies	Coverage	Time Frame
No Poverty	• Headcount: $1.9 (2011 PPP) daily	• Headcount: national poverty line	• 25 Provinces	2002-2013
Zero Hunger	• Prevalence undernourished • Depth of food deficit	• Prevalence of underweight	• 32 Provinces	1995, 2005, 2008, 2011
Good Health and Well-Being	• Neo-natal mortality • Under-5 mortality • Maternal mortality • Non-communicable diseases (NCDs) mortality	• Infant mortality rate • Available • Birth attended by skilled health worker • Monthly per capita household health expenditure	• 32 Provinces • 32 Provinces • 32 Provinces • 32 Provinces	1994, 1997, 2002, 2007, 2012 1994, 1997, 2007, 2012 1996-2015 1996-2014
Quality Education	• % of children out of school • Net enrolment rate, primary • Mean years of schooling • Population with secondary level	• Available • Literacy rate >15 years old • Available	• 32 Provinces • 32 Provinces • 32 Provinces	1996-2014 1996-2014 2003, 2007, 2012
Gender Equality	• Labour participation • Enrolment rate, primary • Adult literacy • Mean years of schooling • Share of women in parliament	• Worked in last 12 months and currently working • % 15-49 years • Secondary and above (%)	• 32 Provinces • 32 Provinces • 32 Provinces	2003, 2007, 2012 2003, 2007, 2012 2003, 2007, 2012
Clean Water and Sanitation	• Improved water source (% with access) • Improved sanitation facilities (% with access)	• Access to safe water • Access to safe sanitation	• 32 Provinces • 32 Provinces	1996-2013 1996-2013
Affordable and Clean Energy	• Access to electricity • Access to clean fuel for cooking	• Available • % household by type of cooking fuel	• 32 Provinces • 32 Provinces	1996-2013 2001; 2007-2015
Decent Work and Economic Growth	• Labour force participation • Youth unemployment rate • GDP per employed (PPP terms) • Unemployment rate	• Available • Available	• 32 Provinces • 32 Provinces	1996-2015 1995-2015
Industry, Innovation and Infrastructure	• Internet users (% population) • Account at financial institution (% population) • Mobile phone penetration	• Households that accessed internet in last 3 months • Total commercial and rural bank loans per capita (IDR) • Households that own cellular phone	• 32 Provinces • 32 Provinces • 32 Provinces	2012-2015 2002-2011 2012-2015
Reduced Inequalities	• Income quintile ratio • Final household consumption per capita	• Difference in avg monthly expenditure per capita: urban vs rural • Household per capita expenditure (IDR)	• 32 Provinces • 32 Provinces	2007-2015 1996-2014
Peace, Justice and Strong Institutions	• Corruption Perception Index • Political stability and absence of violence/terrorism • Freedom in the World	• Indonesian Democracy Index	• 32 Provinces	2009-2015

Source: Literature search

Figure A7: Set of localised metrics for Peru

Peru

Relevant SDGs	International metrics used	Sub-national proxies	Coverage	Time Frame
No Poverty	• Headcount: $1.9 (2011 PPP) daily	• Population with at least a basic need unsatisfied	• 25 Regions	2007-2014
Zero Hunger	• Prevalence undernourished • Depth of food deficit	• Prevalence of underweight	• 25 Regions	2007, 2013, 2014
Good Health and Well-Being	• Neo-natal mortality • Under-5 mortality • Maternal mortality • NCD mortality	• Infant mortality rate • Child mortality rate • Inhabitants per nurse • Inhabitants per doctor	• 25 Regions • 25 Regions • 25 Regions • 25 Regions	2000, 2008, 2011 2007, 2009, 2011, 2013 2002-2013 2002-2013
Quality Education	• % of children out of school • Net enrolment rate, primary • Mean years of schooling • Population with secondary level	• Illiteracy rate >15 years • Public spend per student • Mean years of study	• 25 Regions • 25 Regions • 25 Regions	2006-2014 2007-2014 2005-2014
Gender Equality	• Labour participation • Enrolment rate, primary • Adult literacy • Mean years of schooling • Share of women in parliament	• % of men/women not in poverty without own income • Avg. monthly income • Literacy rate >15 years • Mean years of study	• 25 Regions • 25 Regions • 25 Regions • 25 Regions	2007-2014 2004-2015 2005-2014 2005-2014
Clean Water and Sanitation	• Improved water source (% with access) • Improved sanitation facilities (% with access)	• % Household exposed to water with residual chlorine dosing for consumption	• 25 Regions	2011-2015
Affordable and Clean Energy	• Access to electricity • Access to clean fuel for cooking	• % households with electricity • % households using gas to cook	• 25 Regions • 25 Regions	2003-2015 2003-2015
Decent Work and Economic Growth	• Labour force participation • Youth unemployment rate • GDP per employed (PPP terms) • Unemployment rate	• Economically active (EAP)/ active working age pop, • 1-(EAP employed/EAP)	• 25 Regions • 25 Regions	2004-2015 2004-2015
Industry, Innovation and Infrastructure	• Internet users (% population) • Account at financial institution (% population) • Mobile phone penetration	• Population aged 6 and above using internet • Households with at least one member with access to cell phone	• 25 Regions • 25 Regions	2007-2014 2001-2015
Reduced Inequalities	• Income quintile ratio • Final household consumption per capita	• Average monthly income from work	• 25 Regions	2007-2014
Peace, Justice and Strong Institutions	• Corruption Perception Index • Political stability and absence of violence/terrorism • Freedom in the World	• Crime reporting rate • Voter turnout to General Election	• 25 Regions • 25 Regions	2011-2015 2000, 2001, 2006, 2011

Source: Literature search

Figure A8: Set of localised metrics for Chile

Chile

Relevant SDGs	International metrics used	Sub-national proxies	Coverage	Time Frame
No Poverty	• Headcount: $1.9 (2011 PPP) daily	• Percentage of people living in poverty	• 15 Regions	2006, 2015
Zero Hunger	• Prevalence undernourished • Depth of food deficit	• Indigent households (%)	• 15 Regions	2006,2015
Good Health and Well-Being	• Neo-natal mortality • Under-5 mortality • Maternal mortality • NCD mortality	• Life expectancy at birth • Standardised mortality rate • Females who had pap smear in last 3 years (%) • Hospital bed rate (per 10,000)	• 15 Regions • 15 Regions • 15 Regions • 15 Regions	2000,2014 2000,2014 2006, 2015 2000, 2006, 2007, 2009
Quality Education	• % of children out of school • Net enrolment rate, primary • Mean years of schooling • Population with secondary level	• Labour force with tertiary (%) • Average schooling years (15+) • Available	• 15 Regions • 15 Regions • 15 Regions	2006, 2015 2006, 2015 2000,2014
Gender Equality	• Labour participation • Enrolment rate, primary • Adult literacy • Mean years of schooling • Share of women in parliament	• Available (15+ years) • Average monthly income • Literacy rate, 15+ • Available • Female-headed households (%)	• 15 Regions • 15 Regions • 15 Regions • 15 Regions • 15 Regions	2010, 2011 2006, 2015 2006, 2015 2006, 2015 2009, 2015
Clean Water and Sanitation	• Improved water source (% with access) • Improved sanitation facilities (% with access)	• Households with deficit in sanitary conditions	• 15 Regions	2006, 2015
Affordable and Clean Energy	• Access to electricity • Access to clean fuel for cooking	• Households without electricity	• 15 Regions	2006, 2015
Decent Work and Economic Growth	• Labour force participation • Youth unemployment rate • GDP per employed (PPP terms) • Unemployment rate	• Available • Unemployment, population between 15 and 24 • Available	• 15 Regions • 15 Regions • 15 Regions	2011, 2015 2010, 2015 2006, 2015
Industry, Innovation and Infrastructure	• Internet users (% population) • Account at financial institution (% population) • Mobile phone penetration	• Homes with internet access • PCT patent applications per million inhabitants	• 15 Regions • 15 Regions	2011, 2015 2006, 2011
Reduced Inequalities	• Income quintile ratio • Final household consumption per capita	• Disposable income per capita • Average monthly income (LCY)	• 15 Regions • 15 Regions	2000, 2014 2006, 2015
Peace, Justice and Strong Institutions	• Corruption Perception Index • Political stability and absence of violence/ terrorism • Freedom in the World	• Intentional homicide rate • Voters turnout to general election	• 15 Regions • 15 Regions	2006, 2015 2008, 2014

Source: Literature search

Figure A9: Set of localised metrics for Ghana

Ghana

Relevant SDGs	International metrics used	Sub-national proxies	Coverage	Time Frame
No Poverty	• Headcount: $1.9 (2011 PPP) daily	• Poverty incidence at national poverty line • Extreme poverty incidence at national poverty line	• 10 Regions • 10 Regions	2005, 2013 2005, 2013
Zero Hunger	• Prevalence undernourished • Depth of food deficit	• Children, underweight under 5 • Children, wasted under 5 • Children, stunted under 5	• 10 Regions • 10 Regions • 10 Regions	1998, 2003, 2008, 2014 1998, 2003, 2008, 2014 1998, 2003, 2008, 2014
Good Health and Well-Being	• Neo-natal mortality • Under-5 mortality • Maternal mortality • NCD mortality	• Available • Available • Infant mortality	• 10 Regions • 10 Regions • 10 Regions	1998, 2003, 2008, 2014 1998, 2003, 2008, 2014 1998, 2003, 2008, 2014
Quality Education	• % of children out of school • Net enrolment rate, primary • Mean years of schooling • Population with secondary level	• Literacy rate, 15-49 yrs • Ever attended school, +15 yrs • Median completed school yrs • Attendance rate, 6-25 yrs	• 10 Regions • 10 Regions • 10 Regions • 10 Regions	2003, 2008, 2014 1999, 2006, 2013 1998, 2003, 2008, 2014 1999, 2006, 2013
Gender Equality	• Labour participation • Enrolment rate, primary • Adult literacy • Mean years of schooling • Share of women in parliament	• Employed, worked in past yr • Attendance rate, 6-25 yrs • Median completed school yrs • Access to mass media	• 10 Regions • 10 Regions • 10 Regions • 10 Regions	2003, 2008, 2014 1999, 2006, 2013 1998, 2003, 2008, 2014 1998, 2003, 2008, 2014
Clean Water and Sanitation	• Improved water source (% with access) • Improved sanitation facilities (% with access)	• Available • Households with no toilet facilities	• 10 Regions • 10 Regions	1998, 2003, 2008, 2014 1998, 2003, 2008, 2014
Affordable and Clean Energy	• Access to electricity • Access to clean fuel for cooking	• Available • Available	• 10 Regions • 10 Regions	1998, 2003, 2008, 2014 1998, 2003, 2008, 2014
Decent Work and Economic Growth	• Labour force participation • Youth unemployment rate • GDP per employed (PPP terms) • Unemployment rate	• Mean annual per capita expenditure • Available	• 10 Regions • 10 Regions	1999, 2006, 2013 2000, 2015
Industry, Innovation and Infrastructure	• Internet users (% population) • Account at financial institution (% population) • Mobile phone penetration	• % households with mobile telephone	• 10 Regions	2008, 2014
Reduced Inequalities	• Income quintile ratio • Final household consumption per capita	% households in three middle income quintiles Unemployment: rural vs urban Ever attended school, +15 yrs: rural vs urban	• 10 Regions • 10 Regions • 10 Regions	1999, 2006, 2013 2000, 2015 1999, 2006, 2013
Peace, Justice and Strong Institutions	• Corruption Perception Index • Political stability and absence of violence/ terrorism • Freedom in the World	• Voter turnout in general elections	• 10 Regions	2000, 2012

Source: Literature search

Appendix continued

a distance-to-frontier methodology

A 'distance-to-frontier' approach was chosen as the main methodology in this research to measure the gap between a country and the global best performer on an individual socio-economic metric, a SDG dimension, and its overall socio-economic performance on an index. There are inherent pros and cons for choosing any specific research approach, and this method is no different.

The key advantage of the chosen methodology is its flexibility when building a socio-economic index. Our aim was to cover a wide range of relevant SDG dimensions. Hence the 'distance-to-frontier' concept was appealing because it allowed us to pick a large number of metrics in a SDG dimension and then bundle them 'neatly' in one comparable overall number.

Second, the methodology is intuitive and easy to follow, especially when used to compare socio-economic performance over time. We believe this method – which has fewer assumptions and technicalities than those used in econometric modelling – was best suited to meet the purpose of this study, namely to offer readers (including a non-academic audience) an engaging and broad overview of how socio-economic conditions in regions have changed over time.

We acknowledge some of the shortfalls with this approach compared to more standard econometric techniques. The most obvious relative disadvantage is that it cannot attribute causality, even if there are strong instances of correlation. However, given the challenges of omitted variable bias, measurement error, and reverse causality inherent to this analysis, using econometric techniques could result in biased estimates.

Another disadvantage of this methodology is the tendency of some metrics (literacy rates, unemployment rates etc) to have upper or lower bounds. For example, unemployment rates have a lower bound of 0 per cent, and literacy rates have an upper bound of universal literacy (100 per cent). In these circumstances, progress would have been expected to slow for a country near the upper or lower bounds, compared to a country which was less advanced. Unfortunately, there is a trade-off between these biases, and the availability of metrics with widespread coverage across countries.

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ICMM
International Council
on Mining & Metals

35/38 Portman Sq.
London W1H 6LR
United Kingdom
+44 (0) 20 7467 5070
info@icmm.com
www.icmm.com

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