MYANMAR AT A CROSSROADS:

Past trends of human well-being and a future outlook

April 2023

The Myanmar Development Observatory (MDO) specializes in research and analytical work concerning the development trajectory of Myanmar, with particular focus on the socio-economic circumstances, the progress on the Sustainable Development Goals, and the impact of the conflict. Working with a range of stakeholders, including UN agencies, Civil Society, the private sector and think tanks, the MDO acts as an interlocutor between evidence from the ground and the actual programming to benefit the most vulnerable in Myanmar and enhance their resilience.

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Acronyms and Abbreviations

DHS	Demographic and health survey
EAO	Ethnic armed organization
GDP	Gross domestic product
GNI	Gross national income
GoM	Government of Myanmar
HDI	Human development index
H-HDI	Household-based human development index
HIS	Household income survey
IHDI	Inequality-adjusted human development index
IHLCA	Integrated household living conditions assessments
LN	Log normal distribution
MLCS	Myanmar living conditions survey
NCA	National ceasefire agreement
NLD	National league for democracy
PCA	Principal component analysis
PPP	Purchasing power parity
SPDC	State peace and development council
UNDP	United nations development programme

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Executive Summary

Myanmar is likely to be in a protracted state of crisis for some time. Consequently, the crisis is also very likely to derail the steady progress the country was making in sustained high GDP growth, poverty reduction, creation of employment including that of women, increasing exports and overall, getting closer to achieving many of the SDGs. Myanmar will be challenged in arresting the rising vulnerabilities of the people from lost jobs and lost or diminished livelihoods, providing widespread access to basic services and social safety nets, creating the necessary fiscal space, and curbing the conflict spreading throughout the country resulting in growing insecurity of civilians.

The crisis is posing a serious, and possibly generational threat to the well-being of the people. With extremely limited domestic and international resources available, and an extremely complex and dynamic operating context, the challenge is to try to understand the nature and pace of the southward slide of all conceivable metrics of progress and determine how best to target interventions for maximum impact.

The main purpose of this empirical analysis is to provide that information base. First from 2005-2017 – a period of high progress at the national level and well-captured by comprehensive datasets – followed by estimates of regression post 2020, due to the crises based on smaller but frequent surveys in the absence of any comprehensive national level datasets.

The methodology is based on UNDP's human development index which provides simple and transparent assessments of development, based on a minimal listing of capabilities focused on a basic quality of life. The Human Development Index (HDI), which was introduced in 1990 and focused on income, education and health, was gradually augmented to better capture, for example, inequality and gender development (UNDP, 2020).[1]

An improvised version of the HDI used in this study is the household-based human development index (H-HDI) calculated on data obtained from household surveys. The H-HDI is aggregated from the individual score of each household, rather than by averages, allowing the disaggregation of results by key socio-demographic characteristics of households. This approach is useful for the design and prioritization of recovery and resilience building assistance because by highlighting the differences between household groups, it makes possible the identification of the most vulnerable populations.

In comparing human development among households by socio-demographic characteristics, the study found that between 2005 and 2017:

- Increases in H-HDI were uneven among Myanmar's states and regions. Whereas it increased by over 50% in Kayah and Kachin between 2005 and 2017, it increased by 39% and 40% in Rakhine and Ayeyarwaddy, respectively.

- Poverty depends on the way we define or measure it. The headcount ratio is a "monetary" measure of poverty, whereas concepts such as the Multidimensional poverty index (MPI), the (flip side of) Human development index (HDI, and the H-HDI) include the dimensions of health education, living conditions, assets etc., to arrive at a more comprehensive measure of poverty which is "non-monetary" in principle. There is no consensus in the empirical literature on the nature of co-movement of the two types of measures. For Myanmar, we find that monetary and non-monetary poverty measures moved hand in hand during the study period.

- Households in urban areas disproportionately improved in their rankings against the H-HDI. The development gap between urban households and their rural counterparts increased by 52% over the period of the study. In Mon, there was a nearly eight-fold increase in the urban-rural gap. The southeast of Myanmar (Mon, Tanintharyi and Kayin) witnessed particularly high increases in H-HDI among urban households. Where increases in H-HDI did occur among rural households, these were much more uneven across Myanmar's states and regions.

- There is a clear association between H-HDI and the education level of the household head, with higher levels of education associated with higher development. Between 2005 and 2017, the gap in H-HDI between households with heads with the highest level of education and those with the lowest grew 92%.

- Households with a head aged 14-24 show wide variations in outcomes. In some states/regions, these households are far below the state/region average for H-HDI, whereas they are far above in others.

[1] For example: the Inequality-adjusted HDI, the Gender Development Index, the Gender Inequality Index and the Multidimensional Poverty Index.

- There has been a concerning increase (23%) in polarization[2] between rural and urban households between 2005 and 2017. Polarization by education level of the household increased more than fivefold between 2005 and 2017.

- Inequalities in H-HDI grew sharply between 2005 and 2015 - an 85% increase as measured by the Theil index - before falling back to near-2005 levels in 2017. This trend – rise followed by fall – was predominantly driven by changes in within-group inequalities rather than between-group inequalities, with a significant reduction in levels of identification among socio-demographic groups analyzed in this study between 2005 and 2015. However, between 2015 and 2017 within group inequalities fell sharply, leading to a rise in polarization through the identification channel. This has implications for conflict and other recent political developments which warrant further investigation.

- Inequalities between households at the state/region level vary significantly. Whereas inequality in Ayeyarwaddy and Mandalay grew by only 43% and 57% respectively between 2005 and 2015, inequality in Chin increased 266% and in Rakhine and Kayin by 220%.

What would the H-HDI look like if we were to measure it in 2023?

As there are no comprehensive datasets yet of the scale required for an exact update, based on smaller (but representative) surveys conducted by UNDP and other organizations, we see a clear increase in the overall vulnerability of the population due to falling income, depletion of assets, lack of access to healthcare and nutrition, disruption of education and a rise of insecurity due to the outbreak of conflict.

In early 2021, nearly three quarters (73.6%) of households in Myanmar reported a drop in income. The income shock was more prominent among urban households, with 78.1% reporting loss of income[3].

By the end of 2021, 74.8% of rural households reported reduction in income (compared to 63.3% of urban households)[4]. The situation did not significantly improve by 2022. A smaller survey conducted in Yangon in mid-2022 showed that more than a fifth (21.7 percent) of households had often gone without any cash income[5].

While facing an income shock, households were forced to adopt various coping strategies, from more benign ones (e.g., using savings, borrowing from friends, and family), to more negative ones (e.g., selling productive assets, reducing the intake of nutritious food or removing children from

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2 A property of the Theil index — to decompose total inequality into "within" and "between" group inequalities — allows the measurement of polarization, which, for the purposes of this study, means the formation of (influential) distinct population subgroups. To calculate polarization, the study utilizes the Kanbur-Zhang index (Zhang & Kanbur, 2001), which is the ratio of between group inequality to within group inequality.

3 https://www.undp.org/myanmar/publications/peoples-pulse-socioeconomic-impact-events-1-february-2021-households-myanmar-september-2021

4 https://www.undp.org/myanmar/publications/regressing-gender-equality-myanmar-women-living-under-pandemic-and-military-rule

5 https://www.undp.org/myanmar/publications/helping-communities-weather-socioeconomic-downturn-building-urban-resilience

school). Relying on the negative coping strategies has a potential to significantly impact upon the human capital of the next generation[6]. These effects may take time to get reflected in the health and education sub-indicators, but the direction is clearly downward.

One strategy to get cash in times of difficulty is to sell assets. In mid-2021 over one-fourth (26.5%) of households had relied on selling assets as a coping strategy.

As a result of the economic shock associated with the military takeover, households primarily relied on selling gold and jewelry (68.1%). Some households (38.7%) also relied on selling productive assets such as livestock and motorbikes, further reducing their income generating potential in the short/medium term. Over time, selling of assets became an increasingly common coping strategy. More specifically, 36.9% of households by the end of 2021[7] and 42.1% by mid-2022[8] relied on selling assets to try and cope with the effect of the income shock. As some of the assets sold were means of production (e.g. livestock) or earning income (e.g. motorbike and boat), households risk being stuck in poverty for a longer period. The depletion of assets naturally affects the asset index of the H-HDI negatively, lowering the overall H-HDI.

The periodic surveys after February 2021 show a rising trend of food insecurity in Myanmar. By mid-2021, 38.7% of household reported eating less than usual[9]. This number rose to 40.6% by the end of 2021[10]. Furthermore, in mid-2022, over one in four households (26.0%) in Yangon reported that there was a time when people in their household were unable to eat healthy and nutritious food because of lack of money[11].

Almost a third (30.1%) of households with children in Yangon were unable to eat healthy and nutritious food due to lack of money and over two-fifths (38.4%) ate less due to lack of resources[12]. The impact of the lack of nutritious food to a child's physical and cognitive development is well documented[13]. Thus, relying on this negative coping strategy threatens to keep millions of Myanmar children stuck in a perpetual poverty trap through lower productivity. It will also affect the health sub-indicator of the H-HDI if left unchecked.

Prior to 2021, the public satisfaction with healthcare services in Myanmar was high[14]. Since the military takeover, however, as medical staff (e.g. doctors, nurses, midwives) joined the Civil Disobedience Movement, access to basic public healthcare services became difficult. An UNDP survey in mid-2021 revealed over half (60.6%) of respondents reported access being more difficult than before[15]. By the end of 2021, over half of women (53.6%) reported that accessing health services was more difficult

6 https://www.undp.org/myanmar/publications/impact-twin-crises-human-welfare-myanmar
7 https://www.undp.org/myanmar/publications/regressing-gender-equality-myanmar-women-living-under-pandemic-and-military-rule
8 https://www.undp.org/myanmar/publications/helping-communities-weather-socioeconomic-downturn-building-urban-resilience
9 https://www.undp.org/myanmar/publications/peoples-pulse-socioeconomic-impact-events-1-february-2021-households-myanmar-september-2021
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12 https://www.undp.org/myanmar/publications/helping-communities-weather-socioeconomic-downturn-building-urban-resilience
13 https://www.undp.org/myanmar/publications/impact-twin-crises-human-welfare-myanmar
14 Mimeo. UNDP (2019).
15 https://www.undp.org/asia-pacific/publications/myanmar-peoples-pulse-survey-report-2021

than it used to be. During this period, 4.8% of women had a pregnancy or childbirth issue for which public or private health services could not be accessed; for pregnant or breastfeeding women, this increases to 11.1%.

The absence of many functioning public healthcare facilities led individuals in need to seek healthcare in the private sector. A survey in Yangon indicates that the vast majority (86.9 percent) of respondents sought healthcare in the private sector. As private healthcare is pricier and many households in Yangon and Myanmar do not have the necessary healthcare insurance[16], forgoing healthcare when needed had become common. In fact, three-fifths (58.6 percent) of the low-income households in Yangon found access to health services more difficult, mainly due to higher charges of private health services[17]. The problem was aggravated by the fact that people *do not have money in hand* having lost jobs or other forms of livelihoods.

Schools in Myanmar were first shut down at the start of 2020 due to the COVID-19 pandemic. They were hit by further turmoil after the military takeover, with many students and teachers boycotting state-run schools as part of the Civil Disobedience Movement. According to a survey in Yangon, over one fifth (22.2%) of households with children of school age (age 5 to 17) had removed the children from school.

The reasons for this revolved around security issues but also included high opportunity cost as well as the need to have a helping hand in and around the household increased. While during this period schools moved towards a hybrid method of delivering lessons (online and in-person), the most

[16] Nikoloski Z, McGuire A, Mossialos E. Evaluation of progress toward universal health coverage in Myanmar: A national and subnational analysis. PLoS Med. 2021 Oct 15;18(10):e1003811. doi: 10.1371/journal.pmed.1003811. PMID: 34653183; PMCID: PMC8519424.

[17] https://www.undp.org/myanmar/publications/helping-communities-weather-socioeconomic-downturn-building-urban-resilience

disadvantaged children were excluded. The survey in Yangon indicated that only a tenth (9.9%) of households with school age children were doing online courses at home. This disruption in schooling, both in terms of dropping out of school as well as receiving sub-par quality education will have a long term negative effect on the human capital of children growing up in this tumultuous period[18]. Private and/or online options are costly and can only be afforded by those who have a steady source of income.

One finding we want to highlight is the strong positive correlation between monetary (poverty headcount) and non-monetary (in this case, the H-HDI) measures of poverty in Myanmar. The strength of correlation depends on a few factors, including the level of development and functioning of the social protection system as well as barriers that households could face when accessing health or education services.

In particular, in countries where there are significant obstacles which prevent uninterrupted access to health and education – as in Myanmar at present - the monetary and non-monetary measures of poverty are likely to be highly correlated. In fact, a forthcoming joint study between UNDP and UNICEF in Myanmar finds empirical evidence for the positive correlation between monetary and non-monetary measures also of child poverty in the country.

This finding would inform the both the upcoming programmatic priorities of agencies on the ground including UNDP. The importance of disposable income in hand in dealing with the rising vulnerabilities demonstrated by our findings means that support toward restoration of jobs and livelihoods has no substitute to get people back on their feet at this moment in time. MSMEs (micro, small and medium enterprises), which form the backbone of the economy, are badly affected, e.g., due to lack of access to finance from the beleaguered micro-finance institutes (MFIs). In addition, there are internally displaced people who are being hosted by other communities. The capacity of these host communities in absorbing the displaced people, providing them jobs and other income earning opportunities may also be prioritized. Thus, external funding for a judicious blend of immediate relief and long-term resilience is needed to prevent the downward slide of the well-being metrics measured and analyzed in this study.

[18] https://www.undp.org/myanmar/publications/impact-twin-crises-human-welfare-myanmar

2

Data and Methods

2.1 Data

Computation of the household-based human development index (H-HDI) requires the use of cross section datasets. To calculate the H-HDI for 2005–2017, the following datasets were used:

- For 2005 and 2010: the Integrated Household Living Conditions Assessments (IHLCA).
- For 2015: the Demographic and Health Survey (DHS).
- For 2017: the Myanmar Living Conditions Survey (MLCS).

Box A provides further details of the datasets. The DHS is our dataset of reference. As employed by Harttgen and Klasen (KLASEN, 2012), we harmonized the variables available in the IHLCA and in the MLCS to fit the model.[19]

[19] More details about the harmonization are available in the Appendix.

Box A — Datasets used to calculate household-based HDI

Integrated Household Living Conditions Assessment 2004

The IHLCA 2004 survey was conducted on a nationwide basis with a total sample size of 18,660 households from two rounds of data collection (November–December 2004 and May 2005). The sample was representative at the national level, at the 17 States/divisions level, and at the Urban/rural areas within state/division level. This breakdown suggested a total of 34 strata (2 area types * 17 states/divisions).

Integrated Household Living Conditions Assessment II 2009–2010

The IHLCA II 2009–10 survey was conducted nationwide with a total sample size of 18,660 households with two rounds of data collection (December 2009–January 2010 and May 2010). A stratified multi-stage sample design was used for the IHLCA-II survey with 62 districts as the strata.

Myanmar: Standard Demographic and Health Survey, 2015–16 Dataset

The 2015/16 DHS followed a two-stage sample design. The first 442 clusters (123 urban and 319 rural) were selected from the master sample. A fixed number of 30 households was then selected by each primary sample unit with equal probability systematic sampling. Data were collected between December 7, 2015, and July 7, 2016. The total number of households selected was 13,238, of which 12,780 households were occupied. Of those occupied, 98% responded producing 12,500 household interviews.

Myanmar Living Conditions Survey (2017)

The MLCS 2017 survey is representative of the Union territory (Myanmar national level), states and regions, as well as urban and rural areas. The survey was conducted in 296 of 330 townships (admin3 level). A total of 13,730 households were interviewed. A stratified multi-stage sample design was used. The master sample was stratified.

2.2 Methodology for the household-based human development index (H-HDI)

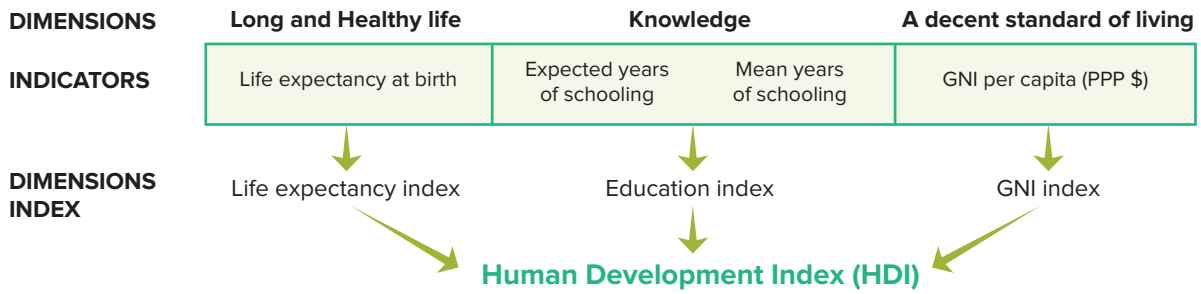
To calculate household-based human development in Myanmar, the Harttgen and Klasen's methodology was adopted (Harttgen & Klasen, A Household-Based Human Development Index, 2012). The indices for the three sub-components of human development — education, health and assets[20] — are calculated first. Calculation of the three sub-components for the H-HDI differs from the methods used for the standard HDI (see Figure 1). Below is a brief overview of how the components and the H-HDI are calculated. Detailed explanations are included in Appendix A.

[20] In the global HDI, the asset component is commonly referred to as the GNI component.

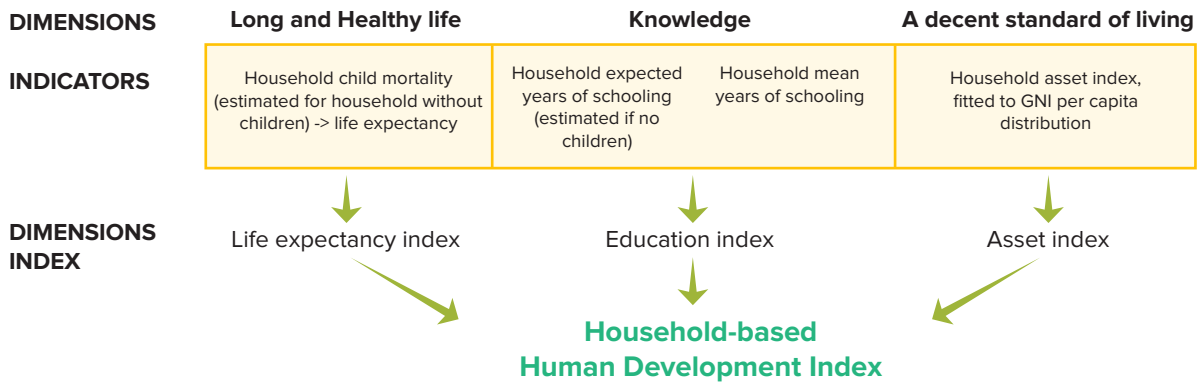
Figure 1

Main methodological differences between HDI and H-HDI

HDI methodology



H-HDI methodology



Asset index

The GNI index at the household level — in this study, we use an "asset index" as a proxy at the household level — is computed in five steps. First, an asset index is calculated using a set of dichotomous variables of households' assets and principal component analysis (PCA). With PCA, each asset variable is assigned a weight, and the asset index is the linear combination of the weighted variables. Second, a log normal distribution is derived using the country GDP per capita (in purchasing power parity (PPP) $) and the corresponding Gini coefficient. Third, the asset index is modelled with a log normal distribution. Based on these two distributions, we simulate household per capita income by attaching to each quantum of the asset index distribution the respective value from the income distribution.

Education index

The education index is constructed from the *mean years of education of adults aged 25 or older and the expected year of education of children* at each level of education of the official school age. The *expected years of education* as a measure of school life expectancy is defined as the total number of years of schooling a child at a certain age can expect to achieve when assuming that their enrollment probability does not change in the future (Harttgen & Klasen, A Household-Based Human Development Index, 2012). Prior to calculating the education index, we employed the multiple imputation method to fill in the missing values of age-specific enrollment information for households without children within the age range. The variables used for multiple imputation are described in detail in the Appendix. After the imputation of the age-specific

enrollment rate, we calculated both the *expected years of the schooling of children and mean years of education for adult* household members. The H-HDI education index is then computed as a geometric mean of the two education sub-indices.

Health index

The health index is calculated by combining information on child mortality and model life tables. An imputation-based approach to calculate the mortality rate at the household level was used. The imputation approach is used to deal with missing values for households without children and to obtain an estimate of child mortality that is continuous. The imputation was completed by regressing the child mortality on a set of basic household and community socio-economic characteristics using the discrete proportional hazard model. Subsequently, we used the predicted value of child mortality for all households including those with children. These predicted values were then used to estimate the household life expectancy at birth using modified logit life table systems (Murray, Ferguson, Lopez, Guillot, & Saloman, 2003). After estimating the life expectancy for each household, the health index was computed.

Household-based HDI (H-HDI)

The H-HDI is calculated by taking the geometric mean of the three sub-indices, in accordance with the approach used in the Human Development Report to calculate the global HDI (Harttgen & Klasen, 2010). The use of the geometric mean implies that households whose achievements differ greatly across components will receive a lower score compared to those whose achievements are more balanced across components. If g denotes the geometric mean and μ denotes the arithmetic means, then H-HDI can be expressed as follows:

$$H\text{-}HDI = g[\mu(y), \mu(e), \mu(h)]$$

Where *y, e,* and *h* are respectively the asset index, the education index and health index.

2.3 Assessing differences in H-HDI among households in Myanmar

Understanding the extent to which changes in human development in Myanmar 2005–2017 were felt (un) evenly among households is a primary purpose for this study. The household-approach to human development facilitates comparison across population subgroups. In doing so, it can provide invaluable insights into underlying vulnerabilities and identify those "left behind" by overall increases in human development.

The household-based approach allows comparison of households by socio-demographic characteristics, including:

- Gender of the household head
- Age of the household head
- Location of the household:
  - Urban and rural
  - State and region[21]
- Family size
- Education level of the household head

These characteristics provide useful lines of enquiry in Myanmar as they have been known to be associated with different outcomes for households in international studies. Households in which the head has no education, those with younger household heads, and those in rural areas have been associated with lower levels of human development (Harttgen and Klasen 2010). The evidence on family size and gender of the household head is more mixed: in some countries, female-headed households and larger families are associated with lower levels of development but in others the opposite is true (Ibid).

It is worth noting that comparing male-headed households with female-headed households is not a proxy for gender inequality (Buvinic & van de Walle, 2019). Comparing outcomes for households by the gender of household head does, however, provide insights into particular vulnerabilities, with the majority of women in female-headed households in developing countries widowed (World Bank, n.d.), for example.

[21] The Union Territory of Nay Pyi Taw was created under the 2008 Constitution from townships that previously formed part of Mandalay region. The 2005 and 2010 H-HDI measures include the area that became Nay Pyi Taw as part of Mandalay region. The 2015 and 2017 measures include separate figures for Nay Pyi Taw.

2.4 Methodology for measuring inequality and polarization in H-HDI

In addition to disaggregating H-HDI to different subgroups of households in Myanmar, this study uses the H-HDI and indices to measure changes in both inequality and polarization over time.

Inequality

This study utilizes both the Gini coefficient —a widely-used measure of inequality — and the Theil index of inequality. While both measure the spread of the distribution across the entire population, the latter provides the additional benefit of being decomposable, allowing measurement of inequalities "within" a population group and "between" population groups[22]. For example, this allows the study to measure inequality within urban and/or rural households over time as well as comparing trends in inequality between urban and rural households.

Polarization

The property of the Theil index — to measure "within" and "between" group inequalities — allows the measurement of polarization, which means the formation of distinct and prominent population subgroups. Such "Within" group inequality can be used to measure an important driver of polarization, viz., "identification". It is the sense of belonging to a particular group an individual feels. For example, in the context of this study, where urban (or rural) households have low levels of inequality — that is to say similar levels of human development — they more strongly identify as "urban" (or rural) as distinct from their "rural" (or urban) counterparts. Phrased differently, if within group inequality is low, a member feels a greater sense of belonging to that group.

"Between" group inequality — referred to as *alienation* — is the average distance (in human development terms) between one group and another. For example, where there are high differences between urban and rural households in H-HDI, there is a stronger level of alienation, and hence stronger polarization.

Thus, where there is low "within" group inequality (strong identification) and high "between" group inequality (strong alienation), there is strong polarization (along that specific dimensions which can be location, gender, religion, ethnicity etc..). So, if inequality among urban households shrinks over time and inequality between urban and rural households grows, it can be said that there is growing polarization between urban and rural households. Polarization is an important determinant of conflicts in societies.

To calculate polarization, the study utilizes the Kanbur-Zhang index (Zhang & Kanbur, 2001), which is the ratio of between group inequality to within group inequality:

$$\underset{(Kanbur\text{–}Zhang\ index)}{\boldsymbol{Polarization}} = \frac{\boldsymbol{Between\ group\ inequality}}{\boldsymbol{Within\ group\ inequality}}$$

The Kanbur-Zhang index has the benefit of allowing comparison of levels of polarization across distinct groups. For example, comparing polarization between rural and urban households to polarization between female-headed households and male-headed households.

In utilizing the Kanbur-Zhang index, the study can identify significant differences in development outcomes between sections of the population, providing insights to policymakers seeking to support *inclusive* and equitable development in Myanmar.

[22] Total inequality is the sum of two components: between and within group inequalities.

3

The Household-based Human Development Index

3.1 Trends in H-HDI

Figure 6 shows the overall trend of the H-HDI and its three components in Myanmar for the years 2005, 2010, 2015 and 2017. Across this period, there was a significant increase in H-HDI of 46%, growing from 0.377 in 2005 to 0.550 in 2017. This trend is comparable with — albeit larger than — that reported in the global HDI, for which a 26% increase occurred between 2005 and 2017 and Myanmar moved from the low to medium human development category.

This increase in H-HDI has been predominantly driven by a substantial improvement in the health index, which increased by 61% from 2005 to 2017. This increase reflects the significant growth in life expectancy at birth in Myanmar, which increased from 62 years in 2005 to 67 years in 2017 (World Bank, n.d.). Improvements in life expectancy could have resulted from two sources which are reduction in risky behaviors and improvements in healthcare infrastructure. WDI data suggests positive trends for both indicators. There is an increasing trend in the proportions of physicians, nurses and midwives per 1,000 population from 2005 to 2019.

Moreover, there is a decreasing trend from 2005 to 2019 in some indicators relating to risky behaviors, particularly mortality from CVD, cancer, diabetes or CRD between ages 30 and 70, and prevalence of current tobacco use among adults according to WDI data.

Increases in the asset and education indices were more modest, increasing by 39% and 34% respectively. Both these indices recorded small decreases between 2015 and 2017.

Figure 2

Nurses and midwives (per 1,000 people)

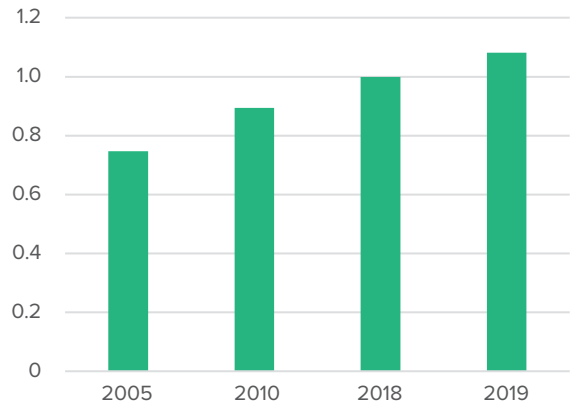


Figure 3

Physicians (per 1,000 people)

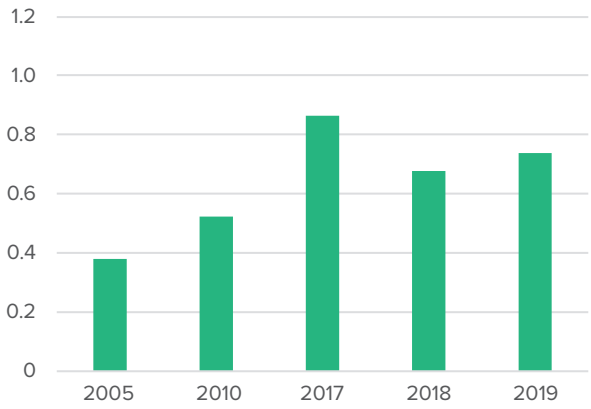


Figure 4

Mortality from CVD, cancer, diabetes or CRD between exact ages 30 and 70 (%)

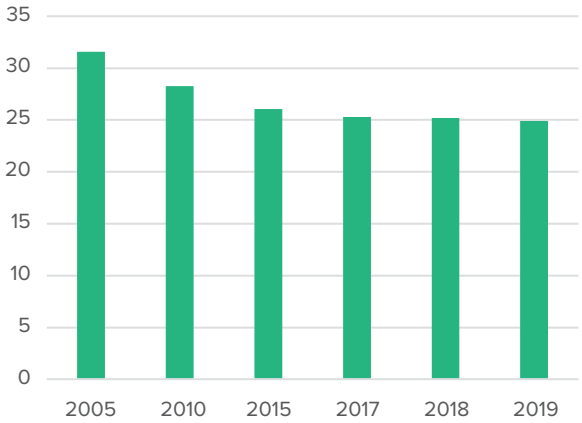
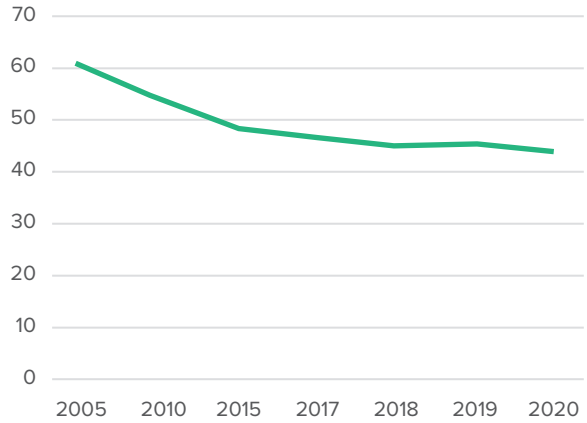


Figure 5

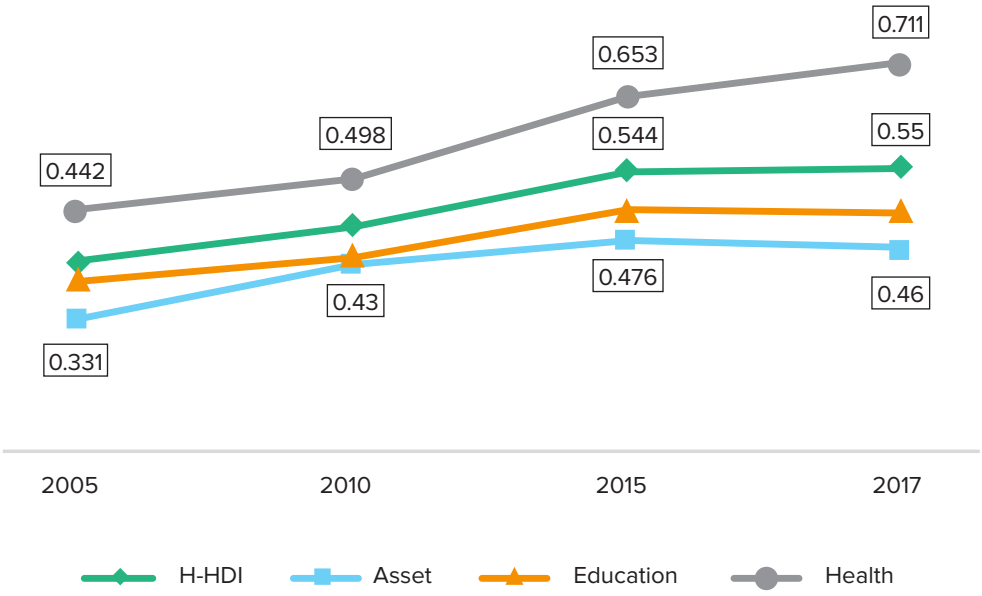
Prevalence of current tobacco use (% of adults)



Source: WDI
Note: 2017 data for prevalence of current tobacco use is missing, therefore data was extrapolated by averaging data of 2015 and 2018.

Figure 6

H-HDI in Myanmar (2005—2017)



3.2 H-HDI by state/region

Map 1 disaggregates the measurements of H-HDI by state/region.[23] Notably, the figure shows that the overall H-HDI improved in all states and regions from 2005 to 2017. This is commendable considering the importance of equitable human development in the achievement of the Sustainable Development Goals.

However, these increases are not uniform across states and regions. Two states and regions — Kachin and Kayah — recorded increases in H-HDI of over 50% from 2005 to 2017. This compares with Rakhine and Ayeyarwaddy, where increases were more modest (39% and 40% respectively).

As a consequence of uneven starting points and uneven growth from 2005–2017, significant gaps in human development remain among states and regions. Yangon was the region with the highest H-HDI for all four years (0.414, 0.498, 0.593, and 0.601 in 2005, 2010, 2015 and 2017 respectively). The lowest H-HDI in 2015 and 2017 was in Rakhine state (0.498 and 0.519 respectively). Looking into monetary poverty (i.e. poverty headcount), H-HDI and poverty rate are negatively correlated. While H-HDI has been increasing over the study period in general, national poverty rate shows a decreasing trend from 2005 to 2017. In 2017, Yangon together with Mandalay and Tanintharyi had the lowest poverty rates and Rakhine had the second highest poverty rate after Chin. Therefore, in general, non-monetary and monetary proxies of human development followed the same story from 2005 to 2017. With UNDP's latest poverty projection, the headcount is estimated to have increased to 46.3% in 2022. Hence, one can assert that H-HDI would have also declined over the same period. This finding is important, because under the current data paucity in Myanmar, it may be feasible to update one and not both the indicators of development.

[23] Tables 4–7 in Appendix B provide a full breakdown of H-HDI results, including the index's subcomponents, by state/region.

Map 1

H-HDI by state and region (2005–2017)

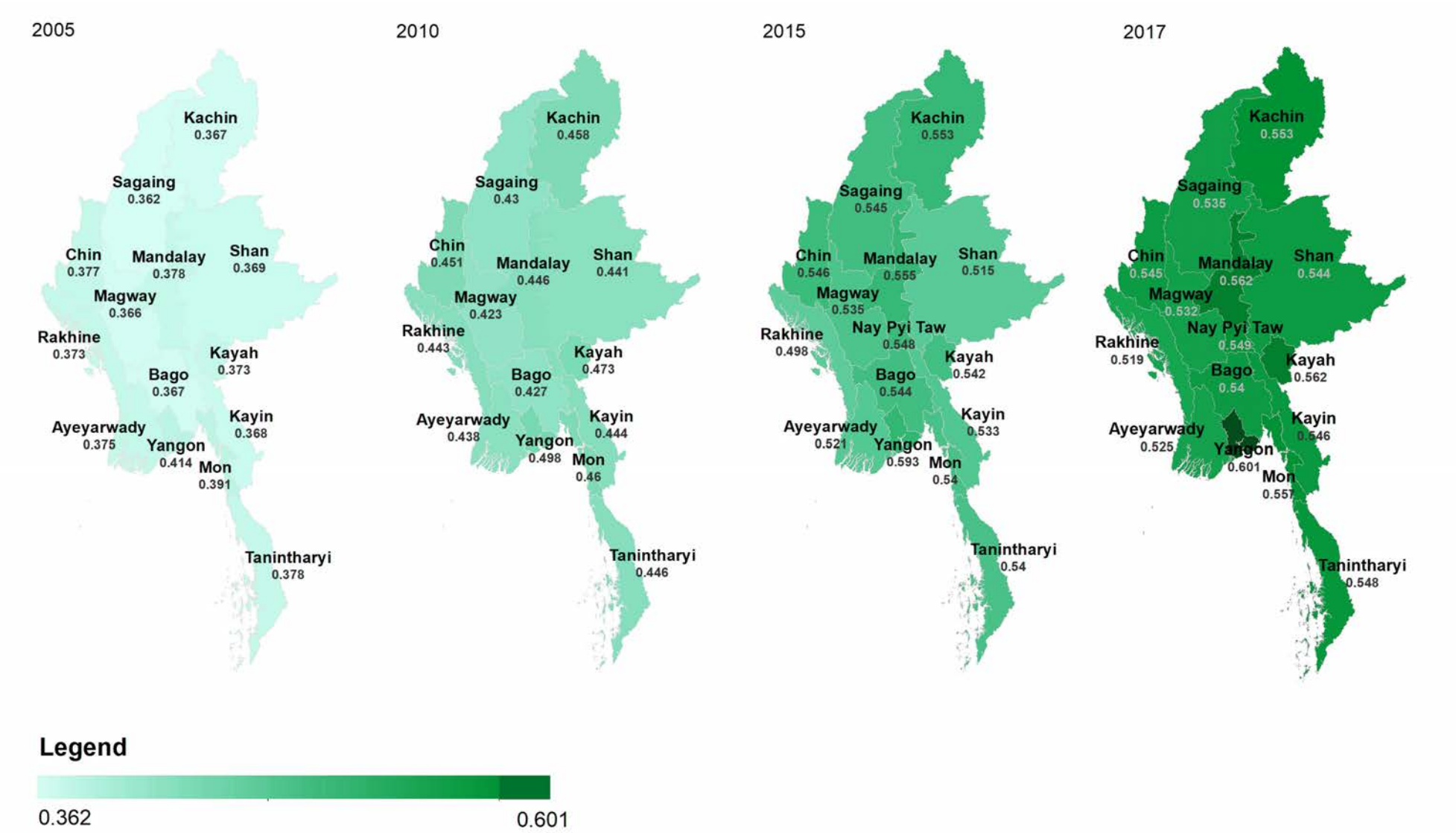


Figure 7

HHDI

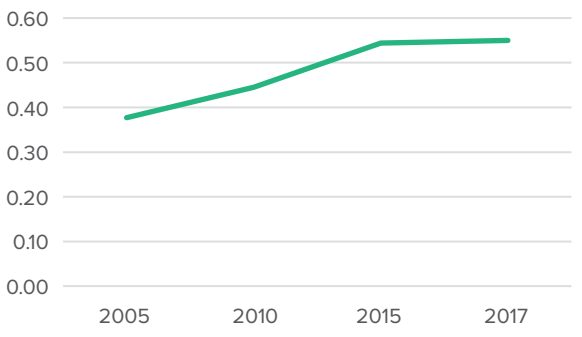


Figure 8

Poverty headcount (%)

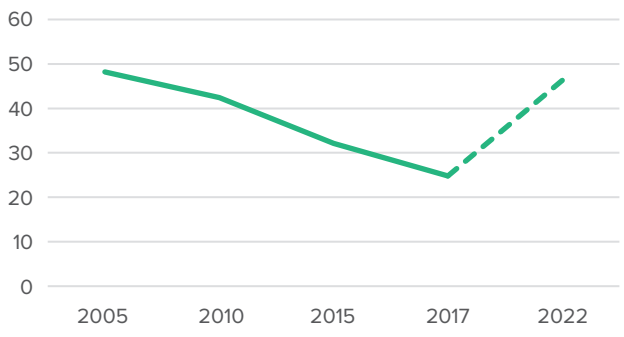
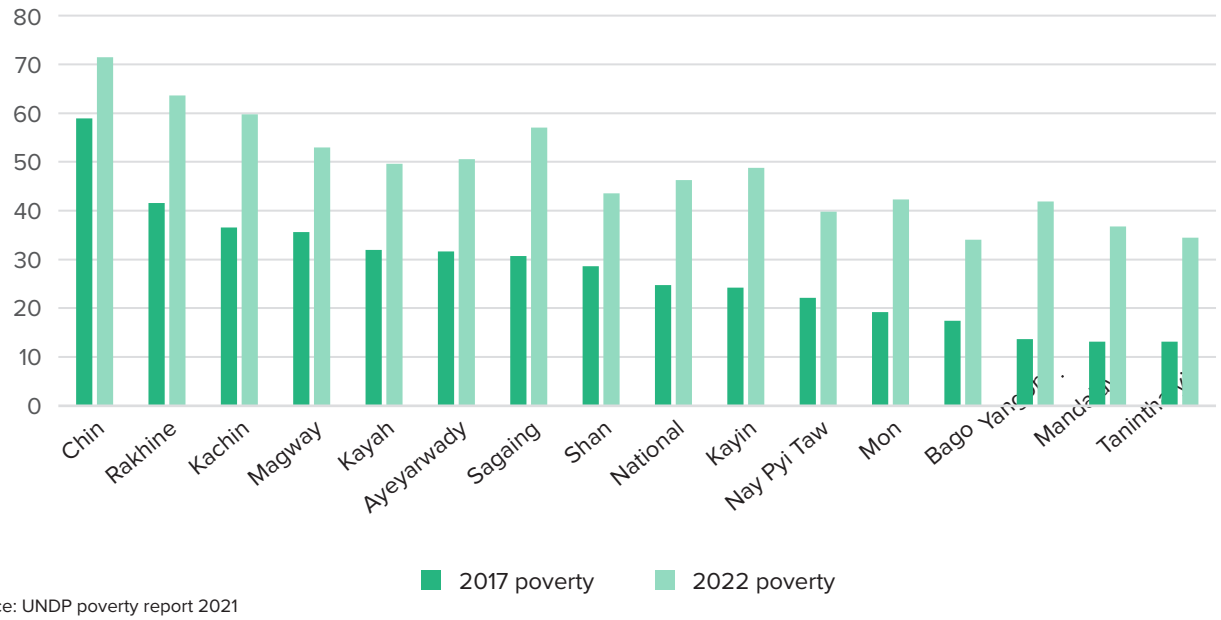


Figure 9

Poverty headcount



Source: UNDP poverty report 2021

In the earlier years, 2005 and 2010, Sagaing and Magway were the two regions that were in the bottom of the distribution (Sagaing at 0.362 and 0.430 respectively and Magway 0.366 and 0.423 respectively).

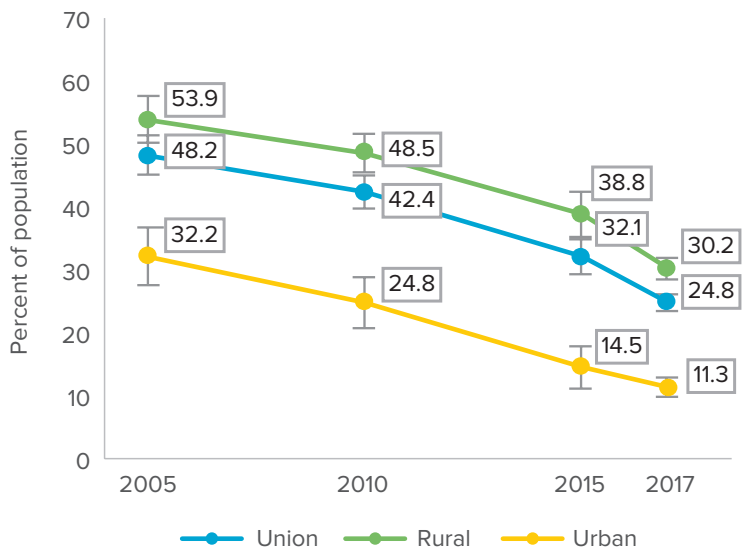
These figures provide some evidence of a growing divide between states and regions. Whereas the difference between the best and worst performing states/regions was 0.52 in 2005, this had grown to 0.82 in 2017. However, expressed in percentage terms, this trend is much more modest: whereas H-HDI was 13% lower in the worst performing state/region than the best performing in 2005, it was 14% lower in 2017. While the fact that all states/regions have achieved progress in H-HDI is positive, results are indicative of persistent inequalities between states and regions and their respective development trajectories. This evidence should serve as a prompt to policymakers to consider targeting states/regions with lower H-HDI and where development has been slower. More positively, it is worth considering what can be learnt from states/regions that have achieved above average development.

3.3 H-HDI by urban and rural areas

Figure 11 shows that H-HDI improved in both urban and rural areas from 2005 to 2015 with a slight decline in urban areas from 2015 to 2017. As expected, rural areas are worse off than urban areas with respect to human development for the four years considered.

Figure 10

Trends in poverty headcount (in percent), 2005 to 2007



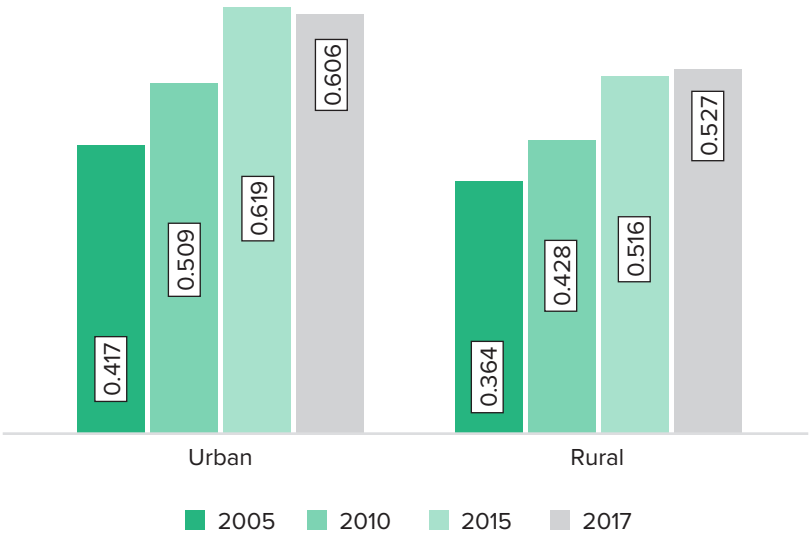
Source: UNDP poverty report 2021

Similar to the trend in H-HDI, poverty headcount in both urban and rural areas decreased from 2005 to 2017. While H-HDI of urban areas declined a little from 2015 to 2017, poverty headcount in urban areas also show a stagnating trend. Rural-urban gaps in H-HDI and poverty headcount could be explained by rural-urban disparities in access to education and health services. According to MLCS 2017, school dropout rate is higher in rural (9.7%) than in urban (7.7%). Rural areas also have lower access to any public and private health facilities (87.8% and 39.5%) compared to urban areas (91.1% and 96.1%). Growth of the service sector in general is also disproportionately high in urban regions like Yangon and Mandalay.

Of concern, however, is that the rural-urban gap increased by 52% between 2005 and 2017 (from 0.5 to 0.8), signifying a notable increase in urban-rural inequalities in human development over this period.

Figure 11

Trend in H-HDI by urban and rural areas (2005–2017)



Analysis of urban and rural H-HDI over time among states and regions reveals crucial differences across Myanmar.[24] In line with the national trend, the H-HDI is higher in urban areas in all states and regions in 2005, 2010, 2015 and 2017. However, the sizes of the increases in urban and rural growth vary significantly across states and regions, with the gaps between rural and urban areas also differing.

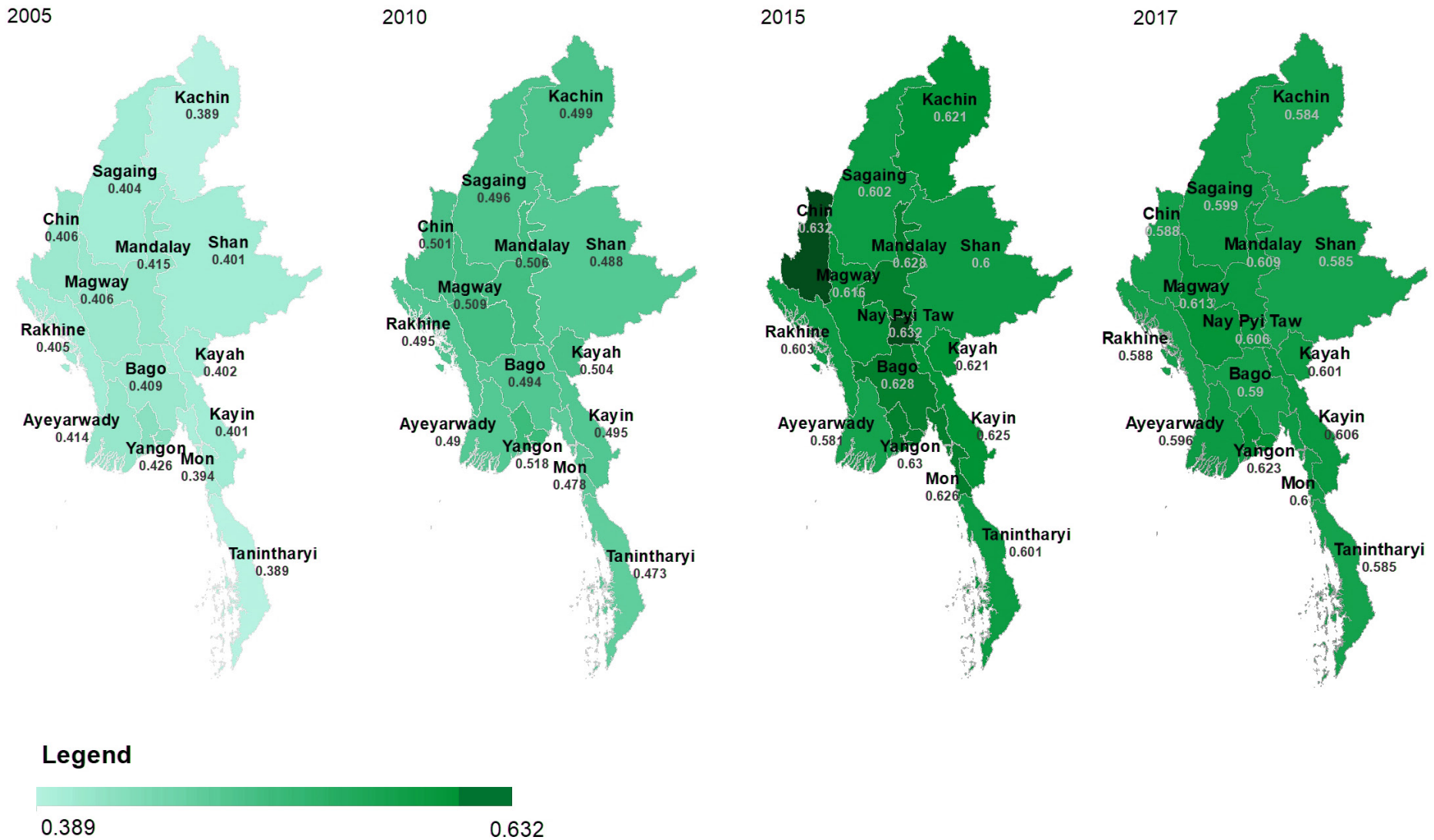
Map 2 shows urban H-HDI among states and regions for the four time periods of this study. Mon state stands out: in 2005, it had the second-lowest level of urban H-HDI; by 2017, it was the fourth highest. H-HDI among urban households in Mon increased by over 52% over this time period. Three other state/regions achieved above 50% increases over the time period: Tanintharyi, Kayin and Magway. Given Mon, Tanintharyi and Kayin's close proximity, there are perhaps important lessons to be learnt from the urban development achieved in southeast Myanmar over the 12 years. Despite this comparatively high growth, Yangon remains the state/region with the highest levels of urban H-HDI.

There is much greater variance in the increases in rural H-HDI from 2005–2017. Whereas the difference between the state/region with the biggest increase and the state/region with the smallest is 0.026 for urban H-HDI, the equivalent figure for rural H-HDI is 0.048. This greater variance provides evidence of much more uneven performance among states/regions in promoting rural development. Kayah and Kachin are the states/regions with the highest percentage increases in rural H-HDI between 2005 and 2017, at 54% and 51% respectively. The increases in Kayah are particularly noteworthy as the state has gone from having the second-lowest level of rural H-HDI to being the state with the highest level of rural H-HDI (Map 3). Conversely, Rakhine has slid down the state/region rankings and is now bottom for rural H-HDI — perhaps a reflection of ongoing conflict and the humanitarian situation within the state.

[24] Tables 8–11 in Appendix B provide the full data across residence areas 2005–2017.

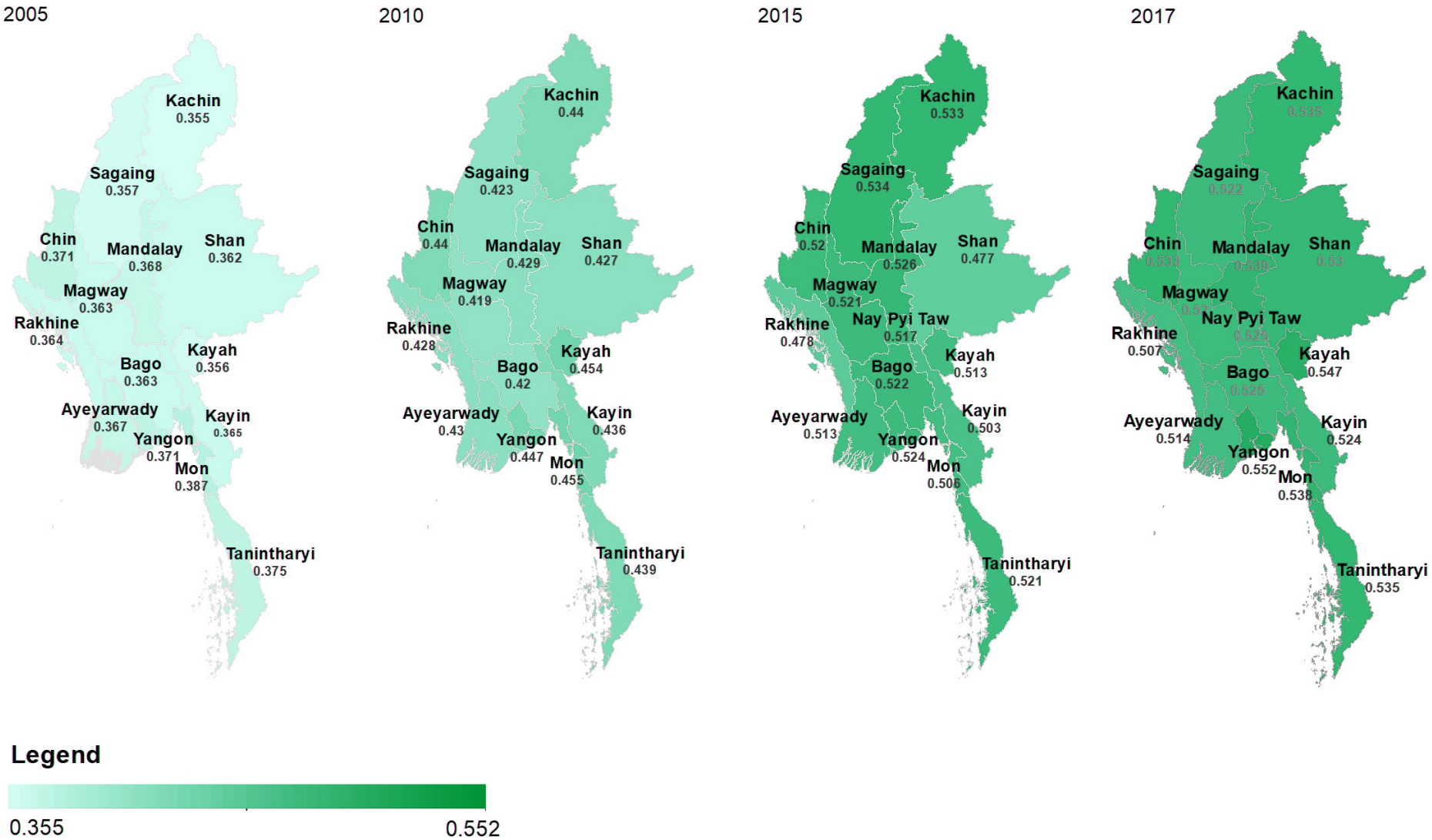
Map 2

Urban H-HDI by state/region (2005–2017)



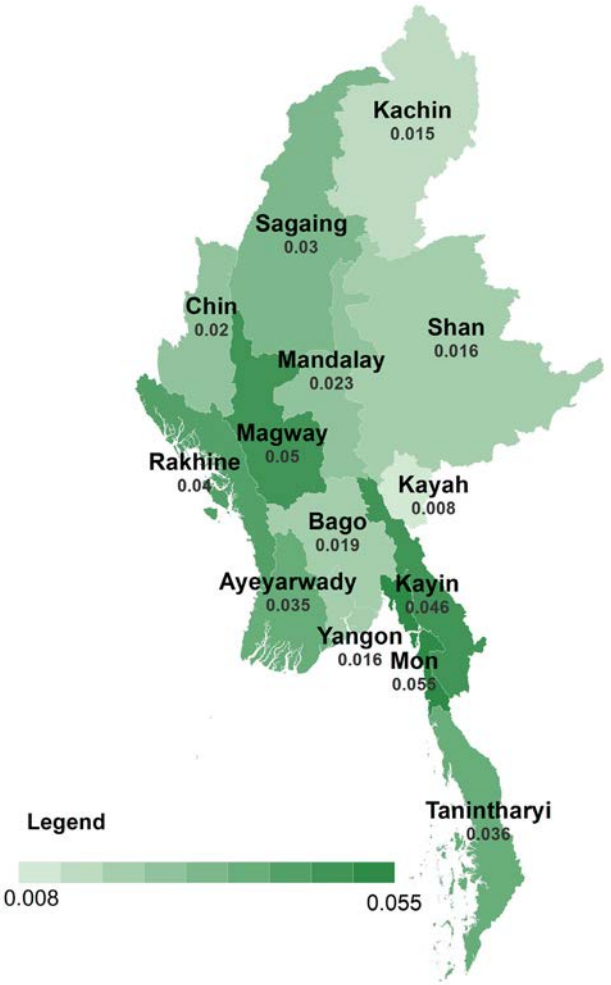
Map 3

Rural H-HDI by state/region (2005–2017)



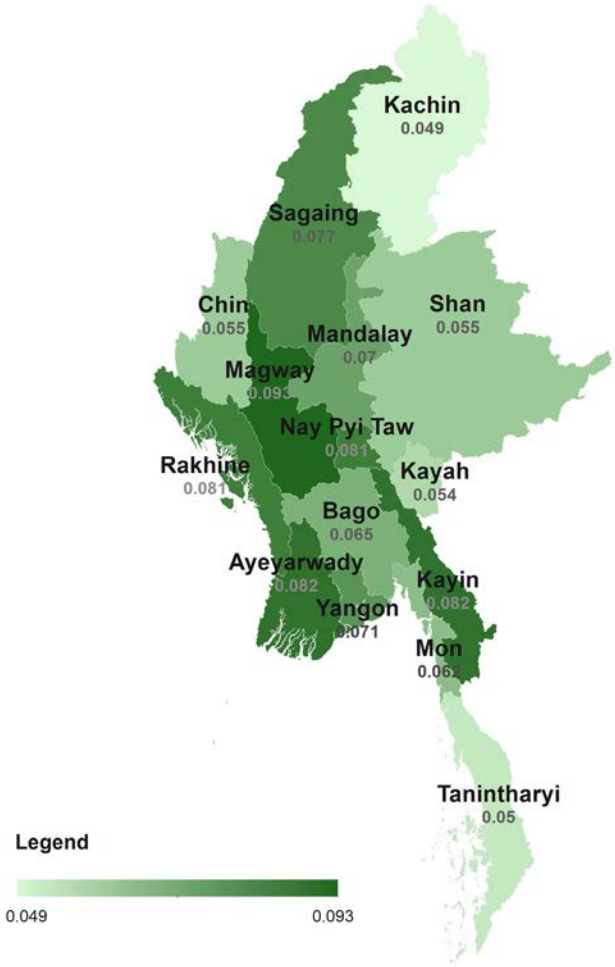
Map 4

Increase in gap between rural and urban H-HDI by state/region between 2005 and 2017



Map 5

Size of gap between rural and urban H-HDI by state/region in 2017



As shown by Map 4, the gap between rural and urban H-HDI increased in all states and regions between 2005 and 2017. However, the scale of the increases varies dramatically among states and regions. Reflecting its strong rural development, the increase in the urban-rural gap in Kachin was comparatively small at 0.003 — a 7% increase. And while its urban development is commendable, Mon state has gone from being the state with the smallest rural-urban gap at 0.007 in 2005 to having a gap of 0.062 — a near eight-fold increase in the gap over the time period.

Increases in the gap between rural and urban H-HDI over the period (2005–2017) mean that, by 2017, significant gaps were visible in all states/regions (Map 5). Balancing rural-urban development and ensuring rural areas are also able to benefit from human development is a priority for future policy and practice.

3.4 H-HDI by gender and age of the household head

There are only minor differences in H-HDI among female and male-headed households and among age groups of household head across all four years (Figure 12). The differences are smaller than those observed for the other subgroups analyzed in this study. However, it is important to note that women headed households are more likely to slide into poverty if an economic shock occurs as pointed out by UNDP's latest poverty report. A study in Sub-Saharan Africa by Nikoloski, Hill and Christiaensen (2015) reveals that female-headed households are more susceptible to food price risk. Given the significant rise in inflation (both food and non-food) in 2022, this is an area of concern.

The differences between female and male-headed household among states and regions are small and often not statistically significant. For example, in 2017, the only state/region with a statistically significant difference was Shan state (see Figure 13). The small differences mean that slight shifts between years dramatically alter rankings among state/regions, obfuscating trends. As has been demonstrated in the broader literature on gender of household heads and their associations with outcomes, there may be a high degree of heterogeneity among female-headed (and male-headed) households, with some demonstrating greater vulnerability and others greater resilience (Buvinic & van de Walle, 2019). The evidence from this study suggests individual-level (rather than household) data may be required to glean actionable insights into gender inequality in Myanmar, or a means of grouping female-headed households into subgroups for further analysis.

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Figure 12

H-HDI by gender and age of the household head (2005–2017)

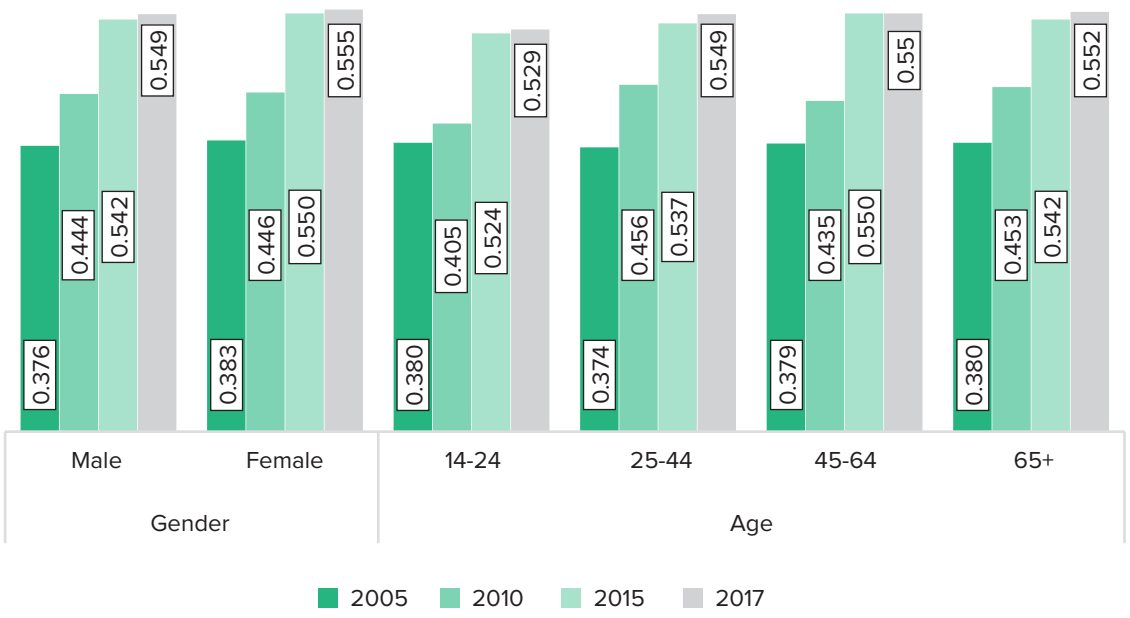
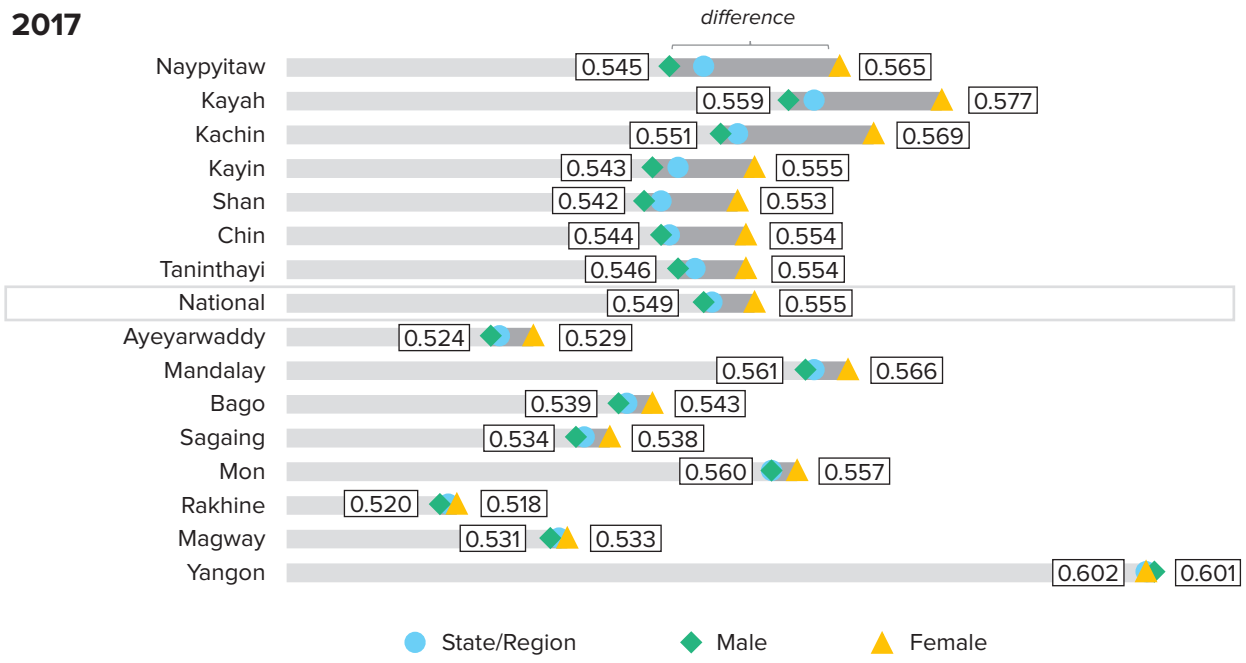


Figure 13

Differences in H-HDI between female and male headed households by state/region (2017)



Whereas the differences in H-HDI by age of household head at the national level were small, at the state and region level, these differences are much larger, with differing patterns of development in different states and regions.[25] The data for 2017, for example, provides interesting insights (Figure 14). For some states/regions, such as Kayah and Kayin, there are only small differences between age groups, whereas in Rakhine, Mandalay and Mon there are considerable differences of over 0.5 between age groups, suggesting age may be a more crucial factor associated with H-HDI in some areas over others.

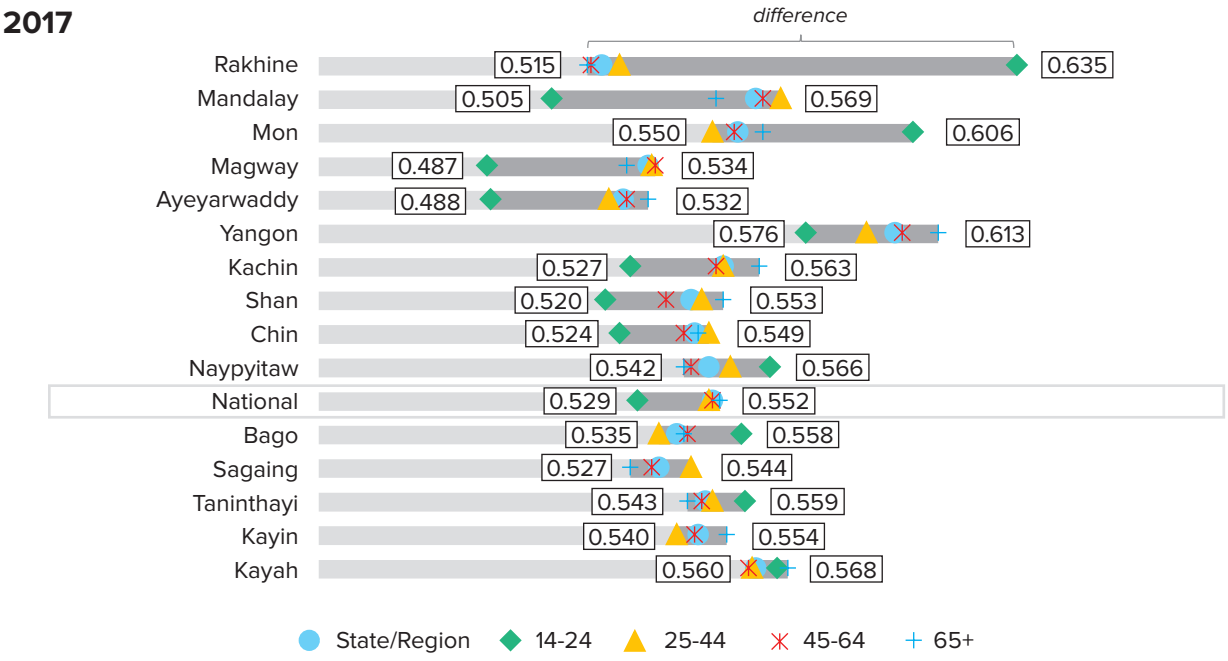
The other important insight provided by Figure 14 is that, for most state/regions, three brackets of age group of household head (25–44, 45–64 and 65+) appear to cluster around one another; it is the 14–24 age group that is the anomaly in most state/regions. For example, if we look at Rakhine — the state/region with the largest differences between age groups, there is very little variance in the older three age brackets, with the variance driven almost entirely by the 14–24 age group. The H-HDI of households headed by the 14–24 age group are, in some states and regions, significantly below the state/region average for H-HDI, whereas they are significantly above the average in others. In 2017, the two states with the highest variance by age of household head, Rakhine and Mandalay, display these contrasting patterns.

The findings of this study highlight households with younger household heads as worthy of further attention. In some states/regions, this could take a strengths-based approach, seeking to understand the reasons households with younger household heads are outperforming others. In other states/regions, the data points to a need to the potential targeting of support to households with younger household heads, who may well require additional help if they are not to be left behind by advances in human development.

[25] Tables 12–15 in Appendix B provide a full breakdown of H-HDI data by age of household head across 2005–17.

Figure 14

H-HDI by age of household head (by state/region, 2017)



3.5 H-HDI by education of the household head

There is a clear association between the human development of households in Myanmar and the education level of the household head for the assessed period. As shown in Figure 15, higher household head education levels are associated with higher levels of H-HDI for all years. The gap between households heads with the lowest level of education and those with the highest level grew between 2005 and 2010, and again between 2010 and 2015, before reducing between 2015 and 2017. Between 2005 and 2017, the gap grew by 92%.

Figure 15

H-HDI by education level of household head (by state/region, 2005–2017)

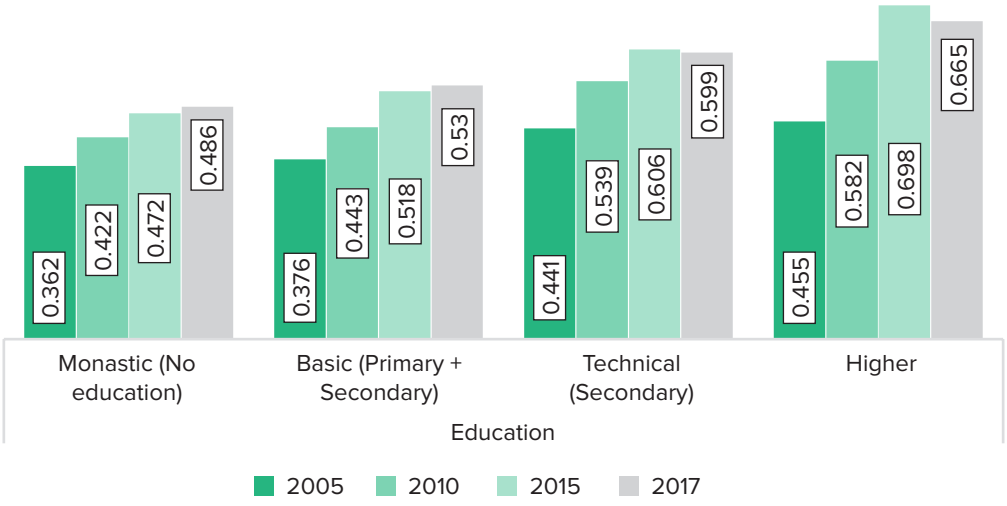
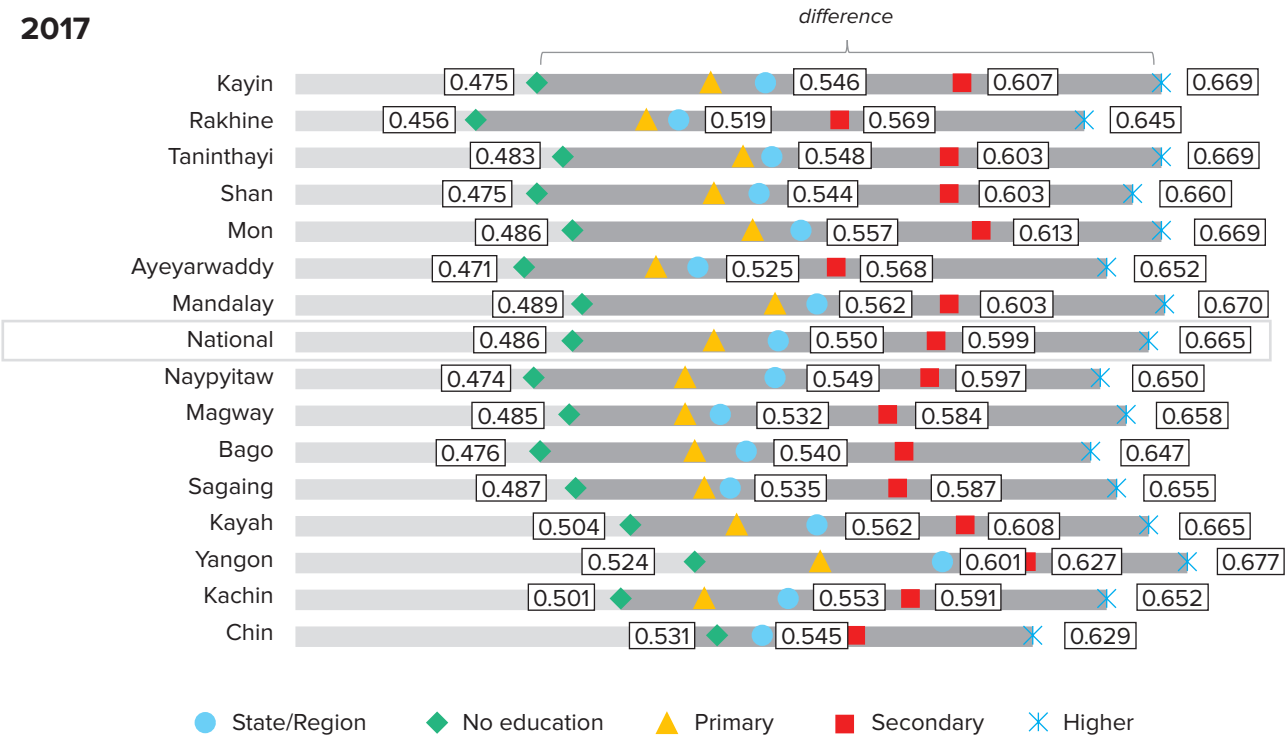


Figure 16

H-HDI by education of the household head (by state/region, 2017)



At the state/region level, the clear association between education level of the household head and H-HDI is also visible. For example, in 2017, the only exception can be seen in Chin state, where the position of the two lowest levels of education were reversed (see Figure 16). Tables 16–19 in Appendix B provide a full breakdown of H-HDI data by education level of household head across 2005–17.

The patterns observed by education of the household head highlight the importance of strengthening Myanmar's education system, with the clear benefits of education to human development. They also demonstrate a need to consider interventions that support households with the lowest levels of education, who are at risk of being left behind by future advances in science and technology.. There is a clear evidence from other research showing the link between a mother's education and her child's development as well. Skoufias and Vinha (2021) confirm that the level of education of a mother positively affects early childhood development through different channels including improved child health and nutrition. Sonalde and Soumya (1998) found a consistent negative relationship between maternal education and the probability of infant death. Ying et al. (2019) argue that mother's education increases adolescents' school enrollment and math test scores as well as improves adolescents' mental health.

4

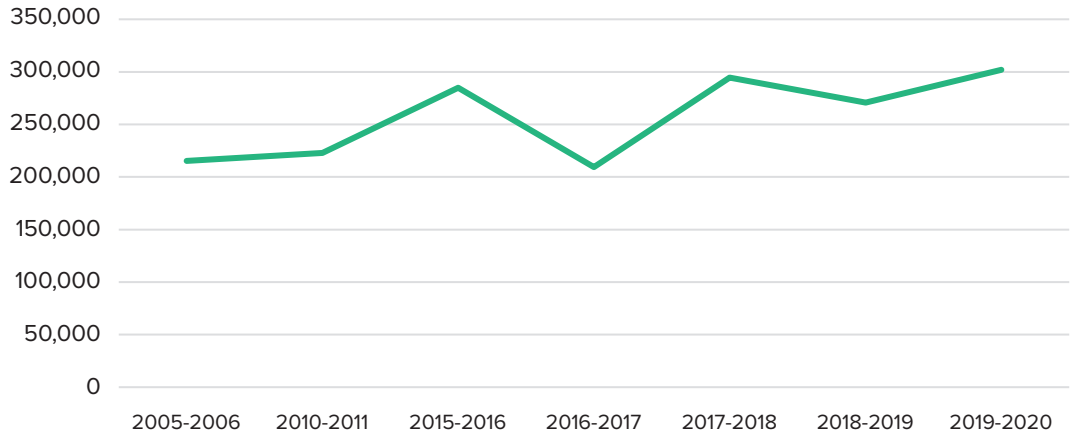
Inequalities and Polarization in Household Human Development in Myanmar

4.1 Inequalities in household human development

Table 1 reports the figures for the Gini and Theil indices from 2005 to 2017, showing changes in inequalities in H-HDI. For the overall H-HDI, inequalities in household human development grew sharply between 2005 and 2015 (36% increase by Gini and 85% increase by Theil), before falling back to near 2005 levels for both indices in 2017. While methodological differences between surveys could be one reason, the prior increases highlight the risks of unequal growth during this period of increasing human development. More importantly though, it appears that most of the H-HDI inequality is driven not by asset inequality (i.e. the proxy for income) but rather by education.

Figure 17

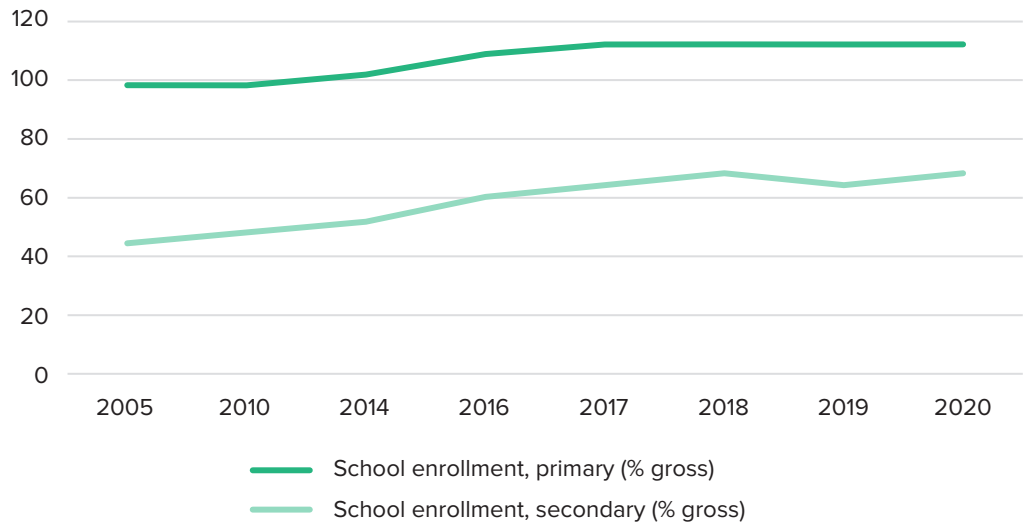
Enrollment in higher education



Source: Statistical Yearbook 2021

Figure 18

School enrollment (primary and secondary)



Source: WDI

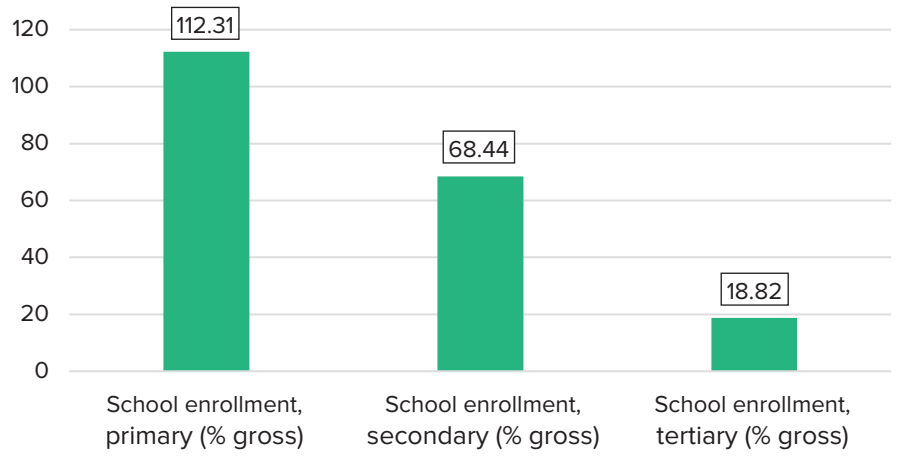
Government data shows that enrollment in higher education was consistently going up until 2015-2016 academic year and suddenly decreased to 2005-2006 level in 2016-2017 academic year. While enrollment rate in primary and secondary education shows a consistent upward trend according to WDI data, the sudden decrease of enrollment in higher education could be partly explained by the assumption that many students from wealthy households joined private colleges and universities in 2016-2017 after completing high schools, which are not covered in the government data.

WDI data shows that in 2020 gross enrollment rate in tertiary education was much lower than enrollment in primary and secondary education. This could suggest that the rich benefit disproportionately from access to higher education, while the poor are left with completing primary/basic education. This could also partly explain the polarization indexes reported in the following section.

At the indices' component level (asset, education and health), the picture becomes more complex. Both indices show a reduction in asset inequality

Figure 19

School enrollment in 2020



Source: WDI

between 2005 and 2017 (18% and 35% reductions for Gini and Theil indices respectively), with the biggest falls recorded between 2005 and 2010. Similarly, both indices identify a large increase in household education inequality between 2005 and 2010 (71% (Gini) and 183% (Theil) increases) before inequalities shrunk between 2010 and 2015 to then fall back to roughly 2005 levels in 2017. For health, the Gini index shows a significant reduction in household health inequality, falling by 57% between 2005 and 2017.

The Theil index, which allows for analysis of inequalities within and between the groups based on different socio-demographic characteristics considered in this study, sheds further light on the trends in inequality between 2005 and 2017.[26] As Table 2 shows, the between component is zero for all decompositions except for urban/rural and education of the household head. This means that the majority of total inequality is driven by inequality within groups rather than between the groups that were defined for this analysis. Phrased differently, this shows that growing inequality was a consequence of decreasing levels of *identification* within the groups, rather than increasing levels of *alienation* between the groups. Similarly, the table shows that the substantial reduction of inequality between 2015 and 2017 was driven by increasing levels of *identification*, with within group inequality falling across the different groups included in this study.

Table 1

Inequality in H-HDI over time (Gini and Theil indices, 2005–2017)

Year	H-HDI (Gini)	Asset (Gini)	Education (Gini)	Health (Gini)	H-HDI (Theil)	Asset (Theil)	Education (Theil)	Health (Theil)
2005	0.066	0.128	0.122	0.007	0.007	0.026	0.024	0.000*
2010	0.086	0.083	0.209	0.006	0.011	0.011	0.068	0.000*
2015	0.090	0.103	0.187	0.010	0.013	0.017	0.055	0.000*
2017	0.068	0.105	0.125	0.003	0.007	0.017	0.025	0.000*

* Non-zero value, this follows a rounding to 3 digits after the decimal point

[26] Tables 20–27 in Appendix B provide the full decompositions of the Theil index and group polarization for the H-HDI at both national and state/region levels.

Table 2

Decomposition of the Theil index

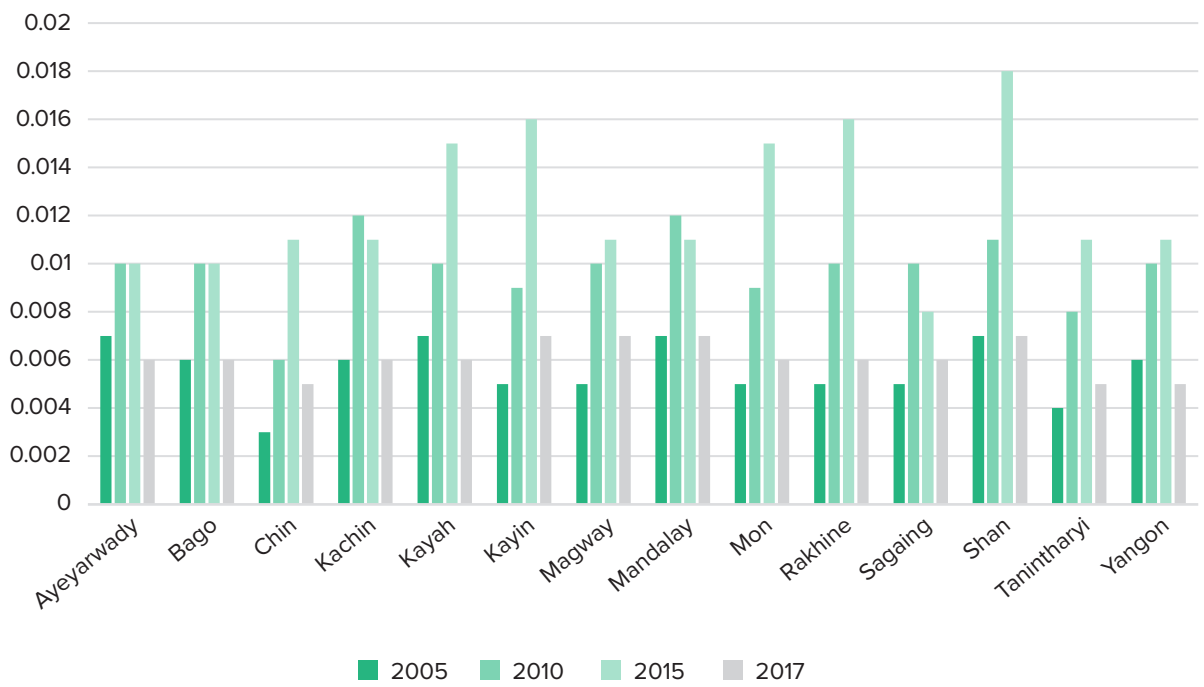
		2005	2010	2015	2017
Residence area (Urban/Rural)	Within	0.005	0.009	0.009	0.005
	Between	0.002	0.003	0.004	0.002
Gender (Female/Male)	Within	0.007	0.011	0.013	0.007
	Between	0.000*	0.000	0.000*	0.000*
Education of the head**	Within	0.006	0.01	0.007	0.004
	Between	0.001	0.001	0.006	0.003
Age of the head**	Within	0.007	0.011	0.013	0.007
	Between	0.000*	0.000*	0.000*	0.000*
Household size**	Within	0.007	0.011	0.013	0.007
	Between	0.000*	0.000*	0.000*	0.000*

* Non-zero value, this follows a rounding to 3 digits after the decimal point; ** Multigroup polarization.

Figure 20 shows the changes in inequality (as measured by the Theil index) at the state and region level. While the national pattern of increases in inequalities between 2005 and 2015 followed by a shrinking of inequalities between 2015 and 2017 holds true for most states and regions, in Kachin, Mandalay and Sagaing, inequality peaked in 2010, before subsequently falling. The size of the growth in inequalities varies significantly among states and regions. Whereas inequality in Ayeyarwaddy and Mandalay grew by only 43% and 57% respectively between 2005 and 2015, inequality in Chin increased 266% and in Rakhine and Kayin by 220%. This finding warrants further investigation, including consideration of whether there are identifiable lessons in achieving inclusive growth that can be learnt from areas that were better able to prevent rapidly growing inequality.

Figure 20

Trends in inequalities at state and region level over time (Theil index)



4.2 Polarization in household human development

Table 3 shows the results of the Kanbur-Zhang index, which measures polarization, by residence area (urban/rural), by gender, age, and education of the household head, and by household size.[27] Increasing polarization across two dimensions stand out: between rural and urban households, and by education level of the household head. From a starting point of comparatively high polarization, there was a 23% increase in polarization between rural and urban households between 2005 and 2017. Polarization by education level of the household increased more than fivefold over the same time period, suggesting level of education is becoming an increasingly important determinant of differentiated prospects of households – a recipe for conflict.

Building off the findings of chapter 3, which highlighted this potential uneven growth between urban and rural households and by level of education of the household head, the Kanbur-Zhang index emphasizes the need for policymakers to ensure sustainable and inclusive growth, so that those households in rural areas and those with lower education levels benefit from advances in human development.

Table 3

Polarization in household human development (Kanbur-Zhang index, 2005–2017)

	2005	2010	2015	2017
Residence area (Urban/Rural)	0.35	0.327	0.39	0.429
Gender of household head (Female/Male)	0.003	0.000	0.002	0.001
Education of the household head*	0.166	0.147	0.84	0.887
Age of the household head*	0.004	0.022	0.005	0.001
Household size*	0.01	0.002	0.002	0.002

* Multigroup polarization.

[27] Tables 20–27 in Appendix B provide full data for Kanbur-Zhang calculations.

5

Conclusion and Way Forward

The study captures the trend of disparities in H-HDI in the recent past, identifies primary drivers of well-being and the transmission channels of various sectoral outcomes on overall well-being. The last comprehensive national household survey was conducted in 2017 (MLCS 2017) by The Central Statistical Organization and UNDP. Since then, there has been no comprehensive update of the same; however, smaller, thematic surveys both by UNDP and other partners enabled us to make certain robust projections on the change of the H-HDI and its components especially after the pandemic and the coup. These were articulated in the executive summary. UNDP, in collaboration with The Asia Foundation and close consultation with its donor partners has launched a nation-wide survey of the Myanmar people (SOMP) which will allow a rigorous update of all the metrics provided in this study later in the year.

For decades, Myanmar's diverse population of 53 million were prevented from reaping the social and economic dividends of the country's strategic location and wealth of natural resources. Authoritarian rule, weak economic management and multiple internal armed conflicts meant Myanmar's human development was low, lagging behind regional neighbors (UNDP, 2015). The systematic social exclusion of much of Myanmar's population — including women and girls, ethnic and religious minorities, and the urban and rural poor, among others — lay at the heart of the country's unmet development potential.

The two decades prior to COVID 19 and the coup were marked by significant political, economic and social change in Myanmar. These changes came to be characterized as a "triple transition": a gradual move from military to civilian rule, conflict to peace and planned to open market economy (World Bank, Myanmar, Economic transition amid conflict: A systematic country diagnostic, 2019). The transitions remained incomplete, however, with their effects felt unevenly across Myanmar's population which this study elaborated upon.

The political context against which the changes took place between 2005 and the present may be useful and is summarized very briefly below with the caveat that a fully political-economy analysis of the country is beyond the scope of this study.

In 2005 and 2010, the first two of the four years for which this report measured the H-HDI, Myanmar was ruled by the military government of the State Peace and Development Council (SPDC). As with its predecessors, the SPDC prevented meaningful political participation, met dissent with indiscriminate violence, and maintained the military's stranglehold on the economy.

Economic mismanagement under the SPDC included the overnight 500% increase in the price of gas in 2007, which catalyzed the "Saffron Revolution" of the same year, in which protests spread across many urban areas of the country. The protests were met with a crackdown by security forces, including widespread arrests. The military continued large-scale offensives in contested areas, such as against the Karen National Liberation Army in the southeast of the country.

In 2008, Cyclone Nargis demonstrated the precariousness of life in many rural communities and exemplified the poor governance and disregard for the general populace that characterized the SPDC regime. The SPDC was criticized for its slow response, the blocking of aid to affected areas and for pressing ahead with planned constitutional referendum — through which the military-drafted 2008 Constitution, which aimed to create a "discipline-flourishing democracy," was rubber stamped.

The 2008 Constitution came into force in January 2011, establishing a territorial administrative system comprising seven states and seven regions, with the former according with areas where minority ethnic groups constitute the majority of population, and the Union Territory of Nay Pyi Taw, the country's capital. In addition to the Union government, 14 new state/region governments were established. A further five self-administered zones and one self-administered division were established with additional but limited powers of local administration, covering a small number (18) of townships.[28]

The 2008 Constitution enshrined the role of the military across sectors and levels of government, such as the requirement that 25 percent of seats in parliaments be reserved for serving military appointees. In many parts of the country, the Union government's authority remained nominal, with as many as one third of Myanmar's 330 townships under contested control (Burke, 2017). In some areas, the same ethnic armed organization (EAO) served as an alternative government for decades, with parallel systems of governance, revenue sharing and service delivery.

From 2011–2015, Myanmar was ruled by the government of Thein Sein and the military-aligned Union Solidarity and Development Party. By 2015, this report's third year of measurement of human development, Myanmar had undergone notable efforts at economic and political liberalization. Economic reforms included banking and telecom sector liberalization, and foreign exchange and foreign investment reform. The Aung

[28] For a full explanation of governance arrangements under the 2008 Constitution see (Batcheler, 2018).

San Suu Kyi-led National League for Democracy (NLD) was encouraged to work within the constitution (with the party contesting the 2012 by-elections), political prisoners were released, modest efforts to relax press censorship were pursued, and legal reforms allowed growing space for civil society to operate. Thein Sein also pursued new efforts aimed at peace, with eight EAOs signing the Nationwide Ceasefire Agreement (NCA) in 2015. Many EAOs did not sign the agreement, with fighting continuing and intensifying in some areas, particularly the northeast of the country.

A particular dimension explored in the study is that of polarization which is strongly associated with societal unrest and conflict in countries. Polarization measures can be several; in this study we used the Kanbur-Zhang index highlighting two important aspects of human psychology, viz., alienation and identification and found a rising trend of the indicator between rural and urban areas both at the national as well as individual state/region levels.

The 2005 to 2015 period saw an 85% increase in inequality as measured by the Theil index - before falling back to near-2005 levels in 2017. This trend – rise followed by fall – was predominantly driven by changes in within-group inequalities rather than between-group inequalities, with a significant reduction in levels of *identification* (i.e., rise in the within group component of total inequality) among socio-demographic groups analyzed in this study between 2005 and 2015. However, between 2015 and 2017 within group inequalities fell sharply, leading to a rise in polarization through the identification channel.

Between 2005 and 2017, household-based human development increased markedly, by 46%. We showed the extent to which these advances were unevenly shared among households, identifying those at greater risk of being *left behind* and finding concerning evidence of increasing polarization among households. The latter is well-documented in the development-economics literature as a key driver of a conflict-prone society.

The 2015 general elections saw a landslide victory for the NLD, with the party coming to power in April 2016. By 2017, this report's final year of measurement of H-HDI, further limited efforts at political and economic reform had been undertaken, such as the Myanmar Investment Law. The NCA-centered peace process was replaced by the Union Peace Conference – 21st Century Panglong, through which Aung San Suu Kyi intended to entice a greater number of armed groups into a more sustainable peace agreement with the Union government. However, progress was slow and conflict once again intensified in parts of the country. It is worth noting that the period also coincides

with a rise in polarization through the identification component. The limits of reform and ostensible civilian government were revealed in 2017, when Myanmar security forces launched an unprecedented campaign of targeted violence against the Rohingya, with more than 750,000 people forced to flee across the border to Bangladesh.

Myanmar's remarkable diversity and complex development history provide strong impetus for evidence and analysis that disaggregates data beyond national averages and helps to provide an understanding of human development at local levels and among specific population groups. Building this understanding became even more pressing following the events of February 2020, which may risk many of Myanmar's recent gains. Evidence is needed that informs interventions in respect to both targeting and resource allocation across sectors and locations to minimize and regression in the gains. This study fills that information gap.

The study serves as a proof of concept for the household-based approach to human development in Myanmar. The approach is effective in illuminating differences among households by location (both state/region and urban/rural), as well as by education-level of household head. The economic growth and advances in human development Myanmar experienced during the period of economic and political liberalization from 2005–2017 are commendable, changing the lives and prospects of many within the country. The onset of crises since the pandemic started in 2020 followed by the political upheaval derailed this process. It is time to resurrect the socio-economic status of the country and to build back better. In that regard, this study serves as a cautionary tale for policymakers and practitioners seeking to support sustainable development. It is clear that rural households, those with lower levels of education, and those in particular state/regions identified in the study were, and continue to be, at much greater risk of not benefiting from Myanmar's development. They are also the ones to be affected more adversely by the ongoing crises.

But there are also positive lessons to be learnt. Adopting a strengths-based approach, stakeholders can learn lessons from, for example, the extraordinary urban growth in southeastern Myanmar, the states/regions that were better able to avoid rapidly-escalating

inequalities, and from the households, such as those headed by 14–24-year-olds, which were able to buck the trends observed in other state/regions and develop at a faster rate than others. These lessons — positive and cautionary — are all the more pertinent following the military takeover of February 2021. In the current context of rapidly rising poverty rates, the study helps identify households that may be less able to weather rising food prices and the collapse in public services. Looking to the future, and in a divided country rife with conflict, the study also emphasizes the need to avoid further polarization, so that all may benefit from future development with one of the key economic drivers of conflict monitored and managed.

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Appendix A: Calculating H-HDI

Calculating the asset index

We simulate income levels for each household in the DHS/IHLCA datasets to overcome problems surrounding the absence of information on income and expenditure within the DHS/IHLCA. The following steps explain the procedure to obtain the household-based HDI asset component.

Step 1 We calculate an asset index

$$A_i = \hat{\gamma}_1 a_{i1} + \cdots + \hat{\gamma}_n a_{in}$$

where A_i is the asset index, the a_{in}'s refers to the respective assets of the household i recorded as dichotomous variables in the DHS/IHLCA datasets. There are respective weights for each asset that are to be estimated.

For the estimation of the weights and aggregation of the index, we use a principal component analysis proposed by Filmer and Pritchett (Filmer & Pritchett, 2001), relying on the first principal component as our asset index. As components for the asset index, we include dichotomous variables whether the assets in Table exist or not in a household which capture household wealth.

ILHCA 2005	ILHCA 2010	DHS 2015
q610 01 Agricultural land (number of plots)	q610 01 Agricultural land (number of plots)	hv206 has electricity
q610 02 Buildings for agricultural use	q610 02 Buildings for agricultural use	hv207 has radio
q611 01 Tractor	q611 01 Tractor	hv208 has television
q611 02 Tractor dishes (3/ 4 dishes)	q611 02 Tractor dishes (3/ 4 dishes)	hv209 has refrigerator
q611 03 Tractor harrow (16/ 18 numbers)	q611 03 Tractor harrow (16/ 18 numbers)	hv210 has bicycle
q611 04 Tractor operated cultivator/ intercultivator	q611 04 Tractor operated cultivator/ intercultivator	hv211 has motorcycle/scooter
q611 05 Tractor operated other implementations	q611 05 Tractor operated other implementations	hv212 has car/truck
q611 06 Power tiller	q611 06 Power tiller	hv227 has mosquito bed net for sleeping
q611 08 Diesel/ petrol engine	q611 08 Diesel/ petrol engine	hv243a has mobile telephone
q611 09 Dynamo	q611 09 Dynamo	hv243b has watch
q611 10 Harvester (motorized or mechinical)	q611 10 Harvester (motorized or mechinical)	hv243c has animal-drawn cart
q611 11 Thresher (motorized or mechinical)	q611 11 Thresher (motorized or mechinical)	hv243d has boat with a motor
q611 12 Water pump (motorized or mechinical)	q611 12 Water pump (motorized or mechinical)	hv244 owns land usable for agriculture
q611 13 Sprayer (motorized or mechinical)	q611 13 Sprayer (motorized or mechinical)	hv246 owns livestock, herds or farm animals
q611 15 Rice mill or huller	q611 18 Animal pulled stock of plough	hv246a owns cattle
q611 16 Cooking oil mill	q611 19 Ploughshare	hv246b owns cows/ bulls
q611 17 Groundnut-shell huller	q611 20 Animal pulled harrow	hv246c owns horses/ donkeys/ mules
q611 18 Animal pulled stock of plough	q611 21 Animal pulled rotary harrow or pulverizer	hv246d owns goats
q611 19 Ploughshare		hv246e owns sheep
		hv246f owns chickens/poultry
		hv246g owns pigs

ILHCA 2005	ILHCA 2010	DHS 2015
q611 20 Animal pulled harrow	q611 22 Animal pulled harvester/ thresher	hv246h owns ducks
q611 21 Animal pulled rotary harrow or pulverizer	q611 24 Sickle	sh110g has table
q611 22 Animal pulled harvester/ thresher	q611 25 Hand harrow	sh110h has chair
q611 24 Sickle	q611 26 Hoe	sh110i has sofa
q611 25 Hand harrow	q611 27 Hand thresher	sh110j has bed
q611 26 Hoe	q611 28 Fork	sh110k has cupboard
q611 27 Hand thresher	q611 29 Rake	sh110l has electric fan
q611 28 Fork	q611 30 Hand sprayer	sh110m has air conditioner
q611 29 Rake	q611 31 Hand water pump	sh110n has sewing machine
q611 30 Hand sprayer	q612 01 Buffalo	sh118f has tuk tuk/htawlargyi
q611 31 Hand water pump	q612 02 Oxen/ cow	sh118h has bot without motor
q612 01 Buffalo	q612 03 Horse, donkey, mule	
q612 02 Oxen/ cow	q612 04 Elephant	
q612 03 Horse, donkey, mule	q612 05 Goat	
q612 04 Elephant	q612 06 Sheep	
q612 05 Goat	q613 01 Land used for non-agric. business (numbers of plot)	
q612 06 Sheep	q613 02 Buildings used for non-agric. business	
q613 01 Land used for non-agric. business (numbers of plot)	q613 03 Machinery for non-agricultural business	
q613 02 Buildings used for non-agric. business	q613 04 Furniture for non-agricultural business	
q613 03 Machinery for non-agricultural business	q613 06 Other fishing equipment (excluding boat)	
q613 04 Furniture for non-agricultural business	q620 01 Other housing (aside from main dwelling)	
q613 06 Other fishing equipment (excluding boat)	q620 02 Land for housing (except land with dwelling)	
q620 01 Other housing (aside from main dwelling)	q620 03 Cupboard	
q620 02 Land for housing (except land with dwelling)	q620 04 Settee (numbers of set)	
q620 03 Cupboard	q620 05 Sewing machine	
q620 04 Settee (numbers of set)	q620 06 Emergency lamp	
q620 05 Sewing machine	q620 07 Battery	
q620 06 Emergency lamp	q620 08 Electric inverter	
q620 07 Battery	q620 09 Regulator/ Step up transformer	
q620 08 Electric inverter	q620 10 Generator	
q620 09 Regulator/ Step up transformer	q620 11 Gas stove	
q620 10 Generator	q620 12 Charcoal stove	
q620 11 Gas stove	q621 01 Hot plate	
q620 12 Charcoal stove	q621 02 Electric stove	
q621 01 Hot plate	q621 03 Rice cooker	
q621 02 Electric stove	q621 04 Electric fan	
q621 03 Rice cooker	q621 05 Electric iron	
q621 04 Electric fan	q621 06 Refrigerator	
q621 05 Electric iron	q621 07 Air conditioner	
q621 06 Refrigerator	q621 08 Washing machine	
q621 07 Air conditioner	q622 01 Pocket radio	
q621 08 Washing machine	q622 02 Radio-cassette (without CD player)	

ILHCA 2005	ILHCA 2010	DHS 2015
q622 01 Pocket radio	q622 03 Stereo/ Hi-Fi cassette (with CD player)	
q622 02 Radio-cassette (without CD player)	q622 04 Black & White TV	
q622 03 Stereo/ Hi-Fi cassette (with CD player)	q622 05 Color TV	
q622 04 Black & White TV	q622 06 Satellite dish (any type)	
q622 05 Color TV	q622 08 VCD/DVD player	
q622 06 Satellite dish (any type)	q623 01 Computer (any type)	
q622 08 VCD/DVD player	q623 02 Typewriter	
q623 01 Computer (any type)	q623 03 Line telephone equipment	
q623 02 Typewriter	q623 04 Mobile/cellular phone equipment	
q623 03 Line telephone equipment	q624 01 Bicycle	
q623 04 Mobile/cellular phone equipment	q624 04 Motorcycle	
q624 01 Bicycle	q624 05 Motorcar (4 Wheels)	
q624 02 Trishaw	q624 07 Boat	
q624 03 Cart (any) for non-agri use		
q624 04 Motorcycle		

MLCS 2017	
Rechargable car battery	Computer
Dry cell battery	Printer
Electric inverter	Smart Mobile phone
Generator	Non smart mobile phone
Gas stove	Bicycle
Charcoal stove	Motorcycle/moped/tuk tuk/e-bike
Regulator	Car
Bed Stead	Tractor
Table	Tractor plough (3/ 4 dishes)
Chair	Tractor harrow (16/ 18 numbers)
Sofa/settee	Tractor operated cultivator/intercultiv
Shrine	Tractor operated other implements, such
Wardrobe	Power tiller
Kitchen Cupboard	Other implementations operated by power
Hot plate	Diesel/ petrol engine for agriculture u
Electric pan	Combined Harvester (mechanical)
Rice cooker	Thresher (mechanical)
Electric iron	Water pump (mechanical)
Electric fan/ Air cooler	Sprayer (mechanical)
Refrigerator/ Deep freezer	Other motorized or mechanical implement
Washing machine	Bullock cart
Air conditioner	Animal pulled plough stalk
Radio	Ploughshare
CD player	Animal pulled harrow
Colour TV	Animal pulled rotary harrow or pulveriz
VC/DVD player	Animal pulled harvester/ thresher
Loudspeaker	Other animal pulled implements
Stereo speakers	Own livestock
Own land	

Step 2 We derive a log normal distribution (LN) based on the respective country specific mean income (GDP) per capita and the respective Gini coefficient obtained from PovcalNet.

$$LN(\mu,\sigma) = f(x;\mu,\sigma) = \frac{1}{x\sigma\sqrt{2\pi}}\, e^{\frac{-(\log(x)-\mu_i)^2}{2\sigma^2}}, \qquad x > 0,$$

The parameters μ and σ of LN(μ, σ) can be determined from the average income *E(Y)* and the Gini coefficient G as follows.

$$\sigma = \sqrt{2}\phi^{-1}\left(\frac{G+1}{2}\right), \;\; \mu = \log\big(E(Y)\big) - \frac{\sigma^2}{2}$$

Where Φ is the distribution function of the standard normal distribution, E(Y) is the average income and G is the Gini coefficient.

The Gini indices used in this report are those estimated by Warr (Warr, 2019).

Step 3 We simulate household income per capita based on the asset index distribution. We note the assumption that the asset index follows a log normal distribution holds and that the estimated income distribution closely follows the asset index distribution.

Step 4 We calculate the household specific GDP component of the HDI. To eliminate differences in price levels across countries we express household income per capita Y_h calculated from the HIS, in USD PPP using the conversion factors based on price data from the latest International Comparison Program surveys provided by the World Bank (2005).

$$y_h^{ppp} = y_h \times PPP$$

Then, we rescale using the ratio between and GDP per capita expressed in PPP.

$$ry_h^{ppp} = y_h^{ppp} \times \left[\frac{GDPPC^{ppp}}{\bar{y}^{ppp}}\right]$$

Step 5 Finally, we calculate the household specific asset index, using the usual minimum and maximum values of the HDI

$$Y^h = \frac{log r\bar{y}_h{}^{ppp} - \log(163)}{\log(108{,}211) - \log(163)} \;\; \forall\, h = 1,2,\ldots,K$$

Where $ry_h^{\bar{}\,ppp}$ is the household specific arithmetic mean of the rescaled household income per capita.

Calculating the education index

We calculate the education index of the HDI at the household level. The education index is composed of the mean year of education of adults aged 25 years or older and the expected years of education of children at each level of education of the official school age.

To calculate the mean years of education of adult household members aged 25 or older we take the average years of education received by all household members 25 years of age or older. We use hv108 from DHS, i.e. Education in single years.

The expected years of education for children at a schooling age measures something like the school life expectancy and is defined as the total number of years of schooling that a child of a given age can expect to achieve, assuming that the current enrolment rates do not change over time.

The data constraint faced when calculating the education index is that enrollment information is only available for households that have school-aged children. We address this problem by employing an imputation-based approach.

Step 1 We prepare data at the member level (individuals younger than 24 years). Subsequently, we run an ordinary least squares regression to show how the explanatory variables fit the model at the individual level and use an imputation-based approach to fill the missing values of enrolment. We predict the enrolment rate for every group age and gender combination fitting the model with household specific variables such as: urban site, female headed household, household size, number of children at home, asset index, head of household education. We use the multiple imputation method to impute the hh enrollment rate for the household without children. To keep the calculation time manageable, we set the number of imputations to derive the missing values to 5. We generate age group enrollment rate by averaging enrollment rate for male and female weighted by the population distribution of males and females. Then, we aggregate data at the household level to obtain the enrollment rate at the household level. School life expectancy is the sum of all children that are enrolled in school by age group.

Variable homogenization between IHLCA, DHS and MLCS

Variable name in code	Variable definition	IHLCA 2005 and IHLCA 2010	DHS 2015	MICS 2017
hv121_	member that attended school during current school	q31002 "Is [NAME] currently attending school?"	HV121 Household member attended school during the current school year.	s2q06 Is [NAME] enrolled in school during the current school year?
hhhnoedu	=1 if head of household has no educationfloat	q32001 "Have you ever attended any type (public/ private/ monastic) of school? (Adult)"	HV109 Educational attainment recodes the education of the household member into the following if HV109=0	hhhnoedu=1 if s1q02==1 (Is [NAME] currently attending school?) & s2q05==0 (What is the highest grade/level successfully completed by [NAME]? NONE) | s2q05==18 (What is the highest grade/ level successfully completed by [NAME]? MONASTIC/ RELIGIOUS)
adult_edu_ mean	average education level of household member older than 25 years	=9 if q32008==1 (Less than high school) =11 if q32008==2 (High school diploma) =10 if q32008==3 (Technical diploma) =16 if q32008==4 (Post-secondary diploma) =15 if q32008==5 (Bachelor degree) =17 if q32008==6 (Post-graduate degree) where q32008 "What is the highest degree that you have completed?"	HV108 Education in single years. This variable is constructed from the educational level (HV106) and the grade at that level (HV107) as follows: HV106 = > HV108 0 = > 20 1 = > HV107 2 = > HV107+x 3 = > HV107+y 9 = > 99 x = years to complete primary education y = years to complete primary and secondary education where both x and y are country-specific.	adult_edu_mean=s2q05+1 (What is the highest grade/ level successfully completed by [NAME]?)

Step 2 Calculate the household-specific adult literacy index A^h and gross school enrolment index G^h using the corresponding usual minimum and maximum values employed in the HDI.

$$A^h = \frac{a^h - 0}{a^{max} - 0} \; \forall \, h = 1,2, \dots, K$$

$$G^h = \frac{g^h - 0}{g^{max} - 0} \; \forall \, h = 1,2, \dots, K$$

Where a^h refers to the household specific enrollment rate and g^h to the household specific average adult education level. We also suggest normalizing the sub-index between 0 and the maximum level of enrollment/adult education.

Step 3 Lastly, the education component is calculated as the geometric mean of the two educational sub-indices.

$$E^h = \sqrt{\frac{(A^h \times G^h) - 0}{0.951 - 0}}, \qquad \forall \, h = 1,2, \dots, K$$

School age (age at start of school year): The Myanmar school year starts in June. The child's age in June determines if they start school that year. For example, a child that is 10 years and 1 month old when interviewed in July will have been 9 years old in June. For this child "age"=10 and "schoolage"=9. With the MICS 2017 database, a variable "schoolage" was obtained by calculating the duration of the school year in months so far at the time of the interview. Next, this number in months was subtracted from the child's age at the time of the interview.

Calculating the life expectancy index

To compute the life expectancy index, we need to address the problem of households without children resulting in a loss of data, and subsequently obtain an estimate of child mortality that has a more continuous character; otherwise, we would have only limited variation in the data. Hence, we combine information on child mortality with model life tables and employ a regression-based approach to calculate mortality rates at the household level.

Step 1 We regress child mortality on a set of basic household and community socio-economic characteristics. We input the child mortality rate using a fractional general linear model with a logit link in acknowledging that the mortality rate can only assume values between 0 and 1. We then use the prediction of child mortality for all households (and not only those without children). This means we are not filling in any observations but rather imputing household-based child mortality rates for all households. Predict and impute child mortality for three age groups: <1 years old, 1-4 years old, and 5 to 9 years old and separately for males and females. Note that we only use <1 year old with HICLA data because deaths information is available only one year previous the survey year.

The variables used to estimate child mortality are the type of place of residence, number of household members, sex of head of household, age of head of household, educational attainment, time to get to water source (minutes), has mosquito bed net for sleeping, asset index (cluster mean), literacy rate (cluster mean), enrollment rate (cluster mean).

Step 2 After having estimated the household specific mortality rate, apply the recently provided modified logit life table systems by Murray et al. (2003) to estimate the household specific life expectancy at birth. This model is based on a Brass logit approach:

$$Logit(l_x^h) = \alpha_h + \beta_h * Logit(l_x^s) + \gamma_x\left[1 + \left(\frac{Logit(l_5^h)}{Logit(l_5^s)}\right)\right] + \theta_x\left[1 + \left(\frac{Logit(l_{60}^h)}{Logit(l_{60}^s)}\right)\right] \quad \forall\, h = 1,2,\dots,K$$

Where α_h is the age, γ_x and θ_x are parameters of the age specific Standard Life Table, and are country specific parameters, and the survival probability from zero to x, 5, and 60. To any value of l_5, the corresponding value for the life expectancy at birth e_0 can be estimated through in iterative procedure.

Steps 1 and 2 were applied to the IHCLA and DHS datasets. In the MCLS, no variable on child mortality was found in the survey so the life expectancy rate of household was estimated by using a linear interpolation between the life expectancy rate from the 2019 Inter-censal Survey (see Table 6.6 of (Department of Population & UNFPA, 2020)) and the life expectancy rate from DHS 2017.

Step 3 After having estimated life expectancy for each household in the DHS data, calculate the household specific life expectancy index of the HDI.

$$H^h = \frac{\hat{e}_0^h - 25}{85 - 25} \quad \forall\, h = 1,2,\dots,K$$

Calculating the household-based HDI

Once the three-dimension indices are devised, we calculate the household-specific HDI by taking the geometric mean of the three-dimension indices to calculate the HDI. We take the geometric mean of the arithmetic mean of the three components. We use g to denote the geometric mean and $\mu(y)$ to denote the arithmetic mean of a given distribution y - that is, household income per capita – and also apply this definition to the education (e) and health (h) components of the HDI. Using the geometric mean has an in-built "inequality aversion" across components which implies that individuals whose achievements differ greatly by components will receive a lower score compared to those with more "balanced" achievements across components.

$$H\text{-}HDI = g[\mu(y), \mu(e), \mu(h)]$$

Appendix B: Tables of Results

Table 4

H-HDI and its components by state/region, 2005

Region	H-HDI	Income	Education	Health
Ayeyarwaddy	0.375	0.321	0.376	0.442
Bago	0.367	0.303	0.371	0.443
Chin	0.377	0.33	0.371	0.441
Kachin	0.367	0.315	0.363	0.441
Kayah	0.373	0.345	0.348	0.441
Kayin	0.368	0.33	0.345	0.441
Magway	0.366	0.302	0.37	0.442
Mandalay	0.378	0.326	0.381	0.442
Mon	0.391	0.359	0.379	0.442
Rakhine	0.373	0.328	0.359	0.441
Sagaing	0.362	0.296	0.368	0.441
Shan	0.369	0.335	0.348	0.441
Tanintharyi	0.378	0.353	0.352	0.441
Yangon	0.414	0.402	0.406	0.443
National	0.377	0.331	0.373	0.442

Table 5

H-HDI and its components by state/region, 2010

Region	H-HDI	Income	Education	Health
Ayeyarwaddy	0.438	0.424	0.402	0.498
Bago	0.427	0.41	0.385	0.499
Chin	0.451	0.425	0.439	0.496
Kachin	0.458	0.424	0.462	0.497
Kayah	0.473	0.46	0.468	0.496
Kayin	0.444	0.439	0.402	0.497
Magway	0.423	0.4	0.386	0.499
Mandalay	0.446	0.424	0.426	0.498
Mon	0.46	0.46	0.43	0.497
Rakhine	0.443	0.42	0.421	0.497
Sagaing	0.43	0.398	0.406	0.498
Shan	0.441	0.436	0.402	0.497
Tanintharyi	0.446	0.451	0.398	0.497
Yangon	0.498	0.49	0.521	0.497
National	0.445	0.43	0.419	0.498

Table 6

H-HDI and its components by state/region, 2015

Region	H-HDI	Income	Education	Health
Ayeyarwaddy	0.521	0.435	0.495	0.648
Bago	0.544	0.472	0.515	0.653
Chin	0.546	0.445	0.546	0.651
Kachin	0.553	0.487	0.525	0.656
Kayah	0.542	0.468	0.501	0.652
Kayin	0.533	0.462	0.473	0.648
Magway	0.535	0.472	0.49	0.651
Mandalay	0.555	0.508	0.506	0.656
Mon	0.54	0.488	0.481	0.654
Naypyitaw	0.548	0.466	0.531	0.653
Rakhine	0.498	0.415	0.443	0.645
Sagaing	0.545	0.497	0.492	0.657
Shan	0.515	0.464	0.425	0.648
Tanintharyi	0.54	0.475	0.501	0.653
Yangon	0.593	0.525	0.598	0.659
National	0.544	0.476	0.505	0.653

Table 7

H-HDI and its components by state/region, 2017

Region	H-HDI	Income	Education	Health
Ayeyarwaddy	0.525	0.421	0.48	0.71
Bago	0.54	0.439	0.498	0.711
Chin	0.545	0.429	0.525	0.71
Kachin	0.553	0.46	0.514	0.712
Kayah	0.562	0.48	0.509	0.711
Kayin	0.546	0.474	0.465	0.711
Magway	0.532	0.432	0.484	0.71
Mandalay	0.562	0.489	0.505	0.712
Mon	0.557	0.492	0.488	0.711
Naypyitaw	0.549	0.454	0.506	0.712
Rakhine	0.519	0.414	0.469	0.71
Sagaing	0.535	0.438	0.489	0.71
Shan	0.544	0.447	0.484	0.711
Tanintharyi	0.548	0.488	0.468	0.711
Yangon	0.601	0.534	0.563	0.716
National	0.55	0.46	0.501	0.711

Table 8

H-HDI by residence area (urban and rural), 2005

Region	Overall	Urban	Rural	T-stat	P-value
Ayeyarwaddy	0.375	0.414	0.367	-0.73	0.466
Bago	0.367	0.409	0.363	-0.143	0.886
Chin	0.377	0.406	0.371	0.361	0.718
Kachin	0.367	0.389	0.355	0.521	0.603
Kayah	0.373	0.402	0.356	0.004	0.997
Kayin	0.368	0.401	0.365	-0.126	0.9
Magway	0.366	0.406	0.363	2.814	0.005
Mandalay	0.378	0.415	0.368	0.75	0.454
Mon	0.391	0.394	0.387	0.193	0.847
Rakhine	0.373	0.405	0.364	0.809	0.419
Sagaing	0.362	0.404	0.357	2.502	0.013
Shan	0.369	0.401	0.362	1.486	0.138
Taninthayi	0.378	0.389	0.375	1.535	0.126
Yangon	0.414	0.426	0.371	0.171	0.864

Table 9

H-HDI by residence area (urban and rural), 2010

Region	Overall	Urban	Rural	T-stat	P-value
Ayeyarwaddy	0.438	0.49	0.43	1.627	0.104
Bago	0.427	0.494	0.42	0.838	0.402
Chin	0.451	0.501	0.44	0.921	0.359
Kachin	0.458	0.499	0.44	-1.075	0.283
Kayah	0.473	0.504	0.454	0.421	0.675
Kayin	0.444	0.495	0.436	-0.858	0.392
Magway	0.423	0.509	0.419	2.398	0.017
Mandalay	0.446	0.506	0.429	0.602	0.547
Mon	0.46	0.478	0.455	0.984	0.326
Rakhine	0.443	0.495	0.428	2.047	0.041
Sagaing	0.43	0.496	0.423	2.932	0.003
Shan	0.441	0.488	0.427	1.774	0.077
Tanintharyi	0.446	0.473	0.439	1.658	0.099
Yangon	0.498	0.518	0.447	1.959	0.05

Table 10

H-HDI by residence area (urban and rural), 2015

Region	Overall	Urban	Rural	T-stat	P-value
Ayeyarwaddy	0.521	0.581	0.513	6.811	0
Bago	0.544	0.628	0.522	13.167	0
Chin	0.546	0.632	0.52	10.998	0
Kachin	0.553	0.621	0.533	14.629	0
Kayah	0.542	0.621	0.513	14.707	0
Kayin	0.533	0.625	0.503	18.329	0
Magway	0.535	0.616	0.521	10.266	0
Mandalay	0.555	0.628	0.526	13.853	0
Mon	0.54	0.626	0.506	13.624	0
Naypyitaw	0.548	0.632	0.517	15.46	0
Rakhine	0.498	0.603	0.478	15.415	0
Sagaing	0.545	0.602	0.534	8.372	0
Shan	0.515	0.6	0.477	8.989	0
Tanintharyi	0.54	0.601	0.521	10.789	0
Yangon	0.593	0.63	0.524	13.211	0

Table 11

H-HDI by residence area (urban and rural), 2017

Region	Overall	Urban	Rural	T-stat	P-value
Ayeyarwaddy	0.525	0.596	0.514	14.277	0
Bago	0.54	0.59	0.525	12.97	0
Chin	0.545	0.588	0.533	10.206	0
Kachin	0.553	0.584	0.535	9.653	0
Kayah	0.562	0.601	0.547	11.083	0
Kayin	0.546	0.606	0.524	12.769	0
Magway	0.532	0.613	0.52	12.743	0
Mandalay	0.562	0.609	0.539	10.633	0
Mon	0.557	0.6	0.538	9.43	0
Naypyitaw	0.549	0.606	0.525	12.228	0
Rakhine	0.519	0.588	0.507	13.525	0
Sagaing	0.535	0.599	0.522	10.759	0
Shan	0.544	0.585	0.53	9.015	0
Tanintharyi	0.548	0.585	0.535	11.134	0
Yangon	0.601	0.623	0.552	11.524	0

Table 12

H-HDI by age of household head (by state/region), 2005

Region	Overall	14-24	25-44	45-64	65+
Ayeyarwaddy	0.375	0.355	0.371	0.378	0.382
Bago	0.367	0.39	0.364	0.37	0.37
Chin	0.377	0.385	0.376	0.376	0.391
Kachin	0.367	0.349	0.357	0.373	0.382
Kayah	0.373		0.366	0.373	0.427
Kayin	0.368		0.367	0.368	0.378
Magway	0.366	0.401	0.362	0.37	0.367
Mandalay	0.378	0.39	0.378	0.38	0.372
Mon	0.391		0.393	0.391	0.387
Rakhine	0.373		0.37	0.376	0.369
Sagaing	0.362	0.35	0.361	0.363	0.359
Shan	0.369		0.365	0.37	0.383
Taninthayi	0.378	0.395	0.383	0.375	0.374
Yangon	0.414	0.373	0.409	0.417	0.419
National	0.377	0.38	0.374	0.379	0.38

Table 13

H-HDI by age of household head (by state/region), 2010

Region	Overall	14-24	25-44	45-64	65+
Ayeyarwaddy	0.438	0.374	0.449	0.428	0.448
Bago	0.427	0.424	0.44	0.416	0.433
Chin	0.451		0.46	0.442	0.445
Kachin	0.458	0.427	0.466	0.443	0.482
Kayah	0.473	0.409	0.496	0.454	0.489
Kayin	0.444	0.432	0.455	0.435	0.445
Magway	0.423	0.372	0.441	0.411	0.43
Mandalay	0.446	0.394	0.456	0.436	0.458
Mon	0.46	0.601	0.468	0.455	0.461
Rakhine	0.443		0.449	0.439	0.447
Sagaing	0.43	0.351	0.445	0.423	0.427
Shan	0.441	0.365	0.451	0.431	0.457
Taninthayi	0.446	0.43	0.468	0.433	0.445
Yangon	0.498	0.54	0.503	0.491	0.511
National	0.445	0.405	0.456	0.435	0.453

Table 14

H-HDI by age of household head (by state/region), 2015

Region	Overall	14-24	25-44	45-64	65+
Ayeyarwaddy	0.521	0.505	0.516	0.53	0.513
Bago	0.544	0.558	0.542	0.544	0.547
Chin	0.546	0.593	0.545	0.546	0.543
Kachin	0.553		0.552	0.549	0.572
Kayah	0.542	0.479	0.537	0.547	0.544
Kayin	0.533	0.595	0.524	0.533	0.548
Magway	0.535	0.576	0.534	0.536	0.532
Mandalay	0.555		0.557	0.556	0.548
Mon	0.54		0.524	0.55	0.537
Naypyitaw	0.548	0.586	0.542	0.556	0.539
Rakhine	0.498	0.472	0.486	0.507	0.489
Sagaing	0.545	0.464	0.547	0.549	0.534
Shan	0.515	0.549	0.506	0.522	0.52
Taninthayi	0.54	0.539	0.537	0.545	0.535
Yangon	0.593	0.509	0.572	0.602	0.611
National	0.544	0.524	0.537	0.55	0.542

Table 15

H-HDI by age of household head (by state/region), 2017

Region	Overall	14-24	25-44	45-64	65+
Ayeyarwaddy	0.525	0.488	0.521	0.526	0.532
Bago	0.54	0.558	0.535	0.543	0.542
Chin	0.545	0.524	0.549	0.542	0.546
Kachin	0.553	0.527	0.553	0.551	0.563
Kayah	0.562	0.568	0.561	0.56	0.571
Kayin	0.546		0.54	0.545	0.554
Magway	0.532	0.487	0.533	0.534	0.526
Mandalay	0.562	0.505	0.569	0.564	0.551
Mon	0.557	0.606	0.55	0.556	0.564
Naypyitaw	0.549	0.566	0.555	0.544	0.542
Rakhine	0.519	0.635	0.524	0.516	0.515
Sagaing	0.535		0.544	0.533	0.527
Shan	0.544	0.52	0.547	0.537	0.553
Taninthayi	0.548	0.559	0.55	0.547	0.543
Yangon	0.601	0.576	0.593	0.603	0.613
National	0.55	0.529	0.549	0.55	0.552

Table 16

H-HDI by education level of household head (by state/region), 2005

Region	Overall	Monastic	Basic	Technical	Higher
Ayeyarwaddy	0.375	0.371	0.372	0.449	0.451
Bago	0.367	0.359	0.367	0.403	0.459
Chin	0.377	0.363	0.375	0.38	0.425
Kachin	0.367	0.352	0.365	0.413	0.43
Kayah	0.373	0.417	0.365	0.484	0.448
Kayin	0.368	0.353	0.369	0.425	0.45
Magway	0.366	0.358	0.366	0.431	0.439
Mandalay	0.378	0.359	0.379	0.475	0.457
Mon	0.391	0.376	0.39	0.461	0.465
Rakhine	0.373	0.356	0.372	0.397	0.446
Sagaing	0.362	0.356	0.362	0.415	0.426
Shan	0.369	0.356	0.37	0.406	0.446
Taninthayi	0.378	0.37	0.382		0.419
Yangon	0.414	0.386	0.408	0.456	0.467
National	0.377	0.362	0.376	0.441	0.455

Table 17

H-HDI by education level of household head (by state/region), 2010

Region	Overall	Monastic	Basic	Technical	Higher
Ayeyarwaddy	0.438	0.416	0.436	0.545	0.588
Bago	0.427	0.419	0.425	0.495	0.568
Chin	0.451		0.448	0.53	0.531
Kachin	0.458	0.409	0.457	0.487	0.588
Kayah	0.473	0.451	0.469	0.564	0.625
Kayin	0.444	0.425	0.445	0.509	0.539
Magway	0.423	0.421	0.421	0.533	0.571
Mandalay	0.446	0.428	0.443	0.536	0.589
Mon	0.46	0.444	0.458	0.499	0.579
Rakhine	0.443	0.411	0.444	0.558	0.564
Sagaing	0.43	0.417	0.427	0.509	0.556
Shan	0.441	0.415	0.445	0.566	0.562
Taninthayi	0.446	0.416	0.451	0.535	0.536
Yangon	0.498	0.458	0.493	0.554	0.601
National	0.445	0.422	0.443	0.539	0.582

Table 18

H-HDI by education level of household head (by state/region), 2015

Region	Overall	No education	Primary	Secondary	Higher
Ayeyarwaddy	0.521	0.453	0.505	0.58	0.683
Bago	0.544	0.471	0.518	0.598	0.691
Chin	0.546	0.491	0.501	0.593	0.669
Kachin	0.553	0.491	0.52	0.613	0.687
Kayah	0.542	0.474	0.507	0.612	0.698
Kayin	0.533	0.459	0.515	0.609	0.704
Magway	0.535	0.481	0.517	0.6	0.68
Mandalay	0.555	0.486	0.532	0.618	0.704
Mon	0.54	0.461	0.523	0.61	0.694
Naypyitaw	0.548	0.471	0.506	0.591	0.711
Rakhine	0.498	0.427	0.477	0.582	0.66
Sagaing	0.545	0.49	0.539	0.606	0.667
Shan	0.515	0.45	0.491	0.606	0.701
Taninthayi	0.54	0.464	0.52	0.607	0.669
Yangon	0.593	0.495	0.541	0.629	0.714
National	0.544	0.472	0.518	0.606	0.698

Table 19

H-HDI by education level of household head (by state/region), 2017

Region	Overall	No education	Primary	Secondary	Higher
Ayeyarwaddy	0.525	0.471	0.512	0.568	0.652
Bago	0.54	0.476	0.524	0.589	0.647
Chin	0.545	0.531	0.514	0.574	0.629
Kachin	0.553	0.501	0.527	0.591	0.652
Kayah	0.562	0.504	0.537	0.608	0.665
Kayin	0.546	0.475	0.529	0.607	0.669
Magway	0.532	0.485	0.521	0.584	0.658
Mandalay	0.562	0.489	0.549	0.603	0.67
Mon	0.557	0.486	0.542	0.613	0.669
Naypyitaw	0.549	0.474	0.521	0.597	0.65
Rakhine	0.519	0.456	0.509	0.569	0.645
Sagaing	0.535	0.487	0.527	0.587	0.655
Shan	0.544	0.475	0.53	0.603	0.66
Taninthayi	0.548	0.483	0.539	0.603	0.669
Yangon	0.601	0.524	0.563	0.627	0.677
National	0.55	0.486	0.53	0.599	0.665

Table 20

Decomposition of the Theil index and group polarization for the H-HDI, 2005(a)

	Theil	Within Residence	Between Residence	Zhang Residence	Within Gender	Between Gender	Zang Gender	Within Educ	Between Educ
Ayeyarwaddy	0.007	0.006	0.001	0.257	0.007	0	0.012	0.006	0.001
Bago	0.006	0.005	0.001	0.148	0.006	0	0.001	0.006	0.001
Chin	0.003	0.002	0.001	0.218	0.003	0	0.002	0.002	0
Kachin	0.006	0.005	0.001	0.231	0.006	0	0.031	0.005	0.001
Kayah	0.007	0.005	0.002	0.305	0.007	0	0.001	0.004	0.002
Kayin	0.005	0.004	0.001	0.134	0.005	0	0.011	0.004	0
Magway	0.005	0.004	0.001	0.183	0.005	0	0.002	0.004	0.001
Mandalay	0.007	0.005	0.002	0.338	0.007	0	0.001	0.006	0.001
Mon	0.005	0.005	0	0.025	0.005	0	0	0.004	0.001
Rakhine	0.005	0.004	0.001	0.283	0.005	0	0	0.004	0.001
Sagaing	0.005	0.004	0.001	0.228	0.005	0	0	0.005	0
Shan	0.007	0.005	0.001	0.217	0.007	0	0.003	0.006	0.001
Taninthayi	0.004	0.004	0	0.037	0.004	0	0	0.004	0
Yangon	0.006	0.005	0.002	0.429	0.006	0	0.001	0.005	0.001
National	0.007	0.005	0.002	0.35	0.007	0	0.003	0.006	0.001

Table 21

Decomposition of the Theil index and group polarization for the H-HDI, 2005(b)

	Zhang Educ	Within Age	Between Age	Zhang Age	Within HHsize	Between HHsize	Zhang HHsize
Ayeyarwaddy	0.138	0.007	0	0.009	0.007	0	0.003
Bago	0.091	0.006	0	0.007	0.006	0	0.004
Chin	0.192	0.003	0	0.011	0.003	0	0.001
Kachin	0.101	0.006	0	0.062	0.006	0	0.005
Kayah	0.47	0.006	0.001	0.162	0.007	0	0.004
Kayin	0.095	0.005	0	0.01	0.005	0	0.001
Magway	0.14	0.005	0	0.011	0.005	0	0.012
Mandalay	0.168	0.007	0	0.004	0.007	0	0.01
Mon	0.206	0.005	0	0.003	0.005	0	0.032
Rakhine	0.187	0.005	0	0.007	0.005	0	0.015
Sagaing	0.078	0.005	0	0.001	0.005	0	0.005
Shan	0.119	0.007	0	0.018	0.007	0	0.004
Taninthayi	0.041	0.004	0	0.017	0.004	0	0.008
Yangon	0.22	0.006	0	0.01	0.006	0	0.015
National	0.166	0.007	0	0.004	0.007	0	0.01

Table 22

Decomposition of the Theil index and group polarization for the H-HDI, 2010(a)

	Theil	Within Residence	Between Residence	Zhang Residence	Within Gender	Between Gender	Zang Gender
Ayeyarwaddy	0.01	0.008	0.002	0.202	0.01	0	0.001
Bago	0.01	0.009	0.001	0.159	0.01	0	0.001
Chin	0.006	0.005	0.001	0.251	0.006	0	0.027
Kachin	0.012	0.009	0.002	0.258	0.012	0	0
Kayah	0.01	0.009	0.001	0.109	0.01	0	0
Kayin	0.009	0.008	0.001	0.141	0.009	0	0.013
Magway	0.01	0.008	0.002	0.222	0.01	0	0
Mandalay	0.012	0.009	0.003	0.335	0.012	0	0.003
Mon	0.009	0.009	0.001	0.061	0.009	0	0
Rakhine	0.01	0.008	0.002	0.298	0.01	0	0.002
Sagaing	0.01	0.008	0.001	0.178	0.01	0	0.005
Shan	0.011	0.008	0.002	0.283	0.01	0	0.008
Taninthayi	0.008	0.007	0.001	0.116	0.008	0	0.002
Yangon	0.01	0.008	0.003	0.323	0.01	0	0
National	0.011	0.009	0.003	0.327	0.011	0	0

Table 23

Decomposition of the Theil index and group polarization for the H-HDI, 2010(b)

	Within Educ	Between Educ	Zhang Educ	Within Age	Between Age	Zhang Age	Within HHsize	Between HHsize	Zhang HHsize
Ayeyarwaddy	0.009	0.001	0.155	0.01	0	0.028	0.01	0	0.006
Bago	0.009	0.001	0.112	0.01	0	0.03	0.01	0	0.013
Chin	0.005	0.001	0.153	0.006	0	0.029	0.006	0	0.004
Kachin	0.01	0.002	0.171	0.011	0.001	0.053	0.011	0	0.023
Kayah	0.009	0.001	0.168	0.009	0.001	0.102	0.01	0	0.024
Kayin	0.008	0	0.04	0.009	0	0.023	0.009	0	0.021
Magway	0.009	0.001	0.127	0.01	0.001	0.054	0.01	0	0
Mandalay	0.01	0.002	0.17	0.011	0	0.024	0.012	0	0.002
Mon	0.008	0.001	0.098	0.009	0	0.019	0.009	0	0.029
Rakhine	0.009	0.001	0.155	0.01	0	0.005	0.01	0	0.019
Sagaing	0.009	0.001	0.146	0.009	0	0.032	0.01	0	0.007
Shan	0.01	0.001	0.098	0.01	0	0.042	0.011	0	0.004
Taninthayi	0.007	0.001	0.097	0.007	0.001	0.073	0.008	0	0.002
Yangon	0.009	0.002	0.186	0.01	0	0.011	0.01	0	0.001
National	0.01	0.001	0.147	0.011	0	0.022	0.011	0	0.002

Table 24

Decomposition of the Theil index and group polarization for the H-HDI, 2015(a)

	Theil	Within Residence	Between Residence	Zhang Residence	Within Gender	Between Gender	Zang Gender
Ayeyarwaddy	0.01	0.009	0.001	0.11	0.01	0	0.003
Bago	0.01	0.007	0.003	0.395	0.01	0	0.002
Chin	0.011	0.007	0.004	0.532	0.011	0	0.002
Kachin	0.011	0.008	0.003	0.389	0.011	0	0.006
Kayah	0.015	0.012	0.004	0.323	0.015	0	0.015
Kayin	0.016	0.012	0.004	0.359	0.016	0	0.001
Magway	0.011	0.009	0.002	0.204	0.011	0	0
Mandalay	0.011	0.008	0.003	0.409	0.011	0	0
Mon	0.015	0.01	0.005	0.455	0.015	0	0.004
Naypyitaw	0.014	0.01	0.004	0.394	0.014	0	0.003
Rakhine	0.016	0.012	0.004	0.306	0.016	0	0
Sagaing	0.008	0.007	0.001	0.162	0.008	0	0
Shan	0.018	0.012	0.006	0.507	0.018	0	0.001
Taninthayi	0.011	0.009	0.002	0.209	0.011	0	0.006
Yangon	0.011	0.008	0.004	0.466	0.011	0	0.006
National	0.013	0.009	0.004	0.39	0.013	0	0.002

Table 25

Decomposition of the Theil index and group polarization for the H-HDI, 2015(b)

	Within Educ	Between Educ	Zhang Educ	Within Age	Between Age	Zhang Age	Within HHsize	Between HHsize	Zhang HHsize
Ayeyarwaddy	0.006	0.004	0.703	0.01	0	0.009	0.01	0	0.002
Bago	0.005	0.005	0.863	0.01	0	0.001	0.01	0	0.005
Chin	0.006	0.005	0.791	0.011	0	0.003	0.01	0	0.014
Kachin	0.006	0.004	0.733	0.011	0	0.007	0.011	0	0.002
Kayah	0.009	0.006	0.688	0.015	0	0.005	0.015	0	0.007
Kayin	0.01	0.006	0.553	0.016	0	0.007	0.016	0	0.007
Magway	0.007	0.005	0.691	0.011	0	0.002	0.011	0	0.003
Mandalay	0.006	0.006	1.074	0.011	0	0.001	0.011	0	0.004
Mon	0.009	0.006	0.672	0.014	0	0.012	0.015	0	0.003
Naypyitaw	0.006	0.008	1.287	0.014	0	0.006	0.014	0	0.035
Rakhine	0.009	0.007	0.77	0.016	0	0.013	0.016	0	0.025
Sagaing	0.004	0.003	0.735	0.008	0	0.015	0.008	0	0.004
Shan	0.01	0.008	0.823	0.017	0	0.008	0.018	0	0.002
Taninthayi	0.006	0.004	0.718	0.011	0	0.003	0.011	0	0
Yangon	0.006	0.006	0.979	0.011	0	0.035	0.011	0	0.001
National	0.007	0.006	0.84	0.013	0	0.005	0.013	0	0.002

Table 26

Decomposition of the Theil index and group polarization for the H-HDI, 2017(a)

	Theil	Within Residence	Between Residence	Zhang Residence	Within Gender	Between Gender	Zang Gender
Ayeyarwaddy	0.006	0.004	0.001	0.331	0.006	0	0.001
Bago	0.006	0.005	0.001	0.242	0.006	0	0.001
Chin	0.005	0.004	0.001	0.216	0.005	0	0.005
Kachin	0.006	0.005	0.001	0.163	0.006	0	0.011
Kayah	0.006	0.005	0.001	0.169	0.006	0	0.012
Kayin	0.007	0.005	0.002	0.427	0.007	0	0.005
Magway	0.007	0.005	0.002	0.386	0.007	0	0
Mandalay	0.007	0.005	0.001	0.291	0.007	0	0.001
Mon	0.006	0.005	0.001	0.218	0.006	0	0
Naypyitaw	0.007	0.005	0.002	0.386	0.007	0	0.014
Rakhine	0.006	0.004	0.001	0.346	0.006	0	0
Sagaing	0.006	0.005	0.001	0.309	0.006	0	0.001
Shan	0.007	0.006	0.001	0.179	0.007	0	0.004
Taninthayi	0.005	0.005	0.001	0.156	0.005	0	0.002
Yangon	0.005	0.004	0.001	0.306	0.005	0	0
National	0.007	0.005	0.002	0.429	0.007	0	0.001

Table 27

Decomposition of the Theil index and group polarization for the H-HDI, 2017(b)

	Within Educ	Between Educ	Zhang Educ	Within Age	Between Age	Zhang Age	Within HHsize	Between HHsize	Zhang HHsize
Ayeyarwaddy	0.004	0.002	0.674	0.006	0	0.008	0.006	0	0.012
Bago	0.004	0.002	0.574	0.006	0	0.005	0.006	0	0.006
Chin	0.003	0.002	0.818	0.005	0	0.005	0.005	0	0.003
Kachin	0.003	0.003	0.805	0.006	0	0.005	0.006	0	0.005
Kayah	0.003	0.003	0.908	0.006	0	0.003	0.005	0	0.052
Kayin	0.004	0.003	0.866	0.007	0	0.005	0.007	0	0.001
Magway	0.004	0.003	0.688	0.007	0	0.006	0.007	0	0.011
Mandalay	0.003	0.003	1.016	0.007	0	0.01	0.007	0	0
Mon	0.003	0.003	1.118	0.006	0	0.008	0.006	0	0.003
Naypyitaw	0.003	0.004	1.295	0.007	0	0.007	0.007	0	0.038
Rakhine	0.003	0.003	0.86	0.006	0	0.008	0.006	0	0.016
Sagaing	0.004	0.003	0.761	0.006	0	0.012	0.006	0	0.009
Shan	0.004	0.003	0.765	0.007	0	0.01	0.007	0	0.001
Taninthayi	0.003	0.003	0.879	0.005	0	0.002	0.005	0	0.007
Yangon	0.003	0.003	1.067	0.005	0	0.015	0.005	0	0
National	0.004	0.003	0.887	0.007	0	0.001	0.007	0	0.002

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