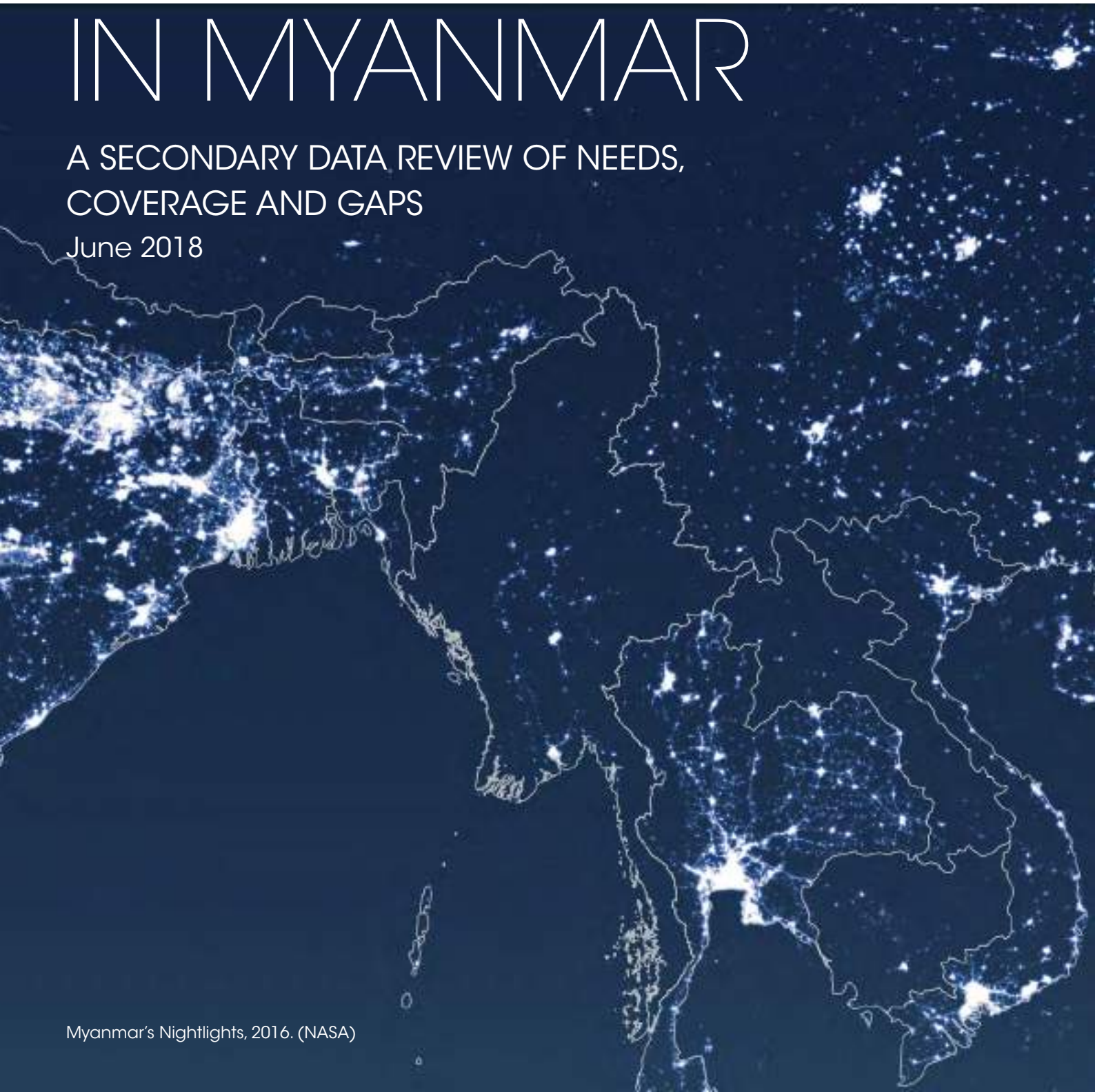
Humanitarian Assistance and Resilience Programme Facility

Humanitarian Assistance and Resilience Programme Facility & the Myanmar Information Management Unit

VULNERABILITY IN MYANMAR

A SECONDARY DATA REVIEW OF NEEDS, COVERAGE AND GAPS

June 2018



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LIST OF ACRONYMS

ACLED	Armed Conflict Location and Event Data
ADB	Asian Development Bank
ASEAN	Association of Southeast Asian Nations
CCCM	Camp Coordination and Camp Management
CDNH	Centre for Diversity and National Harmony
CSO	Central Statistics Organisation
DHS	Demographic Health Survey
DRR	Disaster Risk Reduction
EAO	Ethnic Armed Organisation
EMI	Earthquake Megacities Initiative
EMIS	Education Management Information System
EWARS	Early Warning Alert and Response System
GDP	Gross Domestic Product
GFDRR	Global Facility for Disaster Reduction and Recovery
HARP-F	Humanitarian Assistance and Resilience Programme Facility
HMIS	Health Management Information System
ICT	Information and Communication Technologies
IDP	Internally Displaced Persons
INFORM	Index for Risk Management
IWMI	International Water Management Institute
KAP	Knowledge, Attitudes, Practices
LIFT	Livelihood and Food Security Trust Fund
MIMU	Myanmar Information Management Unit
MMK	Myanmar Kyats
MoH	Ministry of Health
Mohinga	Myanmar's Aid Information Management System
MoSWRR	Ministry of Social Welfare, Relief and Resettlement
NNDMC	National Natural Disaster Management Committee
ODA	Official Development Assistance
OECD	Organisation for Economic Co-operation and Development
RRD	Relief and Resettlement Department
STEM	Science, Technology, Engineering, and Mathematics
TAF	The Asia Foundation
TWh	Terawatt Hours
UN	United Nations
USD	United States Dollar
UXO	Unexploded Ordinance
WASH	Water, Sanitation, and Hygiene
WB	World Bank
3W	MIMU Who is doing What, Where

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This multi-sectoral desk review is the result of a partnership between the Myanmar Information Management Unit (MIMU), a service under the Office of the United Nations' Resident and Humanitarian Coordinator, and the Humanitarian Assistance and Resilience Programme Facility (HARP-F), both of which are actively involved in supporting humanitarian and development programmes around Myanmar.

It seeks to address gaps in data analysis and bring to light some of the differences and disparities across townships, countrywide, to support the design of effective programmes and policies. The review is based on publicly available data and information and hopefully contributes to the way in which all entities involved conceptualise the most appropriate support they can offer.

The methodology and analysis included in this desk review was led by a consultant, with drafting, visualisation and editing from the MIMU and HARP-F teams.

We would like to thank the various providers who shared information and data that was used in this review and analysis, especially the various departments of the Government of the Union of Myanmar that have made township-level administrative data available – chief among them being the 2014 Housing and Population Census which has been extensively used in this analysis.

Our thanks also to those staff of non-governmental organisations and United Nations agencies who provided relevant information and reports, as well as their valuable insights, and to the Technical Review Group which met twice to review the methodological approaches.

This review has been made possible by the kind contributions of the governments of the United Kingdom and Canada, and the European Union.

EXECUTIVE SUMMARY

BACKGROUND AND METHODOLOGY

Myanmar's progress on the global 2030 Agenda for Sustainable Development and the Sustainable Development Goals will largely depend on the country's approach to targeting the poorest and most marginalised people, adhering to the core principle of leaving no-one behind in the country's development. This requires an understanding of pre-existing vulnerability and specifically who is affected, where and how. In addition to enabling more effective planning and policy decisions, this knowledge also supports emergency response.

Vulnerability has no single defining trait; it exists across a diverse range of facets and characteristics, with individuals and groups potentially affected by different vulnerabilities, at different times. There has been little analysis of vulnerability in Myanmar – what does exist is generally at the state/region level, masking differences within and between townships, village tracts and population groups. More detailed analysis is needed to understand variations in vulnerability countrywide, and at lower administrative levels than states and regions.

This report considers vulnerability across Myanmar through a desk review and analysis of national datasets and information at township level over the period 2014-2016. It takes a multi-dimensional approach, using a Vulnerability Index developed specifically for this analysis to better understand vulnerability at township levels. This Index draws on publicly available data to reflect components of human development alongside the impact of conflict and violence in the period under review. Any such Index has its limitations, including the relevance of any particular indicator across different ethnic and geographic areas, the specific indicators selected, and the fact that any index based on township level data cannot show variations within the township. As such, the Vulnerability Index cannot be considered an absolute or perfect measure, but provides an indicative approach to consider the differences across townships.

Gaps in the 2014 Census enumeration have been an important consideration in the results for some townships, particularly in Rakhine. Full Census data was not available for some areas, particularly in Rakhine State, where an estimated 1,090,000 persons were not enumerated, specific areas in Kachin State (46,600 persons from 97 villages not enumerated) and Kayin State (69,753 persons not fully enumerated). Vulnerability in non-enumerated areas may be still higher than estimated. Even with these limitations, Rakhine – as the area with the greatest population not included in the Census - is consistently ranked as one of the most vulnerable locations across the individual and collective indicators examined.

The analysis serves to confirm, and sometimes challenge, current perceptions of vulnerability in Myanmar. It flags specific patterns of vulnerability across the country. Overall it provides the opportunity to review the current emphasis of programming against countrywide vulnerability data, and contributes to a more robust analysis of the nexus between humanitarian and development planning and programming.

A more coherent analysis of the pre-existing vulnerabilities of populations in Myanmar can also support earlier and better targeted emergency response. It promotes a clearer understanding of potentially affected persons who may need assistance while more detailed damage and loss data is being collected, as well as contributing to the establishment of recovery priorities.

MAIN FINDINGS

Climate risk and disaster management: A United Nations report ranks Myanmar among the three most vulnerable countries to extreme weather events with as much as 3% of Myanmar's GDP lost annually due to disasters triggered by natural hazards. The social and economic impact of such events tends to affect the most vulnerable. The Ayeyarwady Delta is one of the most populated parts of the country and particularly vulnerable to climate change with the convergence of a number of compounding factors. The central Dry Zone is also particularly vulnerable with lack of capacity to manage variability in water resources as the source of much of the prevailing poverty and food insecurity in this area.

Conflict: This initiative considered conflict-affected areas as those experiencing active conflict, displacement, riots or protests in 2015-2016. The measure of vulnerability varied significantly across the 68 townships directly affected by conflict in this period with living standards, on average, 23% lower than in non-conflict affected areas. The impacts of living in conflict-affected areas are felt particularly strongly in access to schooling; townships affected by conflict in this period were found to have double the average number of persons who had never attended school or had no formal educational attainment compared to non-conflict-affected townships.

Institutional capacity: Union budgets since the 2011 reforms have been weighted heavily towards electrification, energy generation and infrastructural needs, alongside military spending. Decentralisation is slowly increasing, but state and region allocations remain low at 8%. Allocations for Health and Education have grown substantially since 2011/12, although per capita spending remains low, at USD 35.60 in 2016. Allocations for the Ministry of Social Welfare, Relief and Resettlement have remained very slight and largely static, hovering around 0.03% of GDP.

Urban and rural differences: Stark disparities were found in living conditions and economic freedoms between the residents of urban and rural areas: 72% of rural villages are not electrified and persons in rural areas have markedly lower access to safe drinking water and sanitation; educational outcomes vary significantly and secondary school attendance in rural areas is half of that in urban areas. Nevertheless, rural areas cannot be assumed to be the same across the country, and urban areas similarly cannot be assumed to require the same approaches.

Aid and civil society: 2016 saw commitments of USD 7.44 billion in international, multilateral and bilateral aid, 24% of which was disbursed in this period. 44% of aid was channelled through aid agencies and financial institutions; at least 33% went directly to government entities. ODA channelled through aid agencies is heavily weighted towards Health and Nutrition, Livelihoods, Infrastructure, Agriculture and Protection sectors. Around a third of the activities reported by civil society organisations were focused in 25 townships which account for about 14% of the more vulnerable population based on this analysis.

Shelter and housing: Housing quality provides a useful indication of vulnerability. A third of all households in Myanmar still have floors of either bamboo or earth, and 36% live under thatch or bamboo roofing. Rakhine and Ayeyarwady have the highest rates of poor roofing and wall materials which are unlikely to withstand cyclonic events or heavy flooding. Townships with the greatest number of households with dirt and bamboo floors are located in northern Rakhine (under-enumerated) and in the agricultural townships in Magway, Mandalay and Sagaing.

Water resource management and sanitation: The 2014 Census indicated that 26% of all households countrywide lacked safe sanitation, and 31% lacked access to improved drinking water (3.4 million households). Rakhine is a clear outlier with the lowest levels of safe sanitation, whereas areas of Ayeyarwady, Bago, Rakhine and Yangon have the least access to improved water sources. Areas with poor water and sanitation coincide, in the main, with those with poor shelter.

Health and nutrition: Myanmar's mortality rate is largely due to communicable diseases and injuries which are both treatable and largely preventable with improved health coverage. Pregnancy and childbirth-related factors remain among the leading causes of mortality and morbidity despite increased health spending and improvements in maternal healthcare. Myanmar's maternal mortality rate and under-5 mortality rate are more than double the ASEAN average, while the infant mortality rate is 2.6 times the ASEAN average. There are wide geographic, ethnic and socio-economic disparities; infant mortality rates are highest in the districts of Labutta in Ayeyarwady and Mindat in Chin, whereas Magway, Sagaing and Tanintharyi have particularly high early years mortality rate. Children in rural areas are more likely to be chronically under-nourished (32% stunting) than those in urban areas (20%). Analysis is, however, limited by the lack of publicly available health and nutrition data at township and lower levels.

Education: 89.5% of people over 15 years of age are literate, but with disparities by age, gender, and geographic locations. Literacy is lower in rural than urban areas, and varies significantly across states and regions. Literacy is particularly low in Shan State which accounts for 18 of the 19 townships countrywide where more than half of children have never attended school; Mongkhet township is especially prominent with 85% of children never having attended school. Other townships with particularly high numbers of persons with no education are in Kayin, Magway and Rakhine. Children from rural families, poor or otherwise disadvantaged groups are less likely to transition from primary to secondary education, or to complete their secondary education.

Livelihoods: Wages in Myanmar remain very low; more than half the population work in the agricultural, forestry and fishery sectors with average earnings 18% lower than the Union average salary. Males are generally paid more than females; male daily wage earners are paid on average 47% more than females. Agricultural household heads earn the least of all sectors and rural households are twice as likely to be indebted as urban households. Households in rural areas of Rakhine, Chin and Magway are clear outliers in spending around 70% of their monthly budget on food. Food costs dominate household spending, even in the more affluent urban areas, and no area spends less than 55% of its household budget on food.

Agriculture and food security: 54% of the workforce are employed in agriculture, fishing and forestry; however, Myanmar has the lowest agricultural profits and the lowest agricultural wages in the ASEAN region. Factors for this low productivity include low rates of farm mechanisation, minimal use of pesticides and fertilisers and heavy reliance on manual labour. Paddy, the most water-intensive of all major crops in Myanmar, presents a significant strain on the water resources of many areas and may be less profitable for smallholding farmers. Agricultural income alone will not be sufficient to bring smallholding farmers out of poverty; expanded and improved agricultural extension services will be key to the needed structural changes.

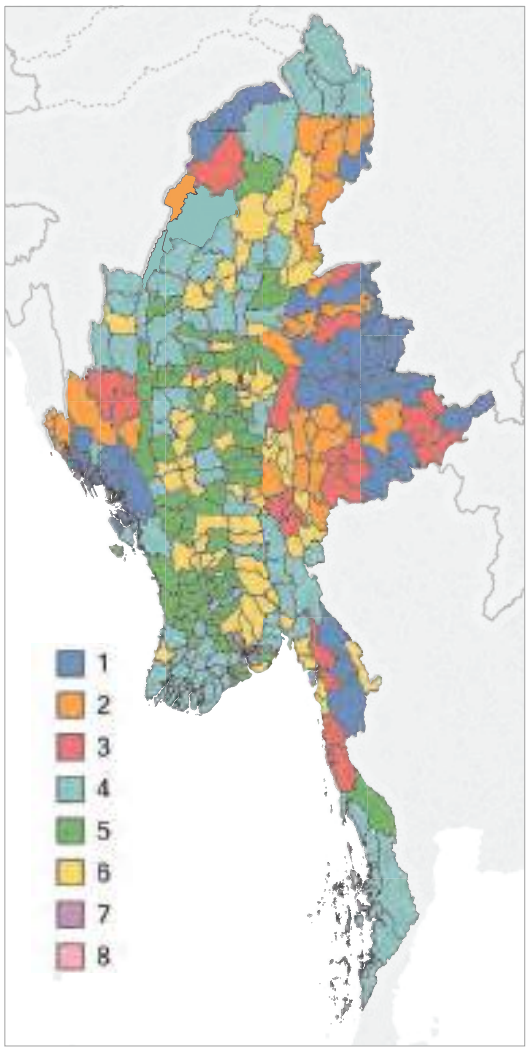
LEVELS OF VULNERABILITY

Based on the Vulnerability Index developed in this review, an estimated 22.7 million persons in Myanmar, or 44% of the population, were found to have some form of vulnerability related to human development and/or exposure to active conflict/violence. These people experience varying combinations of poor housing, lack of education, poor educational attainment, lack of access to safe sanitation and improved drinking water, and direct exposure to conflict.

Shan and Ayeyarwady have the largest populations of vulnerable persons, a function of both their size and relative vulnerability in comparison to other States and Regions. Yangon and Shan show the widest variation in vulnerability across townships (in terms of the number of vulnerable persons and their level of vulnerability), followed by Mandalay, Chin and Rakhine. The poor living conditions of the most vulnerable areas are anticipated to persist, as many of these townships lack the necessary population density to attract investment and employment opportunities.

TOWNSHIP TYPOLOGIES[1]

The Vulnerability Index used in this analysis allows a broad understanding of the diversity and distribution of vulnerable persons in Myanmar. Using this Index, Myanmar's 330 townships cluster into 8 main typologies based on their shared characteristics and development needs – illustrating a wide variation within states and regions as well as certain similarities among townships from different parts of the country. The result is a lens allowing the most vulnerable to be considered more methodically in policy and programme planning. The report also highlights the importance of sharing and analysing available data - at township and lower levels of disaggregation - to strengthen our understanding of vulnerability.



Type 1: Extreme outliers in terms of development needs and/or exposure to conflict

Type 2: Conflict-affected areas with poor human development

Type 3: Hubs in conflict-affected areas

Type 4: Very low access to basic services and infrastructure

Type 5: Agricultural townships with the highest profits per capita

Type 6: Agricultural areas with secondary cities and towns

Type 7: Up-and-coming peri-urban and urban areas

Type 8: Affluent, densely populated city centres

[1] Township values, other than population numbers, are based on Census-enumerated population and may not fully reflect non-enumerated groups.

REPORT STRUCTURE

This desk review addresses the situation countrywide based on available data and assessments. Results are organised into the following sections:

Introduction ***Report Purpose*** and the overall rationale for the approach used.

Section I ***Methodology and Limitations*** describes the approach used to examine the situation and develop the Vulnerability Index which has been applied across townships countrywide as part of this analysis.

Section II ***Causes of Vulnerability*** considers the differing impacts of conflict, natural disaster, under-investment and under-development across regions of the country, with a focus on institutional capacity, civil society, shelter and housing, water resource management and sanitation, health and nutrition, education, livelihoods and household consumption, agriculture and food security.

Section III ***Vulnerability Key Findings*** provides a short summary of some of the key findings across sectors and using the multi-dimensional Vulnerability Index.

Section IV ***Analysis of Township Clusters*** reviews the application of the Vulnerability Index across townships and presents the clustering of the townships categorised into 8 different typologies.

Annexes ***Additional Notes on the Methodology***

References

INTRODUCTION

Vulnerability has no one singular defining trait. It exists across a diverse range of facets and characteristics and individuals and groups of people may be affected by different vulnerabilities at different times. Improvements to housing conditions in particularly poor areas can, for example, lead to improvements in health, wealth and disaster resilience among families receiving that support. Conversely, a natural disaster without that support is likely to lead those same communities to a situation of greater risk and vulnerability.

Ensuring the poorest and most marginalised people are not left behind by progress is central to the global 2030 Agenda for Sustainable Development and to reaching the Sustainable Development Goals. The 2030 Agenda, adopted by world leaders in September 2015, aims to end all forms of poverty, fight inequality, tackle climate change and protect the environment. In addition to emphasising the need to "leave no-one behind" is the need to focus on those whose needs are greatest, first.

Better definition of the pre-existing vulnerability of populations in Myanmar would also support earlier and better targeted emergency response. Effective prioritisation of emergency-affected areas for assistance requires an understanding of the incidence of pre-existing vulnerability of the affected areas along with the magnitude and severity of the damage. This prior analysis indicates potentially affected persons who are likely to need immediate support whilst more detailed damage and loss data is being collected. Once damage and loss figures have plateaued, pre-existing vulnerability remains a key element in determining mid-to-late relief phase allocations as well as the establishment of recovery priorities.

Meeting the needs of vulnerable and marginalised groups requires an understanding of who is affected, where and how. This in turn requires building an understanding of the various dimensions of vulnerability across the country, at the lowest possible level, and regularly monitoring changes to better understand the situation for communities and population groups in different areas. There is, as yet, no updated headcount of poor persons for Myanmar (i.e. a Union-wide consumption survey): The Integrated Household Living Conditions Assessment, last conducted in 2010, provides the most recent data but this is now outdated and available only at the state/region level. A new study is planned for 2018.

This report explores vulnerability at the township level across Myanmar using a multi-dimensional approach based on available published data. Most major surveys in Myanmar provide data at a broad state and region level. This can mask major differences within states - Shan State, for instance, is home to a vast range of contexts, including sparsely populated townships with few residents, conflict-and-displacement-plagued areas, and larger border cities which are experiencing much growth and change. In terms of data at the township level, the most comprehensive data sources tend to be the 2014 Housing and Population Census and routine administrative data collected by line ministries which are the basis for much of the analysis in this report.

The Vulnerability Index and clustering of townships allows a broad understanding of the diversity and distribution of vulnerable persons in Myanmar – both of which are critical factors to consider in developing strategies to address the various issues and risks affecting them. This composite index predicts for a range of underdevelopment, climate risk and conflict indicators. Whilst this model has been initially applied at township level, the logic would also hold true at village tract level were data at this level to be made available.

Some sectors could not be reflected due to the lack of publicly available data, highlighting the need for a more open approach to data sharing. Health and nutrition sectors could not be reflected due to the lack of publicly available township-level data, despite its collection by line ministries on a regular basis. The extent of analysis in some sectors was also limited where data was either not collected at all or not available at township level or for all townships. A more open approach is needed to encourage the sharing of collected data with information on the collection methods and data limitations to enable further analysis to support different programme and policy interventions which recognise the various dimensions of vulnerability.

This multi-dimensional approach to understanding vulnerability clearly indicates differences at township level which broaden our understanding of development needs and gaps across the country. Myanmar's 330 townships, however, are large administrative units with a mix of urban, rural and remote areas, and populations with sometimes significant variation in wealth and vulnerability. Further data and analysis will be required to understand the situation at village tract, village and also sub-village level, where participatory mechanisms such as community fora can play a key role in identifying families and individuals most likely to be left behind by progress.

WHY FOCUS ON VULNERABILITY?

Myanmar has recently made some remarkable development gains, opening possibilities for many of its people to enjoy new economic and political freedoms, but information on who has not yet shared in these improvements is not available. There is no countrywide analysis of poverty and vulnerability through which to better understand and address development needs and gaps, and much of the key data on poverty remains at state and region level.

Even so, unresolved development need quickly translates into humanitarian caseload with the onset of emergencies. Areas with high levels of vulnerability are most at risk with the impact of such events falling disproportionately on poor, landless and vulnerable people who have the least capacity to insulate themselves from stresses and shocks. Humanitarian response and disaster recovery can also be taxing on the national budget, distracting from development priorities. Where allocation of resources for response and recovery is inadequate, affected areas lag still further behind in terms of development progress.

A review of the existing literature identified three overlapping factors limiting equitable development and resilience building in Myanmar, namely (1) Conflict, discrimination, and instability; (2) Underinvestment, underdevelopment and the lack of strong social protection; and (3) Exposure to climate and hazard risks. These three core factors have formed the basis for this analysis and the presentation of this report.

The INFORM Index for Risk Management[2] **categorises Myanmar as having a very high and stable level of risk** based on country-level hazard exposure, vulnerability and coping capacity. Myanmar ranks 12th out of 191 countries globally - slightly ahead of Pakistan and Haiti and just behind Syria and Iraq. Concurrent with the findings of this analysis, Myanmar's high risk-ranking is due to large groups of vulnerable persons, poor institutional capacity and high exposure to natural and human hazards. Managing these risks is of critical importance to Myanmar's development.

[2] INFORM (2017). *Index for Risk Management – Results 2017.* The INFORM index is a global, open-source risk assessment for humanitarian crises and disasters designed to support decisions around prevention, preparedness and response. It is calculated at country level based on hazard exposure, vulnerability and coping capacity.

Myanmar continues to beset by world's longest-running civil conflict. Conflict tensions and local violence stem from several issues but remain deeply entwined with natural resource exploitation in some of these areas. Ongoing conflict and unequal distribution of the benefits of natural resources can fuel instability, corruption and division, discouraging investment which could otherwise provide employment and stimulate growth in Myanmar's resource-rich frontier areas.

Climate risks and conflict have massive, and often unaccounted for, economic dimensions. Extreme weather events and inconsistent weather patterns are anticipated to increase in both frequency and intensity. The severe flooding in 2015 exposed multiple economic vulnerabilities at both the household and institutional levels,[3] leading to a sharp rise in inflation (up to 16%), a 12% decline in exports, an increase in trade deficit and contribution to exchange rate fluctuations. The consequences can be long lasting; research on the impact of climate-related events has shown that affected populations could not resume their previous development trajectory as long as 20 years after a disaster.[4]

[3] World Bank Group – Macroeconomics and Fiscal Management (2015). *Myanmar Economic Monitor.*

[4] Hsiang S. M. & Jina A. S. (2014). *The Causal Effect of Environmental Catastrophe on Long-run Economic Growth: Evidence from 6,700 Cyclones.* Cambridge, Massachusetts: National Bureau of Economic Research

Section I
METHODOLOGY AND LIMITATIONS

This analysis is based on publicly available township-level data for the period 2014 to 2016 and a review of relevant reports and assessments. The aim has been to conduct an analysis of all townships countrywide, however any data analysis is limited by the quality and coverage of available data, neither of which are well documented in Myanmar. An exception is the 2014 Housing and Population Census - this is the main data source used. Other sources of data include line ministries, the Myanmar Information Management Unit (MIMU), Livelihood and Food Security Trust Fund (LIFT), UN agencies, the Centre for National Diversity and Harmony, Myanmar Peace Monitor, World Bank, and the Armed Conflict Location and Event Data Project (ACLED). More detail on the data sources used for this analysis is provided in annex.

The methodology was developed specifically for this analysis and included consultation on the technical approach and key findings. Two technical review meetings were arranged with statistics and information management specialists from Myanmar-based agencies to advise on the options and issues around data and validate the technical approaches and assumptions used in developing the Vulnerability Index. A validation workshop was held with staff of humanitarian and development agencies in March 2017 to review the main findings, the final clustering of townships and possible areas of intervention, and feedback from this workshop was brought into the final analysis.

The overall framework is based on three main drivers behind vulnerability in Myanmar – conflict and instability, exposure to climate and hazard risks, and underdevelopment/underinvestment. Relevant data was gathered and correlated to explore relationships across the various indicators in order to develop a working definition of vulnerability at township level. After a thorough combing of available data, 24 indicators were selected and analysed in 31 different combinations for the predictive value at township level against the dataset, identifying the most accurate index for use in further analysis, and the clustering of townships according to their specific characteristics.

VULNERABILITY INDEX

The Vulnerability Index is drawn from publicly available, township-level data. Some data which would normally be used to assess vulnerability is either not available in Myanmar, or not available at township level. Hence an iterative approach was taken to selecting indicators from available data which checked the reliability of the Index in predicting the results obtained by other analyses (see the Methodology Section in Annex for more detail).

The resulting Vulnerability Index reflects the differing development needs at township level, countrywide, as a resource for programming and further analysis. It combines units of measurement of human development with available data on impacts of conflict and violence over the period 2014-2016.[5] The Vulnerability Index comprises 10 indicators related to socio-economic and demographic factors as measured in the 2014 Census, and a Conflict Index based on reported number of clashes, fatalities, violence against civilians and displacement over this two-year period. These criteria were applied without weighting to develop a vulnerability score.

[5] A different approach is taken by The Asia Foundation in the study, *The Contested Areas of Myanmar: Subnational Conflict, Aid and Development (2017)* which separates these measurements and focuses on conflict-affected townships.

The results of this analysis also guided the areas of focus for the more detailed country analysis which is documented in this report. As such, vulnerability in this document refers to this specific combination of conditions that indicate:

- Insecurity, frequent changes in context, lacking in freedom of movement
- Isolation, remoteness, sparse infrastructure networks and little communication with commercial centres
- Poor housing, lack of savings, insecure livelihoods, those heavily dependent on the environment around them for their survival and sustenance

Components of the Vulnerability Index[6]

- % bamboo and thatch roofs
- % bamboo, earth or wood walls
- % of households without safe sanitation
- % of households not using an improved drinking water source
- % households without electricity for lighting
- % of persons with no formal identity documents
- Child dependency ratio
- % females who are not literate
- % of persons without a middle school education
- % of unpaid family workers
- Conflict Index (indices of clashes, violence against civilians, fatalities and displacement)

Figure 1 *Major Indicators of Vulnerability Considered for the Analysis*

	Major indicators of vulnerability considered in the analysis	Vulnerability Index components
DEMOGRAPHICS	% of persons with no formal identity documents Child dependency ratio Old dependency ratio % of persons with disabilities	% of persons with no formal identity documents Child dependency ratio
HOUSING AND AMENITIES	% of houses with bamboo or thatch roofing % of houses with bamboo, earth or wood walls % of houses with earth or bamboo floors % of households without electricity Number of communications devices per household	% bamboo and thatch roofs % bamboo, earth or wood walls % households without electricity for lighting
EDUCATION	% of men and women who are not literate % of persons with no formal education % of persons without a middle school education % of persons without a high school education % of children not attending school % of children who have never attended school	% females who are not literate % of persons without a middle school education
WATER AND SANITATION	% of households not using an improved drinking water source % of households without safe sanitation % of households with no toilet	% of households without safe sanitation % of households not using an improved drinking water source
LABOUR AND EMPLOYMENT	% of persons who are unpaid family workers Labour force participation rate	Unpaid family workers
CONFLICT AND DISPLACEMENT	% of the chronically displaced population % of clashes % of incidents of violence against civilians % of conflict fatalities	Conflict Index (indices of clashes, violence against civilians, fatalities and displacement)

[6] Township values, other than population numbers, are based on Census-enumerated population and may not fully reflect non-enumerated groups.

Further analysis clusters all 330 townships into 8 major typologies based on their socio-economic characteristics and demographics. For the purposes of this analysis, each township falls into just one of the eight township types, providing an indication of the specific areas of vulnerability at the township level. Clearly any given township will have a variety of conditions in different areas within the township, but the clustering is based on the township level data as the lowest level of data available for this purpose. The clustering by township is explored further in Section 4: Analysis of Township Clusters, and this report also includes a review by sector, drawing on available data as well as information and strategies relevant to addressing specific issues.

The clustering approach enables a clearer understanding of the differences between townships within and across states and regions. Figure 2 indicates the overall results of the clustering based on the data gathered from the 2014 Population and Housing Census and ACLED data from 2015-2016. The "approximate number of vulnerable population" is the number of persons in these areas particularly affected by some of the aspect/aspects of vulnerability covered in the Vulnerability Index, namely low levels of literacy, sanitation, electricity, access to improved drinking water, housing quality, access to services/opportunities requiring identity documents, and high child dependency.

Characteristics used to reflect Township typologies

- Literacy
- Child dependency ratio
- Highest level of education
- Absence of ID cards
- Safe sanitation
- Use of improved drinking water source
- Housing quality
- Urban population
- Use of electricity for lighting
- Conflict Index (indices of clashes, violence against civilians, fatalities and displacement)

Township Type 1 for example, clusters together 36 townships with particularly poor development indicators based on data from the 2014 Census (i.e. extremely low access to safe sanitation, improved water sources and electricity; lowest levels of literacy, education, availability of identity documents, and high child dependency). These townships also tended to have higher levels of conflict/tension in the review period based on the data gathered by ACLED. An estimated 2.7 million persons in these 36 Type 1 townships are impacted by some level of these vulnerabilities.

Type 4 on the other hand is a group of 74 townships which are also predominantly rural and have even lower access to electricity but tend to have significantly better levels of education, literacy and safe sanitation, and little conflict/tension. Nevertheless, a significant number of people in these Type 4 townships have limited access to improved drinking water and poor-quality roofing – and the total number of persons falling within the category of more vulnerable using the Vulnerability Index reaches 5.8 million persons.

This can be contrasted with the 34 predominantly urban townships with comparatively high overall levels of education, electricity, safe sanitation in Type 8, and availability of identity documents, as well as lower overall child dependency and ratings on the Conflict Index. Even so, based on these indicators, an estimated 1 million persons in these townships are still vulnerable and in need. Further analysis then identifies the specific needs; a review of the townships with the highest and lowest education levels for example reveals that Hlaingtharya township has particularly high numbers of children and young persons out of school - information which can be used to target the specific interventions and policies to effectively address these issues.

Use of the Vulnerability Index also allows an estimation of the vulnerable population per township. The approximate vulnerable population for each township (and subsequently each type) is calculated from the % vulnerable population (defined as the average of the various percentage factors in the Vulnerability Index), multiplied by the relevant township population. As such, no thresholds are applied.

Figure 2 *Overview of Township Typologies**

Type	Count of townships per type	Literate (%)	Child depen-dency ratio (%)	Highest education: none (%)	Highest education: at least middle school (%)	Absence of ID: total (%)	Safe sanitation (%)	Improved drinking water source (%)	Conflict Index (%)	Floor type: bamboo or earth (%)	Roof type: thatch/ bamboo roofing (%)	Urban popula-tion (%)	Electricity (%)	Approx. vulnerable population[7] (no. of persons)
1	36	50.87	58.80	59.06	15.64	52.69	35.17	41.85	43.79	49.44	42.01	12.15	19.02	2,733,320
2	25	67.35	58.67	42.56	27.87	26.29	57.50	44.33	41.67	53.89	35.68	20.47	22.63	1,519,749
3	21	70.09	52.09	36.83	32.00	23.72	74.79	61.48	70.99	23.65	25.51	28.33	34.24	1,402,254
4	74	91.86	53.41	14.25	33.43	28.62	68.53	57.82	91.22	27.47	52.62	14.97	11.62	5,817,188
5	64	94.47	39.72	12.05	31.17	23.84	73.84	73.63	96.29	42.28	40.20	12.00	15.23	4,484,117
6	65	92.78	42.30	12.69	39.29	23.84	80.45	75.88	87.26	34.89	30.05	28.21	40.44	4,957,216
7	11	95.49	38.91	7.42	51.84	25.49	89.18	73.71	93.72	27.95	21.90	64.66	61.64	734,867
8	34	97.74	25.65	3.51	76.15	14.14	96.65	96.99	97.25	6.13	4.11	97.24	94.76	1,026,422

Type 1: Extreme outliers in terms of development needs and/or exposure to conflict
Type 2: Conflict-affected areas with poor human development
Type 3: Hubs in conflict-affected areas
Type 4: Very low access to basic services and infrastructure
Type 5: Agricultural townships with the highest profits per capita
Type 6: Agricultural areas with secondary cities and towns
Type 7: Up-and-coming peri-urban and urban areas
Type 8: Affluent, densely populated city centres

**Township values, other than population numbers, are based on Census-enumerated population and may not fully reflect non-enumerated groups.*

[7] The approximate vulnerable population is the % vulnerable population (an average of the various percentage factors in the Vulnerability Index), multiplied by the relevant township population.

LIMITATIONS OF THE ANALYSIS

The Vulnerability Index is not an absolute or perfect measure, but provides an indicative means through which to compare the situation across townships. This analysis compares the situation across townships using specific indicators and through the application of a composite Vulnerability Index developed specifically for this analysis. Use of any such index has its limitations, most notably the relevance of similar indicators across different ethnic and geographic areas (such as housing type), the interplay of drivers and indicators (in this case conflict and well-being), the choice of indicators (limited in this case by the datasets which were available countrywide for the selected time period), and decisions around weighting of particular indicators within the Index to reflect greater or lesser importance. In this case no weighting was applied, and the final Vulnerability Index was checked against other countrywide analyses to ensure its validity.

Gaps in the 2014 Census enumeration have been an important consideration.[8] The dataset used to develop the Vulnerability Index was built around the Census as the largest and most complete dataset in Myanmar and home to key demographic, social and living conditions indicators. The Census was constrained however by the partial or non-enumeration of an estimated 1,206,353 persons, mainly in Rakhine State (an estimated 1,090,000 persons), but also in Kachin State (46,600 persons from 97 villages) and Kayin State (69,753 persons). For the few areas where data was provided only at district level, township population estimates were made based on township population proportions from another source (Ministry of Health).

Comprehensive data on the living conditions of non-enumerated populations was not available and the extent to which the situation differs from neighbouring areas can be inferred only from targeted studies. In Rakhine for example, smaller studies such as that conducted by CDNH indicate differences in living and socio-economic conditions with unenumerated populations being less resilient in general.[9] Vulnerability in non-enumerated areas may be still higher than estimated.

Several key gaps remain due to the lack of publicly available data, especially in the health and nutrition sectors and on protection issues. Data from the Health Management Information System (HMIS) continues to be collected annually at township level but has not been publicly shared for some time (the last available information is from 2011). The recent 2016 Demographic and Health Survey provides information only at the state and region levels and sample sizes for some sub-groups may be particularly small in some instances. More publicly-available data on health and nutrition at township and lower levels will be essential to enable evidence-based planning of health and nutrition interventions.

Proxy indicators have been used to account for the economic conditions of individual townships, given the lack of specific data such as Gross Township Product (an incomplete set was only obtained for 2015). These include roofing type, educational attainment levels, and access to electricity which speaks to the access to non-farm income and the labour productivity of an area.

The Conflict Index is based on data with a more limited timeframe from January 2015 to December 2016. The only available dataset covering Myanmar at the time of this analysis was the Armed Conflict Location and Event Data Project, gathered from media reports and available for a 2-year period from 2015. As such it does not account for events in 2014 and the reporting of casualties from events in late 2016 could not be fully verified. The Conflict Index which was finally included in the Vulnerability Index includes indices reflecting displacement, fatalities, violence against civilians and clashes, and available government data relating to casualties in the latter part of 2016.

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[8] Department of Population, Ministry of Labour, Immigration and Population (2015). *The 2014 Population and Housing Census: The Union Report.*
[9] Centre for Diversity and National Harmony (2015). *Rakhine State Needs Assessment.*

Hazard and climate risk have also not been specifically accounted for in this analysis. Climate risk exists in probabilities – a hundred-year storm for example has a 1/100 chance of occurring every year, hence such events could not be accounted for in the Vulnerability Index. The impact of previous disasters has also not been directly reflected, given the lack of reliable estimates of damages and losses incurred in previous years. A global review of the impact of climatic and conflict events indicates that communities affected by major crises can no longer reach their anticipated development trajectory,[10] suggesting that conflict and disaster-affected areas of Myanmar will continue to experience lower development progress, even after an extended period. Impacts up to 2014 may thus be reflected to some extent in the Census and other data as slowed growth trajectories, living conditions and access to basic services.

Urban population and population density have been excluded from the Index but are considered in the clustering of township characteristics; the reason for this approach is that living in an urban area is not an indicator of vulnerability or resilience but the generally better living conditions in pockets of high density urban population could have biased the results of urban over rural areas.

Gender dimensions have also yet to be explored in more depth. Whilst gender has been taken into account in some aspects of this analysis, further analysis is needed to tease out the relationship between vulnerability, well-being and gender. This should be done across all indicators and sectors to make the best use of the disaggregated data available in the Census.

[10] Hsiang S. M. & Jina A. S. (2014). *The Causal Effect of Environmental Catastrophe on Long-run Economic Growth: Evidence from 6,700 Cyclones.* National Bureau of Economic Research.

Section II
CAUSES OF VULNERABILITY

A review of the data and earlier assessments indicated that the most pertinent factors limiting equitable development and strengthening of resilience can be classified under three overlapping themes, namely:

- Climate risk and disaster management
- Conflict
- Underinvestment and underdevelopment

The following section explores each of these themes in more detail.

1 CLIMATE RISK AND DISASTER MANAGEMENT

Key Findings

- Climatic risks pose a severe threat to Myanmar, the brunt of which tends to affect the most vulnerable.
- Risks posed by climate change and extreme hydro-meteorological events can potentially impact very large numbers of people as was seen in the 2015 Union-wide flooding which displaced 1.6 million persons.
- There is danger of localised, urban flooding caused by sudden cloudburst, soil saturation and poor infiltration rates, poor infrastructure and maintenance (primarily insufficient drainage).
- 4% of the reported 3W activities over the past four years were designated as DRR interventions.

A United Nations report ranks Myanmar among the three countries most vulnerable to extreme weather events.[11] The high risk of natural hazard-related disasters as well as potential impact of climate change result from several factors, including Myanmar's geographical location, high numbers of population in hazard-prone areas, and existing socio-economic vulnerabilities. Many livelihoods, particularly in rural areas, depend on natural resources and the environment which are, in turn, under stress from increased population, commercial exploitation, climate change, and natural disaster.

As much as 3% of Myanmar's GDP is lost annually due to disasters triggered by natural hazards.[12] This leads to far-reaching implications, particularly for large numbers of poorer rural households, small businesses and farmers, and marginalised groups. Myanmar is also highly sensitive to climate change and its consequences, including sea-level rise, warming sea surface temperatures, salt water intrusion in its river deltas, prolonged droughts, and the impacts of shifting weather patterns on agriculture. Efforts are underway to strengthen technical, legal, and financial capacities to reduce risk and mitigate the effects of climate change.

Extreme weather events and inconsistent weather patterns are anticipated to increase in both frequency and intensity; managing these climate risks is of critical importance to Myanmar's development. A review of the impact of almost 7,000 storms by the American National Bureau of Economic Research has shown that economic losses from climate-related hazards may be not only severe, but effectively permanent. Long-term

[11] United Nations Office for Disaster Risk Reduction (2015). *Global Assessment Report on Disaster Risk Reduction 2015.* New York: UNISDR.

[12] Ibid.

effects eclipsed the direct economic losses usually identified in the aftermath of major disasters, and affected populations were unable to resume their previous development trajectory even 20 years after the disaster.[13]

Climate risks and conflict also have massive, and often unaccounted for, economic dimensions. The severe flooding in 2015 exposed multiple economic vulnerabilities at both the household and institutional levels. According to the World Bank,[14] the impact of the flooding resulted in a sharp rise in inflation, peaking at 16% in October 2015, a decline of 12% in exports, an increase in trade deficit and contributed to exchange rate fluctuations. The effects of these extreme weather events (and increased inconsistency in weather patterns) will fall disproportionately on poor, landless and vulnerable people in coastal regions as well as those in the central Dry Zone who have the least capacity to insulate themselves from the effects of climate change.

Measurement of climate risk in Myanmar remains challenging. Whilst direct conflict could be reduced to a township index for the purposes of this analysis, climate risk has proved more difficult to quantify due to the inability to predict the pattern of future disasters and lack of comprehensive data on the damages and losses from earlier disasters or current and future events. Many details about previous hydro-meteorological disasters have been lost or are no longer available. There is a lack of water-related data, and available data is often locally held and dispersed across a wide range of entities: the management of water resources, as a key example, is spread across at least 15 government agencies.

It is known that climatic risks and its associated shocks and stresses pose a severe threat to Myanmar. The Germanwatch Global Climate Risk Index places Myanmar as one of the three countries most affected by extreme weather events between 1996 and 2015. Risks posed by climate change and extreme hydro-meteorological events have the potential to impact the population on a far larger scale than the ongoing conflicts in the country: the 2015 Union-wide flooding displaced 1.6 million persons, almost a million more than the estimated conflict-displaced population.

The social and economic impact of such events can also be extremely high; according to the World Bank, the immediate economic impact of the 2015 floods in terms of physical assets destroyed and production losses amounted to 3.1% of GDP in 2014/2015. The largest impacts of the disaster fell disproportionately on the most vulnerable members of society, in Chin, Rakhine and Ayeyarwady. Resources for medium-term recovery were sparse as line ministries sought to absorb recovery works into their regular budgets, leading to recovery measures competing with their already limited allocations.

Managing this risk will require the development and implementation of systematic strategies and policies. Myanmar's first National Climate Change Policy was validated in April 2017, along with a Climate Change Strategy and Action Plan to be implemented over the period of 2016-2030. One of its priorities is the management of climate risk for people's health and well-being, which includes specific attention to supporting communities and economic sectors in their ability to respond to and recover from climate-induced disasters, risks and health impacts, and build a healthy society.[15]

Further research is needed to accurately identify climate risks to begin to address the massive human and economic toll of extreme weather events, the compounding effect of multiple stresses and the costs of transition and adaptation. These costs will most likely fall on the least resilient members of society who tend to be most dependent on their environment for food, water, fuel and shelter materials. The absence of insurance coverage and low relief allocations by the government also result in affected households assuming a disproportionate amount of climate risks. New financing instruments could usefully be developed to combine contingency funds and disaster insurance with appropriate procedures to support the rapid and coordinated disbursement of funding and implementation of relief activities.

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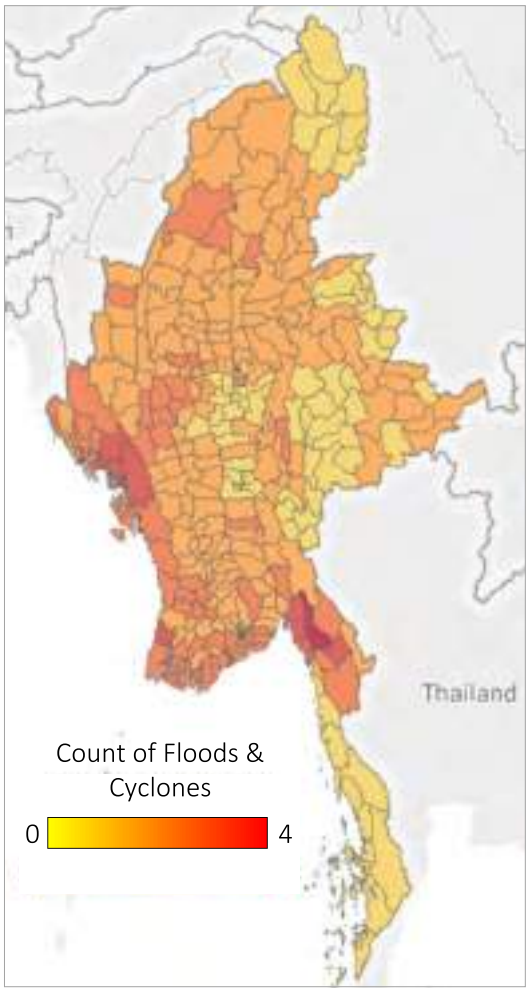
[13] Hsiang S. M. & Jina A. S. (2014). *The Causal Effect of Environmental Catastrophe on Long-run Economic Growth: Evidence from 6,700 Cyclones.* Cambridge, Massachusetts: National Bureau of Economic Research.
[14] World Bank Group – Macroeconomics and Fiscal Management (2015). *Myanmar Economic Monitor.*
[15] Department of Meteorology and Hydrology (2012). *Myanmar's National Adaption Programme of Action to Climate Change.*

DISASTER MANAGEMENT MECHANISMS

Figure 3 *Areas Affected by Significant Flooding and Cyclones (2008-2015)*



The larger the numbers of vulnerable persons and the greater the depth of their privation, the greater the risk of a humanitarian caseload in the event of a crisis or emergency. Humanitarian responses and disaster recovery can be very taxing on the national budget, distracting from development priorities. Insufficient allocation of response and recovery funding leaves the affected area(s) lagging behind their neighbours without the same productive capacity to contribute to the overall economy.

There is currently no emergency management system which is accepted by all Union Ministries. Individuals in the upper ranks of the civil service are largely in charge of directing responses. Depending on the magnitude of the disaster, the official in charge of government response work is either the Permanent Secretary of Ministry of Social Welfare, Relief and Resettlement (MoSWRR) or the Director-General of the Relief and Resettlement Department (RRD). The lead for disaster management was recently moved to the Ministry of Home Affairs whereas the MoSWRR is home to the only functioning Emergency Operations Centre, manages the Disaster Management Training Centre and is taking the lead in the establishment of National Rapid Response Teams.

State/region preparedness for disasters is uneven and often limited. Some have more robust mechanisms for needs assessments and the allocation and disbursement of aid. A more thorough assessment of state/region disaster management capacities is needed, recognising also the importance of engaging more deeply with state and region administrations which are more engaged in direct service delivery. There is a pressing need to overcome cross-ministerial bottlenecks and to develop consolidated expenditure-monitoring and budgeting systems that are aligned with the national relief/recovery frameworks and able to accommodate a range of funding sources.

Developments around Myanmar's national disaster management systems are still underway, providing the opportunity to establish the strong, centralised systems that Disaster Management in Myanmar currently requires. The Ministry of Social Welfare is leading revision of the Myanmar Action Plan on DRR, which will guide government priorities for the next 5 years. The committees and sub-committees of the NNDMC are also being reformed. These efforts will need to be linked with work in the Ministry of Home Affairs, which heads the Search and Rescue Committee, whose functions and terms of reference run parallel to the NNDMC. With both committees signed into law there is a need to clarify where national-level disaster management funding and capacity building should be directed.

Investments in disaster risk reduction and resilience building should be seen as productive and necessary, according to the National Bureau of Economic Research. Suffering a major disaster can alter not only the physical but also the political and economic landscapes, severely delaying development plans and legislative priorities or creating additional debt; emergency response funding mostly consists of public monies – funds that were intended for other priorities. To avoid this and maintain stability for the population, it is necessary to invest in resilience, specifically in strengthening the population's capacity to absorb and/or adapt to shocks and stresses.

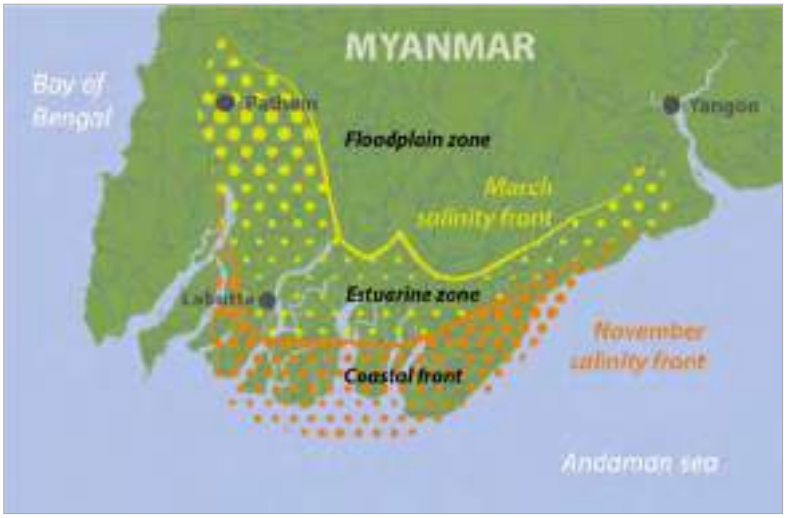
ENVIRONMENTAL DEGRADATION AND VULNERABILITY IN THE AYEYARWADY DELTA

The Ayeyarwady delta is one of the most populated and vulnerable parts of the country. It can be broken into four large sub-regions;[16] the lower delta which is permanently affected by saltwater intrusion; the middle delta which is seasonally affected by saltwater intrusion; the upper delta which is beyond the current reach of saltwater and has the best farmland; and the urbanised deltaic areas around Yangon. The lower, middle and upper delta areas correspond roughly to the coastal, estuarine and floodplain zones (see Figure 4). Monsoonal climate for the delta results in an average annual rainfall varying from 2,500 mm in the southeast to 3,500 mm in the southwest of Ayeyarwady Region, much of it falling between May and December. The coastline is thought to have been stable for more than 150 years, advancing at 0.34 km in the past century.[17]

Various compounding factors influencing Myanmar's vulnerability to climate change converge in Ayeyarwady. These include dependency of employment and national income on climate-sensitive sectors; the concentration of populations and economic activities in coastal zones and low-lying areas; exposure to geological and meteorological hazards (e.g. earthquakes, floods, cyclones and tsunamis) as a result of the country's location; high poverty levels which affect capacity to respond to climate change related impacts; and limited technological capacity to prepare for the impacts of climate change or the consequences of climate change related events.

Human activity is exacerbating the impact of major climatic shocks and stresses such as global warming, cyclonic risk, sea-level rise and increased salinisation, through the construction of multiple dams, deforestation of mangroves and extensive dredging in the Ayeyarwady delta. The environmental impact of the major damming projects is yet to be fully understood.

Figure 4 *Average Salinity Intrusions in the Ayeyarwady Delta – MYFish, Delta Alliance*



One of the most immediate climatic risks posed to deltaic communities is the degradation of water sources. Major risks to water resources in deltaic and coastal areas include pollution (mainly from mining, industrial and agricultural waste as well as untreated wastewater), overexploitation of water sources in the dry season, extreme variations in river flows, storm surges and flood risks, and the siltation of water sources and reservoirs which remains a largely unexplored issue but is understood to be increasing due to the rate of deforestation.

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[16] Driel, W.F. van & T.A. Nauta (2014). *Vulnerability and Resilience Assessment of the Ayeyarwady Delta in Myanmar. Full assessment phase. Delta Alliance report no. 10.*

[17] Ibid.

Figure 5 *Change in Mangrove Cover, Ayeyarwady Delta 1978-2011 – Global Environmental Change*

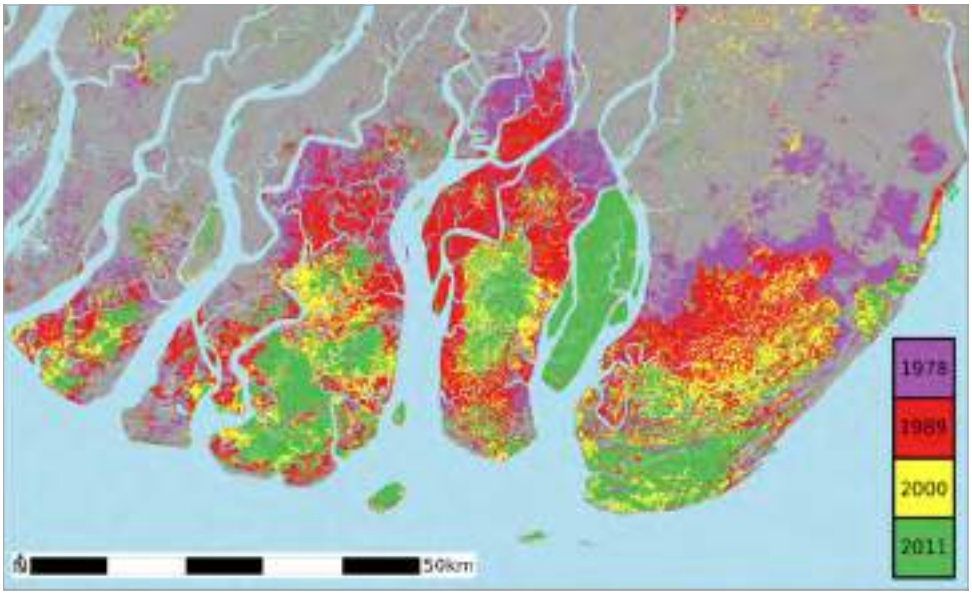
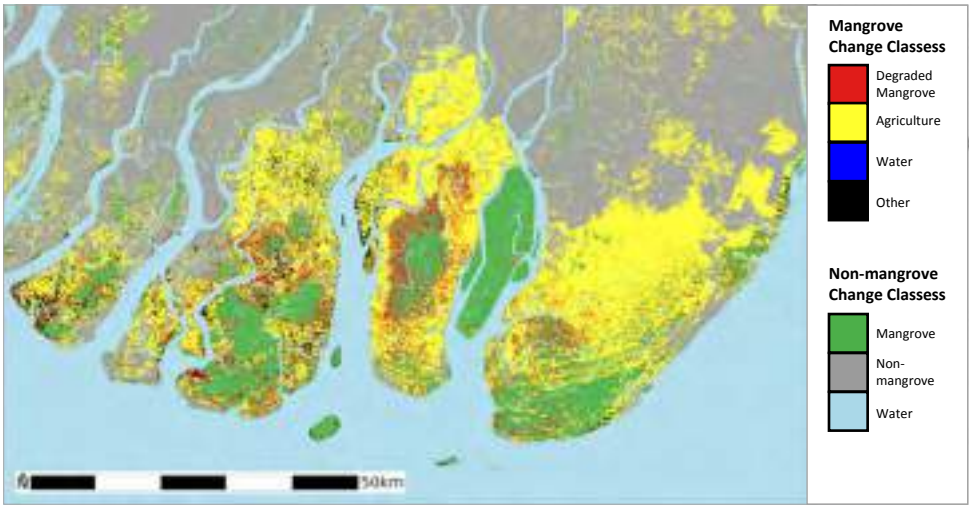


Figure 6 *Causes of Loss of Mangrove Cover in the Ayeyarwady Delta 1978-2011*



Large-scale degradation of mangroves is removing the natural protective barrier and increasing the intensity of storm surges and cyclonic events for coastal populations. Mangroves also play an important role in the desalination of seawater, protecting reefs and sea-grass beds, harbouring significant biodiversity and protecting shipping lanes by trapping excess sediment. However, 83% of the 679,019 acres of mangroves have been lost over the 33-year period to 2013, and the remaining 17% of mangroves are degraded and cannot produce seeds of sufficient quality for reforestation and reproduction due to the expansion of agriculture and the development of shrimp and fish ponds.[18] Figure 5 shows the reduction of mangroves in the Ayeyarwady delta over a 33-year period to 2011.[19]

Shrimp farming, an important economic sector for residents of the Ayeyarwady Delta, provides a much greater return on investment and labour than small-scale farming. Its spread, however, is accompanied by loss of mangroves and deforestation, coupled with increasing pollution and reduction of biodiversity. This opens spaces for invasive pests and vectors as well as diseases amongst marine life – factors which could erode these gains and reduce the resilience of shrimp farmers. The Delta Alliance (amongst many

[18] Ibid.
[19] Webb, E.L., et al., Deforestation in the Ayeyarwady Delta and the conservation implications of an internationally-engaged Myanmar. Global Environ. Change (2013), http://dx.doi.org/10.1016/j.gloenvcha.2013.10.007.

other agencies) has called for additional national-level water-resource management policies, monitoring and enforcement – supporting the implementation of the newly passed Environmental Impact Assessment Act might go some way in resolving this.

In addition to these numerous stresses on an already degraded ecosystem, cyclonic risk and flash floods have the potential to cause extreme and effectively permanent damage and loss. Localised, urban flooding can also cause significant losses and may be caused by sudden cloudburst, soil saturation, poor infiltration rates, poor infrastructure and maintenance (primarily insufficient drainage). The Delta Alliance have also noted that Yangon, and urban areas in general, require stronger solid waste management practices and policies. Community managed options with government incentives have been successful in solving these issues in other countries.

Further challenges for the Ayeyarwady Delta, and the country as a whole, are anticipated over the next century.[20] This is mainly due to the possibility of increased temperatures, longer droughts and increased rainfall compounding the current problems with water scarcity and quality as well as flood risk. A summary of these predictions is included below:

Deltaic, riverine and coastal populations face numerous intersecting challenges, all of which weigh on their capacity to respond to and recover from natural and man-made shocks and stresses. This review of the major issues affecting the Ayeyarwady delta traverses multiple major factors and causes of vulnerability in Myanmar. Localised interventions based on geospatial information and local knowledge should still form the core of programmatic actions to address the challenges in these areas while also incentivising exposed populations to adapt to climate change and begin transitioning. This will, in turn, require open, transparent and accessible communications on the risks and benefits of climate change adaptation.

Townships affected by cyclone Nargis continue to have particularly high concentration of aid agencies and programmatic interventions. A cursory look at reported 3W activities from 2012 to 2016, at least four years after cyclone Nargis, indicates that 10% of all activities in the affected areas occurred in just 4 townships in Ayeyarwady; they are Bogale, Labutta, Mawlamyinegyun and Pyapon.[21] It is probable that their exposure to cyclone Nargis may have permanently altered their growth trajectories and that is the main reason for their vulnerability and high concentration of 3W activities.

Figure 7 *Climate Change Predictions – National Adaptation Programme of Action, 2012*

Predictions for 2001-2020	Predictions for 2021-2050 (compared to 2001)	Predictions for 2051-2100 (compared to 2001)
• Increase of ~0.7 °C in Ayeyarwady • Increase in clear sky days in northern and central Myanmar, exacerbating drought events • Highly variable rainfall throughout the country with only a small increase in Ayeyarwady. Increase in floods and droughts from variable rainfall conditions	• Increase of 1.4 °C in Ayeyarwady • Increase in annual rainfall of approximately 250 mm in the Ayeyarwady Delta; longer periods of heavier rains • Longer dry spells	• Increase in 3.5 °C in Ayeyarwady • An increase of approximately 450 mm of rainfall in Ayeyarwady; weakened monsoon climate, worsened by decreased cloud cover and an increase in drought periods across most of Myanmar

[20] Department of Meteorology and Hydrology, Ministry of Transport; Ministry of Environmental Conservation and Forestry; & United Nations Environment Programme (2012). *Myanmar's National Adaption Programme of Action to Climate Change.*
[21] The MIMU 3W, or Who is doing What, Where, describes the implementation of humanitarian and development activities by agencies (non-governmental organisations, United Nations, Red Cross). Currently over 200 agencies report their activities through this system every 6 months.

WATER RESOURCES MANAGEMENT AND VULNERABILITY IN THE CENTRAL DRY ZONE

As with the Ayeyarwady delta, the central Dry Zone has already been extensively studied and much high-quality research has already been made publicly available. Several features of the central Dry Zone make specific parts of it especially vulnerable to climatic shocks and stresses, and in need of dedicated and consolidated watershed management.

The 10.4 million residents of the 85,859 km^2 central Dry Zone (12.8% of the Union's land area) are spread across 56 townships, predominantly in Sagaing, Magway and Mandalay. However, as can be expected from such a large swathe of the population, the residents of the Dry Zone – apart from experiencing a lack of reliable access to water resources – are neither uniform in their demographics, socio-economic status, relative capacities and vulnerabilities, or even the climatic conditions which they experience. What they do all share is increasingly erratic rainfall levels due to climate change which increasingly impairs agricultural and pastoral activities. Typically, the mean annual rainfall in the Dry Zone ranges from 500-1,000 mm, well below the 2,000 - 5,000 mm experienced by the rest of the Union. Temperatures often reach 40°C in the dry season and evapotranspiration rates are double those of rainfall.

Rain-fed agriculture remains the primary source of livelihood for the large rural population in this area. The Dry Zone produces most of the Union's oilseeds, pulses, more than a fifth of its rice, about half the cattle and more than two-thirds of all sheep and goats. Even so, less than 16% of the 515,000 hectares of cultivated land in the Dry Zone has irrigation infrastructure, with a still lower proportion of farmland actually being irrigated.[22]

Lack of capacity to manage variability in water resources is the source of much of the prevailing poverty and food insecurity in the Dry Zone. Irrigation investments are underperforming to a noticeable extent; the Nyaung-U Pumped Irrigation Project for example, was able to irrigate only 26% of the areas targeted in the wet season and 15% in the dry season. A 2012 Auditor General's Office report found that 67 river water pumping stations achieved just 16.3% of their target with some reservoirs and diversion dams not supplying water at all.[23]

Restricted access to energy and electricity is the biggest constraint to the effectiveness of irrigation systems. Census data shows access to electricity to be highest in the more urban townships of Monywa, Sagaing and Pakkoku. While this may be the result of the slowly extending grid, rural areas are clear priorities for electrification and energy provision, and particularly those areas in which less than 10% of the households were found to have access to electricity (Sinbaungwe, Natmauk, Pauk, Myaing, Myothit, Kamma and Mindon in Magway and Ayadaw, Tabayin and Kani in Sagaing).

Despite the large irrigation subsidies, these massive public expenditures remain too expensive for many farmers. The operational cost estimated by the Ministry of Agriculture for pumped irrigation projects in 2013 was MMK 40,000-45,000 per acre, whereas farmers paid a standard MMK 6,000 to 9,000 per acre for the full irrigation of crops in the dry season.[24] IWMI's community survey also found the distribution of these water resources to be very unequal and lacking in adequate structures to regulate and coordinate water distribution, leading to conflicts between large-scale and small-scale farmers. These factors suggest that public expenditures in these areas could possibly be more effectively allocated and managed to reduce levels of vulnerability.

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[22] Johnston R. et al. (2015). *Improving Water Management in Myanmar's Dry Zone: for food security, livelihoods and health. International Water Management Institute.*

[23] Ibid.

[24] Ibid.

The groundwater reserves of the Dry Zone are not as vast as previously thought. Sustainable use of these resources would yield only an estimated 50% of the current surface water storage volume. This would allow up to 26.3% of the Dry Zone to be irrigated if no further paddy fields were considered for irrigation and the maximum sustainable amount of groundwater extracted.[25]

Climatic change has led to the earlier retreat of the monsoon as well as severe and pronounced episodes of flooding in parts of the Dry Zone. Recent events included cyclone Nargis, the 2011 Pakkoku Floods and the major floods in 2015 which, in areas like Pwintbyu, displaced 115,478 persons (70.5% of the population) and flooded 25,358 houses.[27] Much of the water management infrastructure in the Dry Zone was not built to withstand such heavy rainfall and spillways are often inappropriately designed and/or managed to cope with the flooding.

Figure 8 *Annual Precipitation – AWP 2017* [26]

Meanwhile, deforestation, overgrazing, excessive harvesting of trees for fuelwood and poor farming practices have led to soil erosion and land degradation. Desertification is increasing, leading to the loss of productive land and excess sedimentation in canals due to lower water flows, causing damage to pumps and increasing the difficulty of navigating the rivers that run through the area.

Evidence-based decision making is hindered by the lack of water-related data and the fragmented systems of water resources management. At least 15 government agencies hold some level of responsibility for water resources management, and water-related data is dispersed among government departments, districts and irrigation schemes. Consolidation of public water resource resource management was one of the major WASH-related recommendations in both the Post-Floods-and-Landslides Needs Assessment and National Recovery Framework and Plan for the 2015 Union-wide flooding.

Some progress has been made over the last few years including the creation of a National Water Resources Committee to coordinate water resources planning and information dissemination, as well as significant levels of donor support to specific water resources management projects. There is still a need for an effective and comprehensive water-related data management system with contemporary approaches to monitoring networks, data collection and analysis as recommended by IMWI to avoid over-exploitation of water resources and reduce vulnerability in the Dry Zone.

Health interventions still dominate the reported agency activities in the Dry Zone. The higher concentration of agency activities in the more affluent and urbanised areas such as Pakkoku, Yenangyaung, Meiktila and Monywa may be less of an indication of vulnerability than their population density.

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[25] Ibid.
[26] Drury, L.W., *Hydrogeology of the Dry Zone - Central Myanmar.* The Australian Water Partnership (2017).
[27] Emergency Operations Centre (2015). *National Natural Disaster Management Committee Situation Report on the 2015 Flooding and Landslides (#1-6).* Nay Pyi Taw: National Natural Disaster Management Committee.

Reducing levels of vulnerability in the Dry Zone will require a focus on several issues, including the priority investments for effective water management identified by IMWI and LIFT.

- The development of larger, community-based grant-or-loan-based financing schemes to enable the construction and maintenance of more major infrastructural works such as deeper and better-sited dams and water harvesting structures.
- Additional investment in agricultural extension services, including the requisite budgeting not only for manpower but for transport and other operational costs incurred in reaching remote locations.
- Additional allocations for research, data analysis and dissemination of evidence to support informed decision-making amongst both public and non-governmental entities; this includes more widespread data sharing and the concerted consolidation of information.
- The consolidation of water resource management – including the development of hydroelectric dams, irrigation and other key infrastructure – under one to two major national-level committees (perhaps in tandem with the Climate Change Adaptation Committee). At the local-level, watershed management strategies employed in other contexts should be more thoroughly considered.
- The incentivisation – either through public or agency funds – of increased diversification away from paddy and large livestock (cattle and sheep are particularly water-intensive) towards oilseeds, nuts, poultry and forms of non-farm income.
- Prioritisation of soil and water conservation measures through economic means, including by extending the electrical grid to reduce reliance on fuelwoods, enforcement of penalties for illicit deforestation and the development of agroforestry industries to induce reforestation (which will also improve flood control).

In conclusion, vulnerable households are already the most exposed to and assume much of the risk for major climatic shocks and stresses such as cyclones/storms, floods and changing weather patterns. Concerted and coordinated preparedness efforts will be needed at both the national and local levels to better support rural populations through upgrading their living conditions or the construction of disaster-resistant shelters.

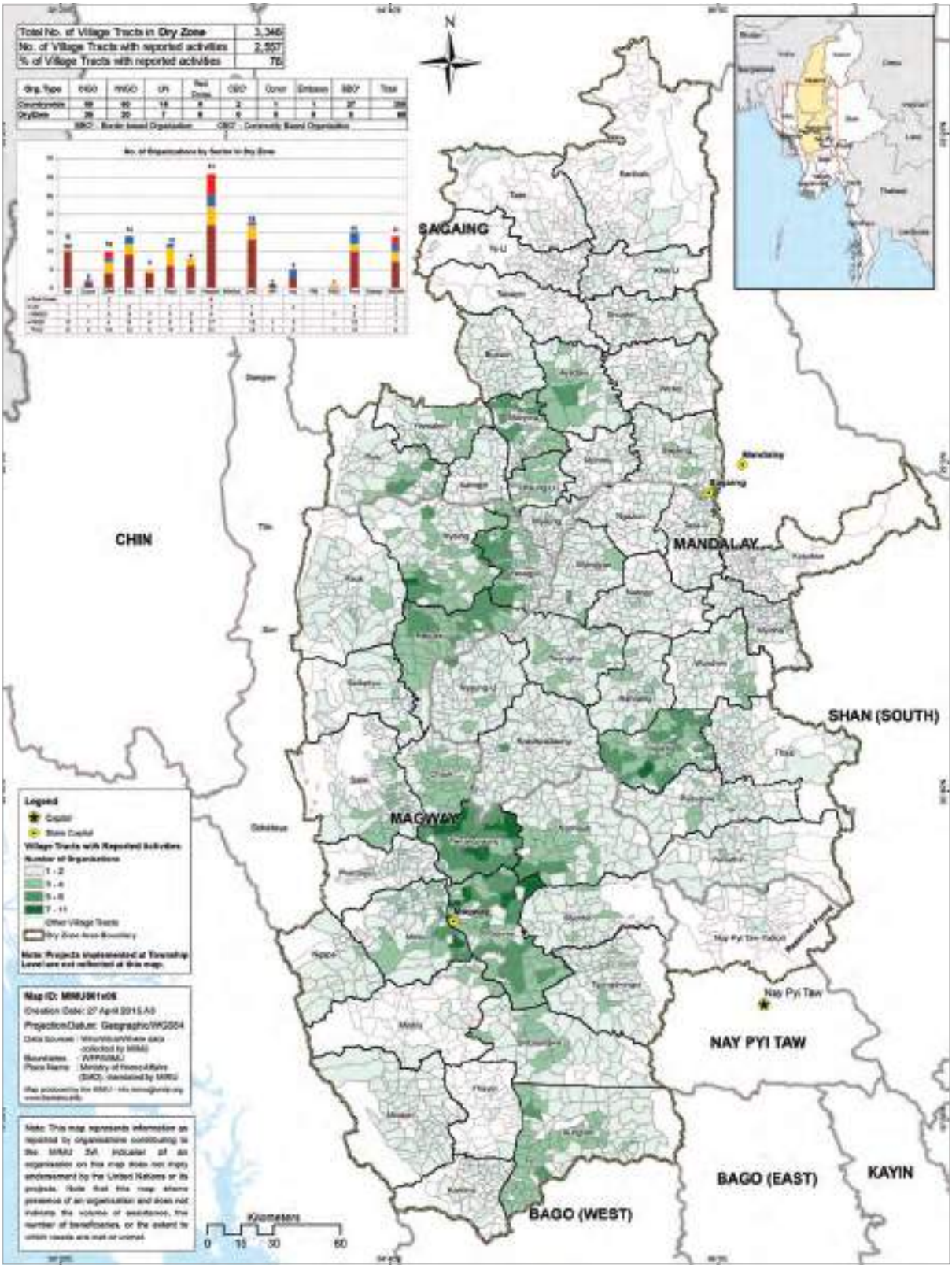
Policymakers should think of climate change adaptations not so much as cost sinks but as "protective and productive" investments. New technologies and investments represent a massive economic opportunity for many persons in what is ultimately a necessary undertaking. Investment is needed for iterative and experimental programming with appropriate monitoring and evaluation to enable thorough analysis of the effectiveness of suggested solutions. Additional redesign of potential solutions should be tested to ensure that they are adequately adapted for the wide range of contexts across the Union.

Independent of the considerable economic consequences and risks posed by climate change, extreme hydro-meteorological events have the potential to cause other human impacts on a far larger scale than the ongoing conflicts and protracted crises in the country. The most recent major climatic events - the 2015 Union-wide flooding - displaced 1.6 million persons, almost a million more than the estimated conflict-displaced population. With insufficient investment in recovery there is also the possibility of chronic displacement for flood-and-landslide affected persons, even for those with proper titles and deeds to property.

Efforts are needed to address the role of household debt in disasters and its possibility to trap persons in a cycle of poverty. Steps such as those taken by Pact following the 2015 floods[28] – namely restructuring outstanding loans in disaster-affected areas and recapitalising some clients – can enable households to recover

[28] Jason Meikle, personal communication, November 2016.

Figure 9 *MIMU 3W – Organisations' Activities in the Dry Zone*



more quickly and avoid this cycle of poverty. This, as well as the experience of microfinance institutions in typhoon Haiyan in the Philippines, indicates that whilst natural disasters do represent risks to creditors, they may be mitigated at an institutional level and the investment of insuring portfolios as a whole is an important step. Furthermore, debt forgiveness was generally rare and unnecessary except in the most extreme of cases.

There is a need for both greater and stronger centralisation and national-level planning as well as local-level adaptation and participation in the design and implementation of interventions. At the national-level, greater clarity is required from government on how climate risks and natural disasters will be managed. The use of geospatial data (and the capacity to collect and employ it) remains low; this gap in national-level coordination has left much space for local-level experimentation and adaptation, but it also means that interventions are not nationally or even regionally coordinated to allow the government to benefit from employing interventions at scale.

At the local-level, recent surveys have gathered a number of recommendations to mitigate the impact of cyclones in particular. The Vulnerability and Resilience Assessment of the Ayeyarwady Delta, as well as A Study on Knowledge, Attitudes and Practices (KAP) for Disaster Risk Reduction in Rakhine State by REACH, both published in 2015, have uncovered some useful data. Bearing in mind that the survey area, northern Rakhine, is one of the most vulnerable areas of the country with some of the lowest levels of well-being (such as Pauktaw) and highest numbers of vulnerable persons (Maungdaw), the REACH survey found that:

- 75% of households report that their important documents are safely stored in one place, and 48% have emergency food supplies. However, 35% of persons did not know where to go in the event of a disaster, and 80% of people said that they would consider the circumstances prior to evacuating all household members, primarily due to the need to safeguard property.
- 63% of those surveyed saw construction of stronger cyclone shelters as an immediate priority for mitigation, while a third felt that awareness-raising would reduce the impacts of disasters. A third also cited the need to rehabilitate local ecosystems, with 18% specifically citing mangrove restoration.
- Though slightly more than half of interviewees said that they would be likely to focus on their own households and would not have time to support the community as a whole, REACH noted that community cohesion, in several instances, can be quite strong and point to the key role of "emergency organisations such as youth volunteer groups in providing help during disasters."

However, there is also some cause for concern: 42% of those interviewed did not know who was responsible for performing various functions during a disaster. Only 13% of interviewees reported that their community has a disaster management committee and just 6% had taken part in a disaster preparedness drill. Though these results came from some of the most vulnerable townships in the country, with the least educational attainment, their relative vulnerability and unfortunate familiarity with both climatic risks and conflict may have improved their knowledge of disasters. Additional research and learning is required to better tailor interventions in other areas.

Significant opportunities for disaster management interventions exist at all levels in Myanmar, from national and state/regional level institutional capacity-building and policy development to local level awareness raising, risk assessments and investment in resistant infrastructure. 4% of the reported 3W activities over the past 4 years were marked as specifically DRR interventions; this is particularly important given that every dollar spent on preparedness results in seven dollars saved in aid expenditures.[29] Further focus continues to be needed to mitigate the potential adverse consequences of disasters countrywide, including for particularly vulnerable coastal and estuarine areas, as well as in the central Dry Zone.

[29] United Nations Development Programme (2016). *#Act Now – Save Later* Campaign; retrieved from http://www.undp.org/content/undp/en/home/ourwork/get_involved/ActNow.html on 12 December 2016.

2 CONFLICT

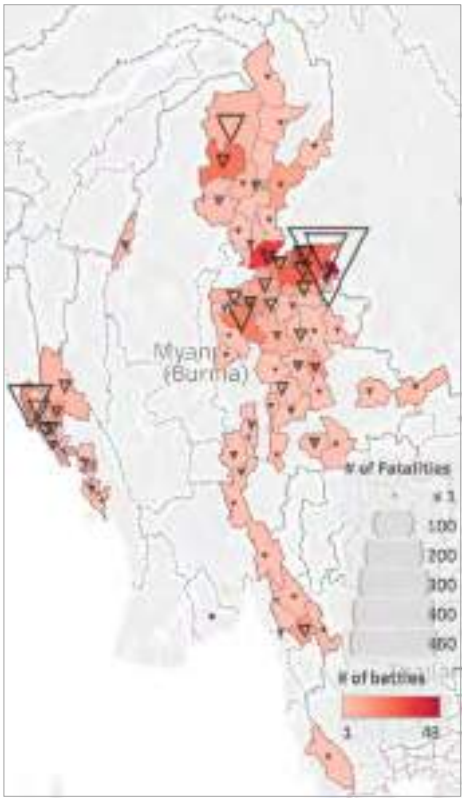
Key Findings

- Myanmar has the longest-running civil war in the world, with widespread displacement, contamination by unexploded ordnance, and violence against civilians in conflict areas.
- An average of 19.8% children in areas that were directly conflict-affected in 2015-2016 have never attended school, compared to 9.7% of children in townships not affected by conflict in that period.
- Conflict-affected townships see an average of 34.7% of their population achieving no educational attainment. In non-conflict-affected townships, this is 17.1%.

Myanmar has the longest-running civil war in the world with widespread displacement, UXO contamination and violence against civilians in conflict areas. Conflicts occurred primarily between the central government and non-state armed actors. As indicated by the attention to nationwide ceasefire and peace processes, peace and stability have been clearly recognised by Myanmar's previous and current administrations as preconditions for economic development and poverty alleviation.

Few datasets are publicly available on conflict and unrest in Myanmar. This analysis covers the period January 2015 to December 2016 and is drawn from the Armed Conflict Location and Event Data Project (ACLED) dataset which is designed for disaggregated conflict analysis and crisis mapping, as well as government figures,[30] and the NFI-Shelter-CCCM Cluster Analysis. All of these are publicly available. This analysis does not extend to the background of the conflict or areas which may have experienced latent conflict in this period; it should be recognised however that development indicators and opportunities in areas affected by conflict over past years are also likely to have been compromised.

Figure 10 *Clashes Recorded in 2015-2016*



The period 2015-2016 has seen conflict in the northern and eastern parts of the country, and in Rakhine. Based on information from the Armed Conflict Location and Event Data Project, this two-year period saw 800 events of political violence and protest, including 538 clashes, 1,095 recorded conflict fatalities, and 77 instances of violence against civilians.[31] At least 13.5% of conflict fatalities were reportedly non-combatants.

Data shows that these patterns of violence have held fairly constant since 2011, mostly involving non-signatory groups to the Nationwide Ceasefire Agreement. This has included recurring hotspots of violence located primarily in areas of Kachin, Shan and Kayin, including noticeable jumps in conflict in northern Shan

[30] With the lack of independent verification of the death toll resulting from the recent escalations of violence in Rakhine State, the analysis has used the last official death toll as provided by the government.

[31] Note that clashes/protests refer to event/days, as such a 2-day clash/protest will be recorded as two events, one on each day.

State, beginning in 2014. 65% of all clashes were between the Northern Alliance and the Military over 2014 to 2016, resulting in 70% of all conflict fatalities in this period. Rakhine also experienced a significant escalation in military operations in late 2016; government figures at the end of 2016 indicate that 65,000 persons had fled to Bangladesh whilst an additional 23,000 persons were internally displaced and 134 persons had died as a direct result of the violence.

Figure 11 *Clashes in 2014*

Figure 12 *Clashes in 2015*

Figure 13 *Operational Areas of Non-State Armed Groups (2015)*

Source – Myanmar Peace Monitor

The specific issues and grievances which drive conflict and unrest in Myanmar have held fairly constant over the past few years. Opposition to, and dissatisfaction with, the National Education Bill was the cause of widespread protests and demonstrations in 2015 (77 riot/protest events). Other prominent grievances related to the construction of dams and the associated displacement of human populations, as well as issues of remuneration and the need for the enforcement of terms of agreement between mining and construction firms and displaced populations.

The main areas of grievance over this period have related to armed conflict, displacement, riots and protests. Civilians formed the largest group of recorded fatalities apart from casualties from the intense 2015 Kokang conflict in this period; at least 13.5% of conflict fatalities were non-combatants. Clashes between non-signatories to the Nationwide Ceasefire Agreement and with the military are responsible for 65% of all clashes and form 70% of all conflict fatalities. Causes of outbreaks of violence include competition for control of strategic/commercial interests and the ownership and management of natural resources, clampdowns on illegal logging and drug cultivation, and overlapping territories and failure to adhere to agreements over controlled areas.[32] Protracted conflicts have sustained crises in governance, as territorial arrangements between conflict parties are rarely formalised; conflict areas often contain a mixture of government-controlled, paramilitary-controlled, ethnic armed organisation-controlled and vast areas of 'mixed authority' arrangements. The effect on governance impacts in turn on access to services and specifically who provides what services and the population able to access them.

[32] Burma News International (2015). *Deciphering Myanmar's Peace Process: A Reference Guide 2015*

Figure 14 *Overview of Clashes/Battles and Unrest*, January 2015 -September 2016 – ACLED Dataset*

Armed Conflict	# Clashes	% of Clashes	Fatalities	% of Fatalities	Themes of Riots and Protests	# Events
KIA/Military	108	20.07%	84	8.44%	National Education Bill	77
TNLA/Military	105	19.52%	96	9.65%	Mining, Environment & Land Rights	52
Violence Against Civilians	77	14.31%	135	13.57%	Labour Rights	31
MNDAA/Military	72	13.38%	432	43.42%	Reconciliation	24
SSA-N/Military	32	5.95%	31	3.12%	Burmese Muslims & Islamophobia	20
UAG/Military	24	4.46%	39	3.92%		
Burmese Muslims/Military	23	2.97%	134	13.47%	Violence Against Civilians and Unfair Detention	15
AA/Military	21	3.90%	67	6.73%	Drugs	12
N. Alliance or FUA/Military	20	3.72%	43	4.32%	Representation & Minority Rights	9
SSA-S/TNLA	19	3.53%	5	0.50%	Rule of Law, Press Freedom & Political Rights	6
DKBA/Military	16	2.97%	3	0.30%	Thailand Conviction	6
No Fatalities	10	1.86%	0	0.00%	Housing & Basic Services	4
SSA-S/Military	8	1.49%	12	1.21%	Miscellaneous	6
Other	6	1.12%	10	1.11%		
Political Assassination	4	0.74%	4	0.40%		
TOTALS	**538**		**1,095**			**262**

**Note that the "Military" in this table also includes Government-backed militias.*
Clashes refers to "event-days" such that a 2-day battle/clash will be recorded as two events, one on each day.

An estimated 644,000 internally displaced persons (IDPs) fled their homes in Myanmar due to conflict and communal violence in 2016.[33] Most were in Rakhine, Kachin, Northern Shan and Kayin. Some were displaced for shorter periods and were able to return. Among the persons displaced by conflict, 217,514 are persons living in camps and are regularly monitored, namely 86,900 persons in Kachin, 119,876 in Rakhine (of which 94,091 are in camps around Sittwe city) and 10,378 persons in Shan. The humanitarian needs and situations of two-thirds of the internally-displaced population in Myanmar – namely those outside of camps – are not systematically or effectively monitored. Alongside those displaced more recently are an estimated 400,000 persons displaced in earlier conflicts in south-eastern Myanmar.

Displacement, independent of its duration, has been seen to have multiple, severe negative impacts.[34] These negative impacts may vary based on the length of time displaced; ability to still use the property from which the persons were displaced for housing and/or economic activities; loss of income; loss of social cohesion; and increased stress and tension. These effects, as summarised in Figure 16 from the National Recovery Framework and Plan to address the effects of the 2015 floods and landslides,[35] may be even more severe for conflict-displaced persons.

Failure to identify the remaining displaced persons and mitigate these negative impacts further increases the vulnerability of conflict-affected areas. This analysis shows that such areas are already much less resilient than the less restive portions of the country, emphasising the need for additional development aid to these areas in concert with the protracted support chronically-displaced populations.

[33] http://www.internal-displacement.org/countries/myanmar/.

[34] Correa E., Ramirez F. & H. Sanhuja (2011). *Populations at Risk of Disaster: A Resettlement Guide.* GFDRR.

[35] Government of the Union of Myanmar (2015). *Myanmar Post-Disaster Needs Assessment of Floods and Landslides.* Nay Pyi Taw: Government of Myanmar.

IDPs in border areas are also noted as facing additional hardships, including lack of shelter, food, medicine and healthcare as well as education for children.[36] The massive economic and social impacts of displacement include the loss of revenue and erosion of community and household resilience. Even where these effects are not apparent, the onset of further violence and natural disasters can further exacerbate the situation, compromising the health, nutrition and well-being of individuals and households.

Figure 15 *Overview of IDPs and Refugees 2015 – Myanmar Peace Monitor*

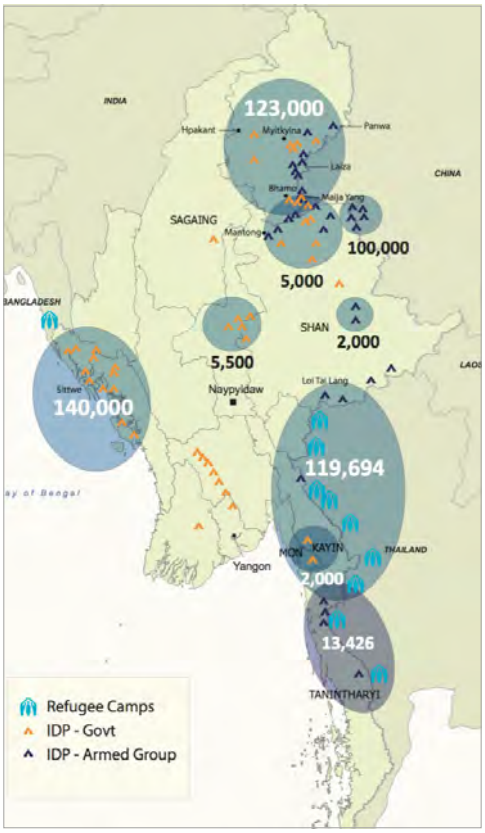


Figure 16 *Effects of Displacement – GFDRR 2011*

Effects on Displaced Population	Landlessness Homelessness Loss of income Loss of economic networks Loss of access to public services	Loss of access to social services Loss of social networks Impact on health Loss of community assets
Effects on Populations Remaining at Site and not Relocated or Displaced	Loss of income Loss of economic networks Poorer quality public services	Poorer quality social services Loss of social networks
Effects on the Host Population	Greater competition for jobs and resources Poorer quality public services	Poorer quality social services Increased mortality and morbidity Emergence of disputes

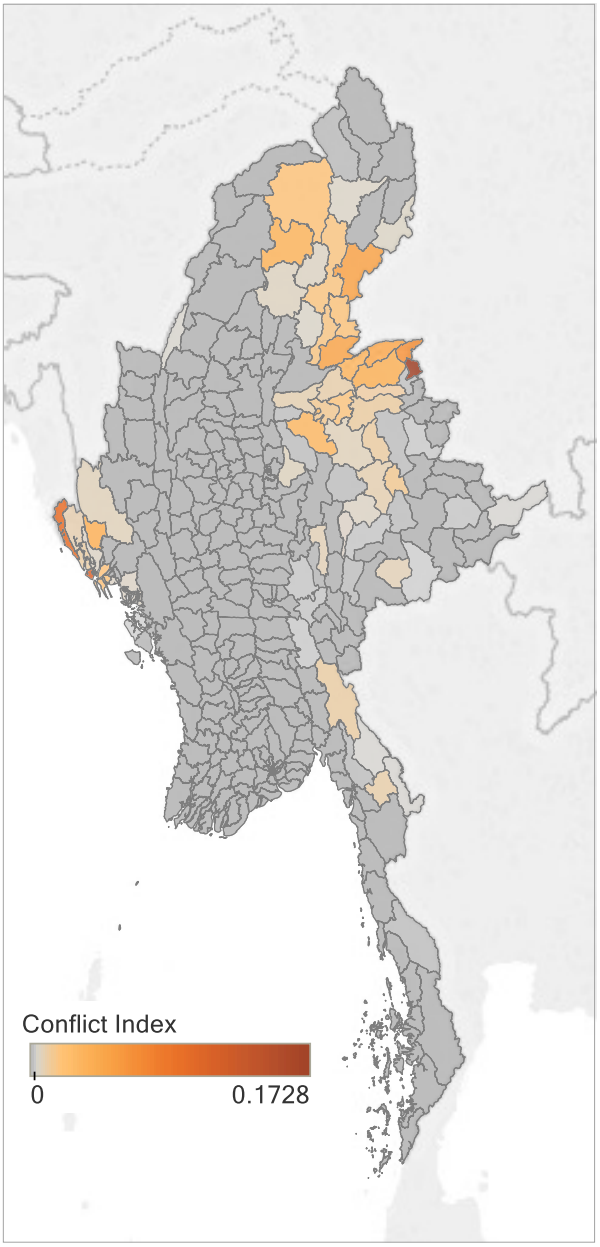
Mining, environmental degradation and land rights were some of the prime drivers of riots and protests over 2015-2016, being the grievance behind about a fifth of all riots and protests. While the ACLED dataset does not include a complete accounting of all instances of riots and protests, it indicates larger trends and the major drivers of public dissatisfaction. Key issues included the construction of dams and the associated displacement of human populations, environmental issues such as protests against the improper dumping of mining waste, and issues of remuneration and the need for the enforcement of terms of agreement between mining and construction firms and displaced populations. Other efforts such as the dredging of the Ayeyarwady delta and raising river banks faced significant opposition in this period from local farmers who felt their needs were not being considered in these larger infrastructure undertakings.

A Conflict Index, created for the purposes of this analysis, ensures that the wider Vulnerability Index includes the impact of direct conflict experienced over the period 2015-2016. This sub-index allows a comparison of conflict events across townships; it includes clashes/battles, conflict fatalities, displacement and violence against civilians. The township-level share of direct conflict in the period January 2015 to September 2016 is depicted in Figure 17 with darker colours indicating greater intensity of conflict. The intensity and frequency of these armed clashes appears to have increased in recent years although this cannot be quantified due to methodological differences between the Myanmar Peace Monitor and ACLED datasets.

[36] Burma News International (2015). *Deciphering Myanmar's Peace Process: A Reference Guide 2015.* Chiang Mai: Burma News International. Myanmar Peace Monitor.

Living standards in areas directly affected by conflict in this period are lower than those areas not affected by conflict, averaging about 23% worse. The impacts of living in conflict-affected areas are particularly felt in lower access to schooling. In conflict-affected areas, close to 21% of persons reported never having attended school while 35% reported no educational attainment. In non-conflict-affected areas by comparison, 9% have never attended school and 17% have no formal educational attainment.

Figure 17 *Conflict Index 2015-2016*



Housing conditions differ to a lesser extent, being on average 15% worse in conflict-affected areas. The lessened effects of conflict on housing appears to be due to several factors, one being the proximity of many of the conflict-affected areas to the Chinese border where improved housing materials such as corrugated iron sheeting may be easier to obtain. In some areas, EAOs have provided improved infrastructure and basic services, an example being Laukkaing which had an electrification rate of 89.53% at the time of the 2014 Census, in line with the best performing townships outside of Yangon's urban core.

Nevertheless, there is quite a wide variation in living conditions in conflict-affected areas; rural areas of Rakhine and Shan fare the most poorly, though even in urbanised areas such as Muse and Sittwe, access to education and educational attainment remains poor despite improved sanitation, housing materials and access to electricity.

There is a need for additional development aid to conflict-affected areas in concert with protracted support to chronically-displaced populations. As this analysis shows, conflict-affected areas are already much less resilient than the less restive portions of the country. Given the severity of the potential adverse effects of displacement, failure to adequately identify the remaining displaced persons and mitigate these negative impacts risks increasing the vulnerability of areas already affected by conflict.

A recently released report by The Asia Foundation[37] echoes the findings of this report in terms of the nuanced development picture across conflict-affected townships. It found that almost one-quarter of Myanmar's population in 2016 live in townships with live or latent characteristics of conflict. Whereas the MIMU-HARP review links indicators of underdevelopment and active conflict in its assessment of vulnerability over the period 2014-2016, the TAF initiative considers the political/conflict and human development components separately in order to determine the impact of development on conflict in the contested areas included in the analysis.

[37] The Asia Foundation (2017). *The Contested Areas of Myanmar: Subnational Conflict, Aid and Development.*

Importantly, the TAF report notes that tackling underdevelopment alone will not be enough to create peace. No simple correlation could be found between human development, economic growth, and conflict in Myanmar's contested areas. There was, however, a risk of development policies being manipulated to support security objectives with economic changes and increased natural resource exploitation potentially increasing tensions and fuelling grievances and rivalries, while also providing funds that have sustained conflict.

Figure 18 *Direct Conflict-Affected and Other Townships – Census 2014*, ACLED 2015-2016*

Indicator	Direct Conflict-affected Townships	Other Townships	Ratio
Persons who never attended school %	20.71%	9.35%	45.15%
No formal educational attainment %	35.13%	16.75%	47.70%
Improved drinking water source %	53.82%	69.89%	77.00%
No ID total %	33.00%	25.76%	78.06%
At least middle school education%	31.01%	38.24%	81.10%
Literacy %	73.27%	88.87%	82.45%
Safe sanitation %	61.65%	74.05%	83.26%
Thatch and bamboo roofing %	31.32%	36.72%	85.30%
Bamboo or earth floors %	38.12%	32.61%	85.54%
Child dependency ratio	51.95%	44.56%	85.76%
Communications devices per HHD	1.15	1.34	85.87%
Electrification %	28.01%	32.20%	86.98%

**Township values, other than population numbers, are based on Census-enumerated population and may not fully reflect non-enumerated groups.*

3 UNDERINVESTMENT AND UNDERDEVELOPMENT

INSTITUTIONAL CAPACITY

Key Findings

- Union budgets since the 2011 reforms have been weighted heavily towards electrification, energy generation and infrastructural needs along with high levels of military spending.
- Decentralisation is slowly increasing, but state and region allocations remain low at 8%.
- Allocations for Health and Education have grown substantially since 2011/12, although per capita spending remains low, at USD 35.60 in 2016.

A vast proportion of government spending is allocated towards electrification and energy expenditures. Currently, approximately 67% of households are not connected to the grid. Expansion of both grid, transmission and power generation are anticipated to result in large gains in living standards, employment opportunities and improvements in labour productivity, especially for those in rural areas.

Though growing rapidly, Myanmar has extremely low per capita electricity, about one-twentieth of China's consumption. Myanmar's average electrification ratio grew from around 16% in 2006 to 34% in 2015[38] but remains relatively low with reported per capita electricity consumption of around 150–160 kWh, compared to China's consumption of around 3,300 kWh.[39] This low per capita figure also masks high levels of inequality in access to electricity across the country – whereas Yangon has an electrification rate of 78%, followed by Kayah (46%), Mandalay (40%), and Nay Pyi Taw (39%), rural areas are still poorly electrified, averaging less than 20%.[40]

Myanmar's National Electrification Plan seeks to provide country-wide access to electricity by 2030, although options for remote and mountainous areas are more limited. The Plan comprises grid and off-grid components; 7.2 million households are to be connected to the national grid, achieving access to electricity for 36 million people by 2030, and support will also be given to remote communities for off-grid technologies such as solar or micro/mini-hydropower. The cost of extending the national grid is determined by the topography of the land and mountainous and remote regions can expect the grid - along with all its associated improvements to quality of life - to arrive much nearer to 2030, if at all. Plans depicting the recommended sequencing of electrification[41] show remote communities – primarily those in Shan, Chin, Kachin and Kayah – which are not targeted for grid connection at all in this period. They will instead be provided with "pre-electrification" services, or the use of solar systems or mini-grid generation. Such services will be further complicated by the lack of opportunities for commercialisation as well as the need to promote their advantages to the target populations.

[38] Asian Development Bank (2016). Myanmar: *Energy sector assessment, strategy, and road map.*

[39] Dobermann, T. (2016). *Energy in Myanmar.* International Growth Centre, IGC Myanmar.

[40] Asian Development Bank (2016). *Myanmar: Energy sector assessment, strategy, and road map.*

[41] World Bank (2015). *Myanmar: towards universal access to electricity by 2030* (presentation).

Figure 19 *Summary of Major Items in the Union Budget*

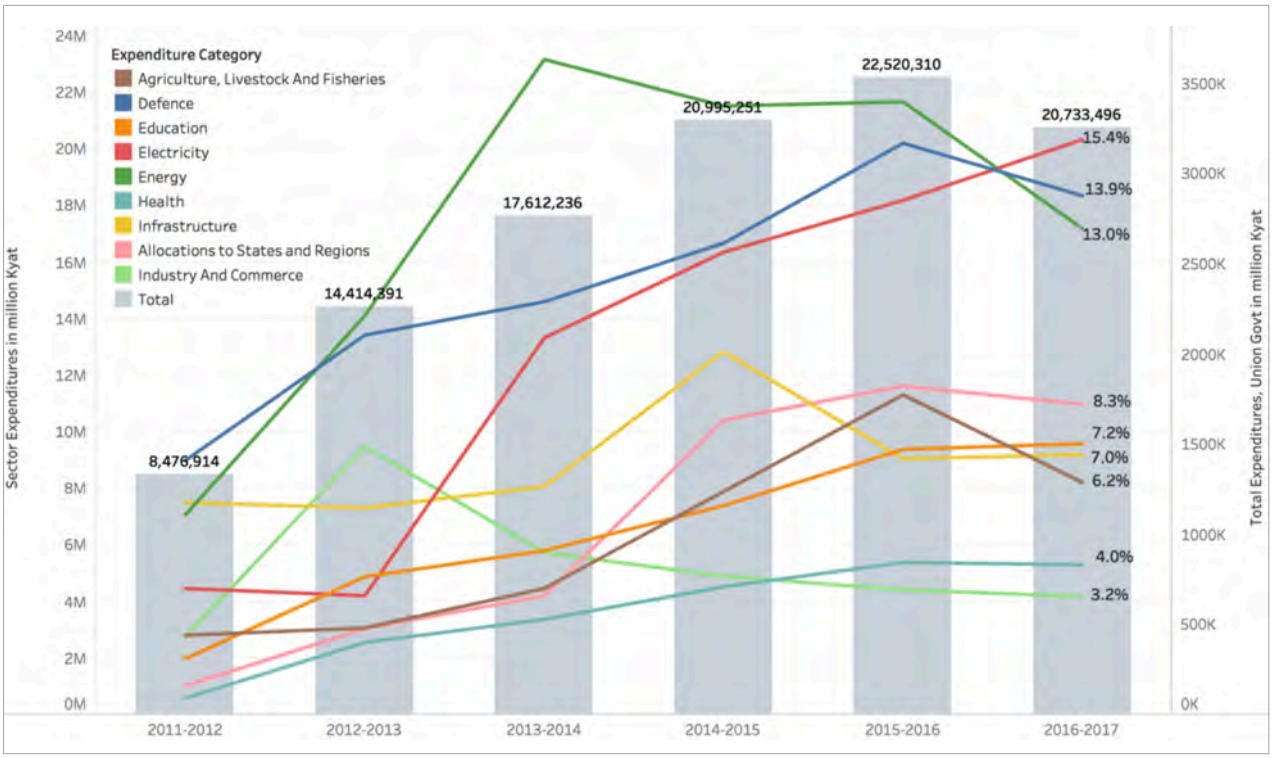


Figure 20 *Electrification in the 2014 – Census**

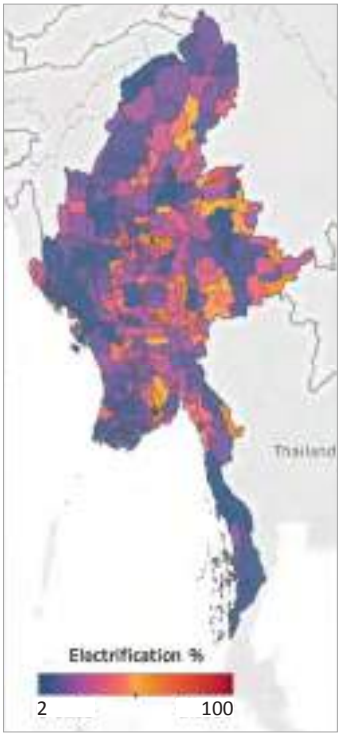
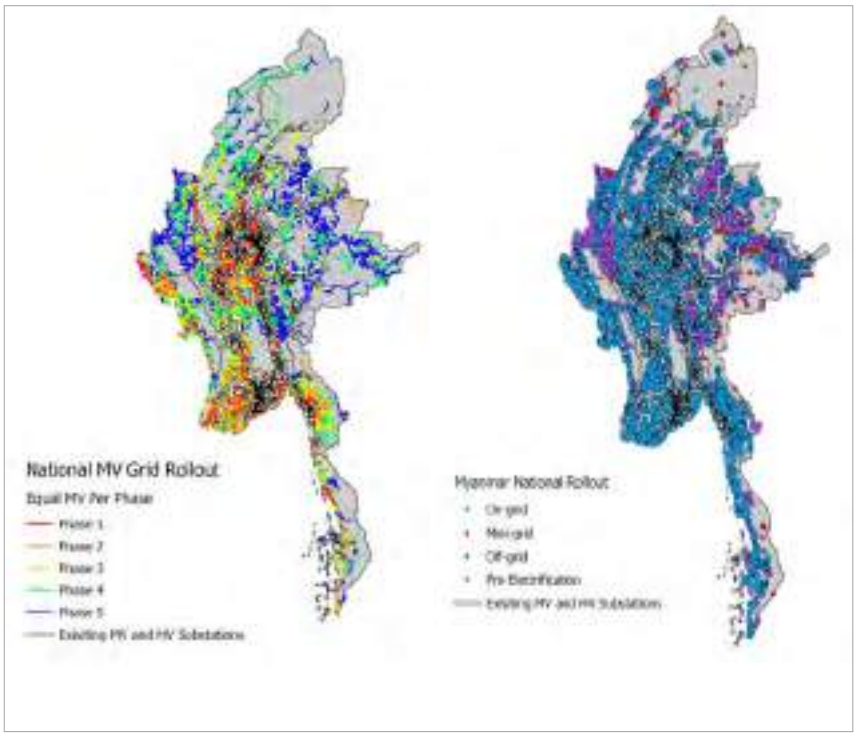


Figure 21 *Phasing of the National Grid Rollout, and Grid Access*



**Township values may not fully reflect non-enumerated groups*

Myanmar's hydropower production has grown significantly but remains an under-used resource. Despite growth in hydropower production from 110 kWh in 2011 to 180 kWh in 2014, this was reportedly only 5.8% of the available hydropower generated (8.71 TWh of the available 240.2 TWh).[42] A further 12% of the hydropower potential was developed or under construction. Hydropower initiatives have also generated their share of controversy – the suspended Myitsone Dam, for example, would have inundated large tracts of territory, potentially fuelling conflict while providing electrical output for export to China.

While only hydropower is being exploited commercially, there is known technical potential for other renewable energy sources such as wind-power in Shan and Chin states and along the coast, as well as extensive solar potential of the central Dry Zone estimated at around 52,000 terrawatt-hours per year.[43] Once built, such systems provide electricity at near-zero marginal costs, making solar and wind technologies attractive options for small-scale provision of electricity, particularly in remote areas.

Ultimately, substantial additional social spending is required to raise living and socio-economic conditions in particularly under-served areas to rates even approximating the national average. The poor living conditions and low accessibility of these areas are likely to persist as many of these townships lack the necessary population density to attract investment and employment. Additional efforts are needed to offset and subsidise the cost of providing goods and services to these areas.

Allocations for both education and health have steadily grown since the 2011/2012 reforms. Analysis of the Union budgets indicates an increase in public social protection expenditures (education, healthcare, social protection) from 0.94% of GDP in 2010 to 4.12% of GDP in 2015; public healthcare expenditure alone increased from 0.24% to 1.49% of GDP over this period. By contrast, allocations for the Ministry of Social Welfare, Relief and Resettlement have remained very slight and largely static over the past 6 years, hovering around 0.03% of GDP.

Figure 22 *ASEAN Health Expenditures 2014 - World Bank*

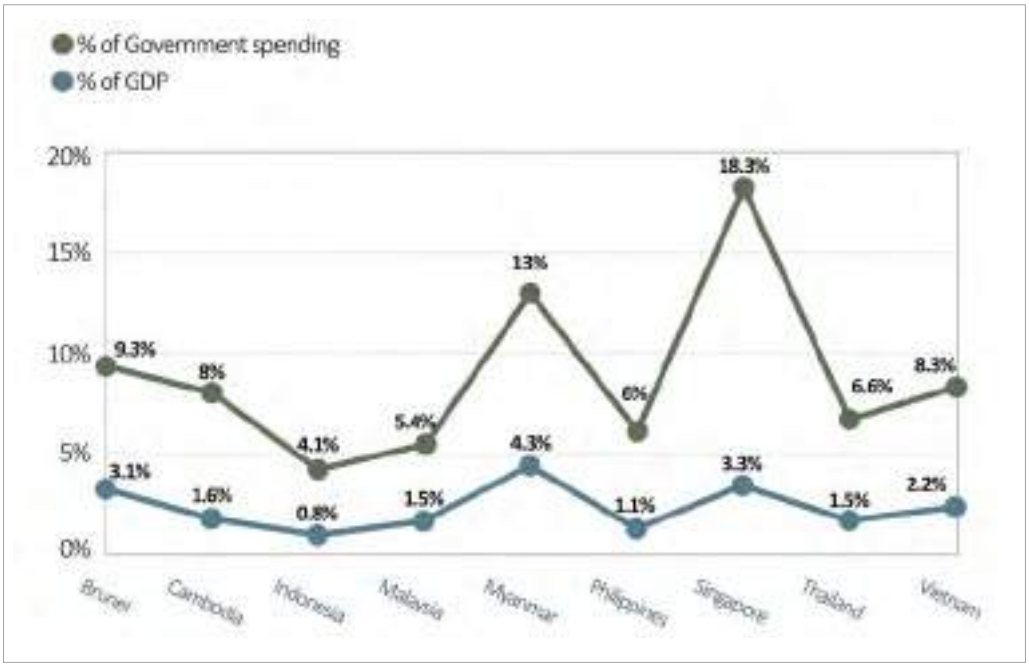
Country	Public % of total 2014	Out of pocket % of total 2014	External resources % of total 2014	Per capita $ 2014
Brunei Darussalam	93.9	6	0	958
Cambodia	22	74.2	16.3	61
Indonesia	37.8	46.9	1.1	99
Lao PDR	50.5	39	31.8	33
Malaysia	55.2	35.3	0	456
Myanmar	45.9	50.7	21.8	20
Philippines	34.3	53.7	1.4	135
Singapore	41.7	54.8	0	2,752
Thailand	86	7.9	0.5	360
Vietnam	54.1	36.8	2.7	142

[42] Min Khaing (2015). *World Hydropower Congress – Regional Development: How can Costs be Shared? (presentation).* Beijing: Ministry of Electric Power.
[43] Dobermann, T. (2016). *Energy in Myanmar.* International Growth Centre, IGC Myanmar.

The World Bank notes that many of the 2011/2012 reforms relating to education and health care have already been enacted: primary-level education is now compulsory and primary and secondary education fees have been waived, with 79,000 additional teachers hired. Children, pregnant mothers and patients needing emergency services now have access to free medicine and healthcare. Out-of-pocket expenditures have dropped from 80% to 50%.

Despite these increased allocations, per capita spending remains low due to the limited scale of the Union Budget.[44] Defence spending is the exception, forming an unusually large portion of the reported Union budget[45] compared to that of Myanmar's neighbours in ASEAN – many of whom also have ongoing insurgencies and violent upheavals in their restive regions:

Figure 23 *Defence Spending as a % of GDP and Total Government Spending, 2014 – Abuza*



Likely sources of funds to increase government revenue and, by extension, social spending, were highlighted by the World Bank and the research and advisory non-profit, Global Financial Integrity. The World Bank, in its 2015 Public Expenditure Review, highlighted the need for improvements in tax administration and the more consistent imposition of customs duties as the main vehicles by which the government may improve and stabilise revenue collection. Global Financial Integrity (GFI) estimated that illicit financial inflows over the 54-year period from 1960-2013 totalled USD 77.7 billion or an average of 14.4% of GDP. Nearly half of those inflows, in real terms, occurred over the period 2010-2013, growing to USD 8 billion per annum today (or more than half of the Union budget).[46] Tax losses due to illicit inflows have deprived the country of crucial public funds, amounting to up to 172% of health expenditures and 73% of education expenditures during the period studied. Illicit outflows are dwarfed by the inflows but still average 6.5% of the country's GDP.

[44] World Health Organisation (2014). *Health Expenditure per Capita and Public Expenditures*. Accessed through http://data.worldbank.org/indicator/SH.XPD.PCAP?locations=MM.

[45] Abuza, Z. (2014). *Analyzing Southeast Asia's Military Expenditures* (using Stockholm International Peace Research Institute data). Center for Strategic and International Studies.

[46] Dev, K. & Spanjers, J. (2015). *Flight Capital and Illicit Financial Flows to and from Myanmar 1960-2013.* Global Financial Integrity.

Corruption, inequality and fluctuations in commodity prices remain risks to both growth and government revenue. The World Bank advocated some re-balancing to diversify Myanmar's economy and lessen the impact of commodity price fluctuations. Additionally, corruption remains a major challenge; Myanmar was ranked 136th out of 176 countries by Transparency International.[47]

Despite these factors, the Union budget is generally allocated in accordance with government's stated priorities. This is alongside its obligations in defence spending and very small budgets made available for key functions such as Social Welfare and Social Security.

National spending patterns also prevail at the state and region level, with infrastructure and urban development forming 69% of expenditure. This would seem justified given Myanmar's intense need for infrastructure, coupled with infrastructure's relative cost-effectiveness in achieving social benefits which include poverty alleviation and the reduction of inequality.[48] Resources at state/region level remain however much more constrained than at the national level, as can be seen in the state/region expenditures for the 2013/14 fiscal year.

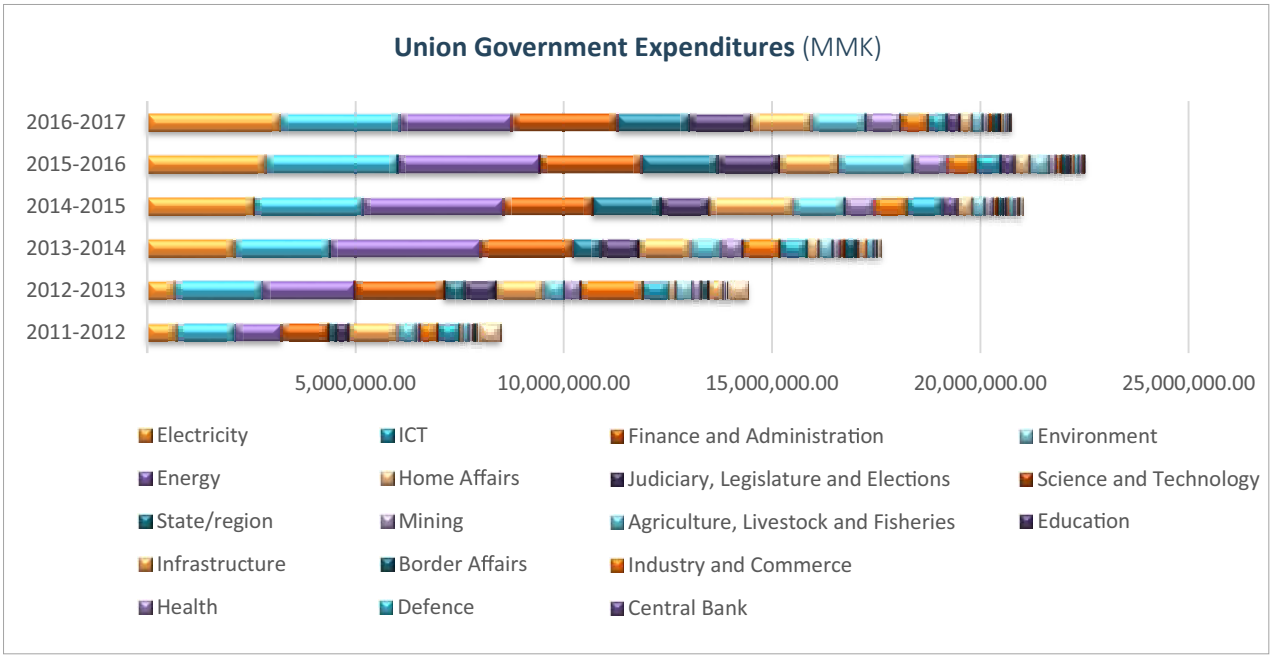
Figure 24 *Reported Union Budgets 2011-2017 (all figures in million Kyats) – Open Myanmar Initiative*

Union Budget Category	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	% of 16/17
Electricity	699,641	659,890	2,088,741	2,564,006	2,851,112	3,187,686	15.4%
Defence	1,409,648	2,104,198	2,289,022	2,613,847	3,167,885	2,876,469	13.9%
Energy	1,108,834	2,211,954	3,631,830	3,373,699	3,396,783	2,694,258	13.0%
Finance and administration	1,134,436	2,148,981	2,206,721	2,139,399	2,454,977	2,526,985	12.2%
S/R allocations	160,201	477,675	659,208	1,632,908	1,821,695	1,720,419	8.3%
Education	310,401	764,793	909,459	1,158,917	1,470,998	1,501,854	7.2%
Infrastructure	1,175,868	1,146,390	1,265,390	2,011,919	1,418,614	1,442,331	7.0%
Agriculture, livestock and fisheries	440,540	481,420	699,706	1,237,084	1,773,137	1,287,803	6.2%
Health	92,008	400,719	528,573	709,184	844,053	831,052	4.0%
Industry and commerce	432,197	1,486,887	898,258	768,298	692,234	655,705	3.2%
ICT	529,108	634,285	657,372	881,316	589,172	459,379	2.2%
Central Bank*	-	-	-	359,757	343,468	308,183	1.5%
Home affairs	75,516	158,024	273,212	347,050	355,093	302,034	1.5%
Environment	142,465	397,412	344,901	300,267	452,184	251,447	1.2%
Mining	87,855	213,366	166,452	193,568	175,373	138,364	0.7%
Science and technology	42,564	22,492	115,162	121,877	149,322	123,910	0.6%
Border affairs	38,367	146,991	271,010	128,441	130,441	122,566	0.6%
Judiciary, legislature & elections	12,708	18,347	65,795	76,279	88,974	65,522	0.3%
Sports, religion and culture	19,647	350,263	187,595	63,540	59,522	51,644	0.2%
City development council (NPT)	4,136	6,141	172,657	140,983	122,883	50,937	0.2%
Foreign affairs	2,491	46,502	58,985	72,192	76,807	50,908	0.2%
Labour, employment & social security	8,853	8,039	7,106	27,823	32,973	28,073	0.1%
Immigration and population	2,656	11,678	26,988	18,253	20,206	21,383	0.1%
Social welfare, relief and resettlement	15,113	21,015	11,902	16,577	16,092	18,645	0.1%
Executive	531,648	496,917	76,179	38,054	16,298	15,926	0.1%
Grand Total	**8,476,913**	**14,414,391**	**17,611,236**	**20,995,251**	**22,520,310**	**22,520,310**	

**No expenditures as the independent Central Bank had not yet been fully formed and separated from the Ministry of Finance.*

[47] Transparency International 2016. *Corruption Perceptions Index.*
[48] Seneviratne D. & Sun Y. (2013). *Infrastructure and Income Distribution in ASEAN-5: What are the Links?* International Monetary Fund.

Figure 25 *Comparison of Union Expenditures by Year*



Overall, the state/region budgets may not be termed redistributive. There is insufficient evidence – at least at the state/region level – to conclude that higher levels of per capita government spending are correlated with vulnerability or GDP per capita. The only statistically significant relationships related to state/region expenditures are a positive relationship between the absolute size expenditures and total population size and a negative relationship between per capita spending and population size. Per capita spending is generally highest in areas which have the smallest and sparsest populations: Chin, with its sparse population, has the highest per capita expenditures of any area. Whilst large area like Shan and Yangon are accorded similarly large allocations, there is a certain mismatch between the size of the vulnerable populations in Bago and Kayin and per capita expenditures in those areas. As with the data on vulnerability, it will probably be best to obtain township-level figures for GDP in order for patterns and variations to become more visible.

Decentralisation is slowly increasing, but state and region allocations remain at 8%, and Myanmar lacks a framework for the systematic decentralisation of administrative power. The current state of decentralisation in Myanmar may be described, perhaps, as incomplete. In other ASEAN countries, such as Cambodia, important sectors for local development and service delivery such as health, education and (to a certain extent) natural resource management have been largely devolved to local governments with some major decisions still made by line ministries. Increasing budgetary allocations for states and regions is a step in the right direction; concerted negotiations between state/region administrations, ethnic groups and national level are still needed along with a framework for the systematic decentralisation of administrative decision-making.

Notably in the state and region budgets, water resource management and housing account for only 1.8% of all expenditures or USD 7.3 million in 2013/2014. With such limited government resources, shelter and water and sanitation needs are anticipated to require additional support for the foreseeable future. Specific townships will be highlighted in the next section, mainly for the paucity of their living conditions. This would not ordinarily be a cause for concern as the vast majority of funds (94% on average) are managed by line ministries; however, there has been no commensurate investment in either (rural) housing or water and sanitation from the Union government.

Myanmar's economy is also vulnerable to climate shocks and stresses. The flooding in 2015 contributed to slowing economic growth to 7% from the average of 8.5%[49] after the 2011-2012 reforms. While there were other contributing factors aside from the supply shocks caused by heavy flooding, namely lower commodity prices and a slowdown in new investments because of uncertainty around the election, this highlights the potential impact of such events on the country's growth.

Additional data would be needed to perform an analysis of coverage of line-item budgets at the township level. Some of the required data may be available with the General Administration Department (GAD), given their central role in Township Committees. There is also a keen need for increased civil registration and the release of vital statistics such as births, deaths, morbidity, as well as information on the developing economy (businesses opened locally etc). GAD currently collects village-level data which, if made available, would be invaluable in any targeting effort as well as in monitoring key indicators.

Figure 26 *State/Region Headline Indicators 2013/2014 – Open Myanmar Initiative and MIMU-HARP Analysis**

State/Region	Total Population	Vulnerable Population	Vulnerability Incidence	GDP 2015-2016 (million Kyat)	GDP per capita (USD)	S/R govt Expenditures (million Kyat)	S/R govt Expenditures per capita (Kyat)
Rakhine	3,188,807	1,935,247	60.03%	3,038,447	714.64	77,130.48	36,749.68
Kayin	1,574,079	916,749	58.82%	1,157,213	618.19	29,001.99	19,279.06
Shan	5,824,432	3,254,647	58.36%	4,005,710	515.81	168,693.10	28,963.01
Kachin	1,689,441	842,207	54.43%	1,237,773	549.49	53,170.98	32,365.26
Chin	478,801	251,131	51.02%	234,178	366.82	47,799.13	99,830.90
Tanintharyi	1,408,401	682,651	49.42%	3,501,779	1,864.76	45,345.13	32,196.18
Ayeyarwady	6,184,829	2,983,768	47.87%	8,344,558	1,011.90	97,598.28	15,780.27
Sagaing	5,325,347	2,364,113	46.54%	7,386,084	1,040.23	101,308.38	19,023.81
Magway	3,917,055	1,748,708	45.33%	5,930,205	1,136.46	138,995.79	35,484.77
Kayah	286,627	114,692	44.52%	225,970	591.28	25,803.93	90,026.18
Bago	4,867,373	2,094,817	43.92%	5,188,866	799.54	62,735.06	12,888.90
Mon	2,054,393	894,883	43.85%	2,562,259	935.41	30,553.80	26,333.99
Mandalay	6,165,723	2,311,387	38.10%	6,634,594	807.03	97,057.92	15,741.53
Nay Pyi Taw	1,160,242	410,343	33.68%	1,405,692	908.66	--	--
Yangon	7,360,703	1,869,787	23.36%	14,408,766	1,468.14	167,277.47	22,725.75
Total/average	**51,486,253**	**22,675,130**	**44.04%**	**65,262,093**	**950.67**	**1,142,471.44**	**22,701.41**

**Township values, other than population numbers, are based on Census-enumerated population and may not fully reflect non-enumerated groups*

[49] World Bank Group – Macroeconomics and Fiscal Management (2015). *Myanmar Economic Monitor.*

SMALLER URBAN CENTRES AND POVERTY REDUCTION AND RESILIENCE

A comprehensive approach which differentiates larger and smaller urban areas as well as differing rural areas will be needed to sustainably increase resilience, reduce poverty, and generate income equality. The stark disparities in living conditions and economic freedoms between the residents of urban and rural areas are evident; 72% of rural villages are not electrified and persons in rural areas have markedly lower access to safe drinking water and sanitation; furthermore, educational outcomes vary wildly and secondary school attendance in rural areas is half of that in urban areas.[50] Nevertheless, rural areas cannot be assumed to be the same across the country, and urban areas similarly cannot be assumed to require the same approaches. Urban and rural areas must be addressed in a comprehensive manner which seeks to exploit the interconnectedness between them that already exists.

Larger cities tend to offer advantages in terms of income and education over smaller urban areas and towns. A review across 51 countries from 1984 to 2004[51] revealed that persons who moved to major urban areas had much higher incomes than those who moved to towns and county seats. Similarly, secondary and tertiary urban areas were able to attract and accommodate four times as many people as large cities and collectively accounted for twice as much poverty reduction. Large cities were also found to be generally less accessible to rural migrants. The Planning Commission of Tanzania noted that whilst incomes for those who had moved to towns and secondary cities experienced smaller gains in income than migrants to major cities; they also benefited from lower living expenses and closer links to their places of origin.

However, small and intermediate urban centres play an important role in rural and regional development. Analysis by the OECD[52] highlights their contribution as centres of demand, as markets for agricultural produce, as points of distribution of more cost-effective goods and services, and as linkages to national and export markets. The proximity of smaller urban centres to rural producers, along with infrastructure enabling ready access, are thus factors in increasing agricultural incomes. Smaller urban centres and towns can also become centres for the growth and consolidation of rural non-farm activities and employment, through the development of micro, small and medium sized enterprises, or serving as sites for branches of large private enterprises. Through offering non-farm labour for rural migrants from the surrounding region, these smaller urban areas can insulate greater numbers of people from the seasonality and climate vulnerability of agricultural work. Vibrant smaller towns also allow a more "balanced" and better distributed urban development, thus decreasing the pressure on larger urban centres.

Rural areas will also require private as well as public investment to address existing disparities. Whilst towns and secondary cities might be excellent targets for larger-scale infrastructural and commercial investments – which would also ultimately benefit the surrounding hinterland – household and community level interventions in rural areas must continue so that existing disparities are not further exacerbated. Investments in farm productivity in rural areas should be paired with increased access to transportation, electrical and telecommunications infrastructure as well as financial and business development services in their adjacent towns and secondary cities. Essentially, productive and protective investments in towns and secondary cities will accelerate poverty reduction in an economically viable manner, but those in rural areas must also be provided with the skills and tools to make use of the new opportunities around them.

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[50] Department of Population, Ministry of Labour, Immigration and Population (2015). *The 2014 Population and Housing Census: The Union Report.*
[51] Christiaensen L., de Weerdt J. & R. Kanbur (2016). *Urbanization and Poverty Reduction: The Role of Secondary Towns in Tanzania.* Dodoma: Planning Commission, Office of the President, Tanzania.
[52] Tacoli C. (2004). *The Role of Small and Intermediate Urban Centres and Market Towns and the Value of Regional Approaches to Rural Poverty Reduction Policy.* Helsinki: OECD.

AID AND CIVIL SOCIETY

Key Findings

- In 2016, USD 7.44 billion in international, multilateral and bilateral aid was committed, and of this, USD 1.77 billion was disbursed in this period.
- 44% of aid was channelled through aid agencies and financial institutions; at least 33% was destined directly towards government entities.
- The 44% of ODA channelled through aid agencies was weighted very heavily towards a small number of sectors: predominantly Health and Nutrition (32.5%), Livelihoods and Infrastructure (17%), Agriculture (15.1%), Protection (11%), WASH (7%) and Education and Governance (4.5% each).

Myanmar's official Aid Information Management System, Mohinga, states that USD 7.44 billion in international, multilateral and bilateral aid was committed in 2016 and USD 1.77 billion of it disbursed.[53] 44% of aid was channelled through a combination of aid agencies, institutions such as the World Bank, social enterprises and corporate social responsibility departments (some of which partnered with government entities); 33% of aid was destined directly towards government entities and the remainder had no implementing agency mentioned but appears from the accompanying remarks to have also been allocated directly to the government as well.

As with Government resources, the 44% of ODA channelled through aid agencies in this period was weighted very heavily towards implementation in particular sectors, as indicated in data collected by the MIMU 3W / Who is doing What Where.[54] Both the Mohinga system and the MIMU 3W[55] capture a significant proportion of the in-country activity outside of government services but depend on donor and implementer reports and may under-report the actual situation. 91% of all reported 3W activities pertained to either Health and Nutrition (32.5%), Livelihoods and Infrastructure (17%), Agriculture (15.1%), Protection (11%), WASH (7%) and Education and Governance (4.5% each).

Based on the reports of 210 agencies, 25 townships had more than 1,000 of activities in 2016. While this accounts for about 14% of the vulnerable population and a third of all activities, there is a statistically significant positive relation between the number of vulnerable people and the number of activities reported in the countrywide 3W. Among these 25 townships are Bogale, Pyapon, Labutta, Malamyinegyun and Ngapudaw in Ayeyarwady; Hpa-an and Kawkareik in Kayin; Meiktila in Mandalay; Yenangyaung in Magway; and Buthidaung in Rakhine. While indicative of targeting which is grounded in support to the most vulnerable, such figures do not include the activities of some local NGOs and many community-based organisations without the capacity to input into these tools.

More than a third – 124 townships – of areas received fewer than 0.042 activities per hundred persons. They share few other similarities: many are urban and peri-urban areas where the poor and vulnerable are not as easy to identify and there are few agencies specialising in urban development and resilience issues. However, several others are amongst the most vulnerable townships in the Union, including Monghsat,

[53] Mohinga Database, 2016 data, retrieved from https://mohinga.info/en/dashboard/loacation/ 13 Jan 2017.
[54] MIMU 3W / WHO is doing What, Where, September 2016. Mohinga information gathers information on financial commitments as reported by cooperation partners, mainly bilateral donors and United Nations agencies. The MIMU 3W, conducted every 6 months, gathers information on the spread and type of implemented activities, mainly from NGOs and UN agencies. It does not include any financial information.
[55] 3W activities compared to the approximate caseload of vulnerable persons has an R-squared of 0.29 whereas this relationship drops to 0.03 in considering vulnerability alone.

Nanyun, Lahe, Tabayin, Narphan, Keshi, Mongton and Mongyai. Unlike similarly sparse areas in Kayah and Chin which have between 1 and 4 activities per 100 persons, they have not been allocated larger per capita expenditures – Nanyun, Sagaing Region, was the location of just 4 activities last year, despite being the 8th most vulnerable township.

At the other end of the spectrum, Ayeyarwady is very well-represented across all the major sectors. Its townships receive a large proportion of Agriculture, Health and Nutrition and Non-agricultural Livelihoods and Infrastructure support. The heavy presence of activities may be due to a range of causes, including the large numbers of vulnerable persons in Bogale, Labutta and Pyapon, as well as the transition of relief programmes after cyclone Nargis to development-oriented activities.

Figure 27 *Vulnerability Incidence and Approximate Vulnerable Population**

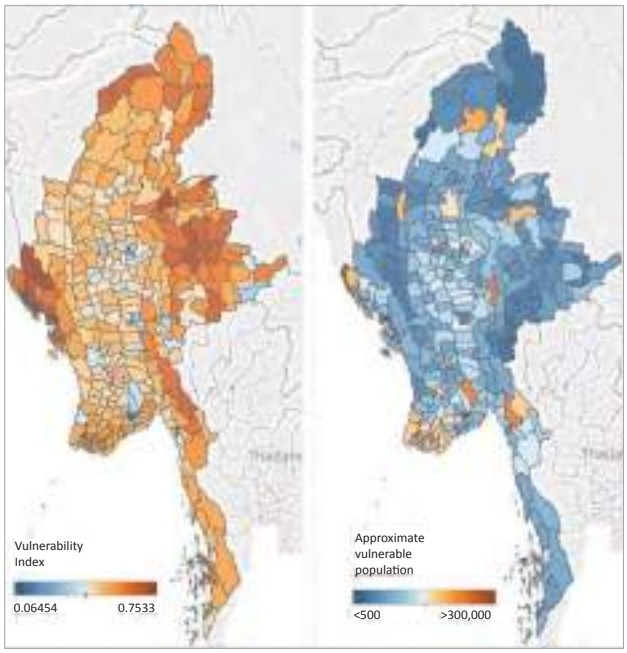
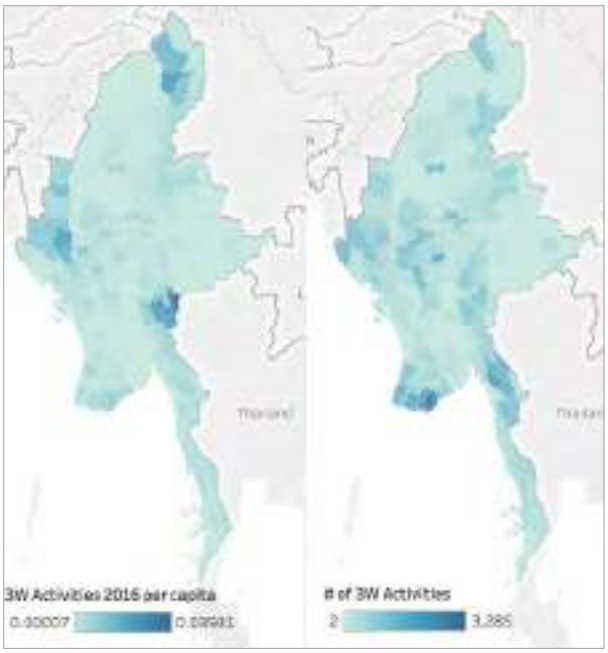


Figure 28 *3W Activities per capita and Total Activities*



**Township values, other than population numbers, are based on Census-enumerated population and may not fully reflect non-enumerated groups*

Figure 29 *State/Region Vulnerability Score against Reported 3W Activities per capita*

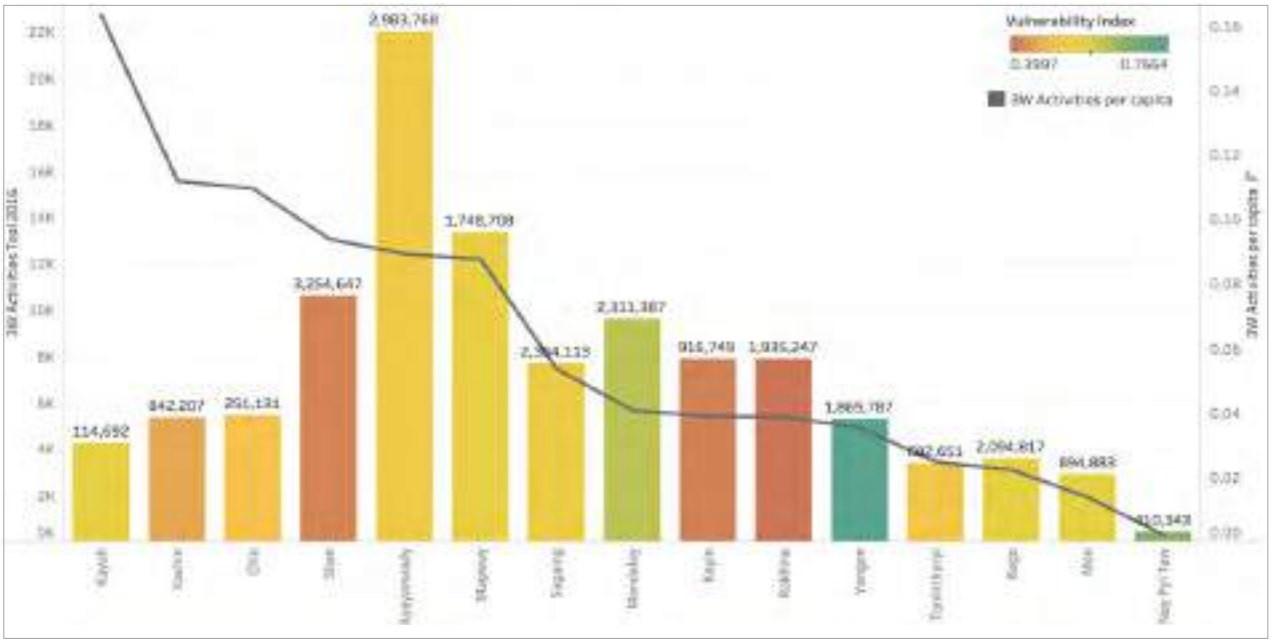
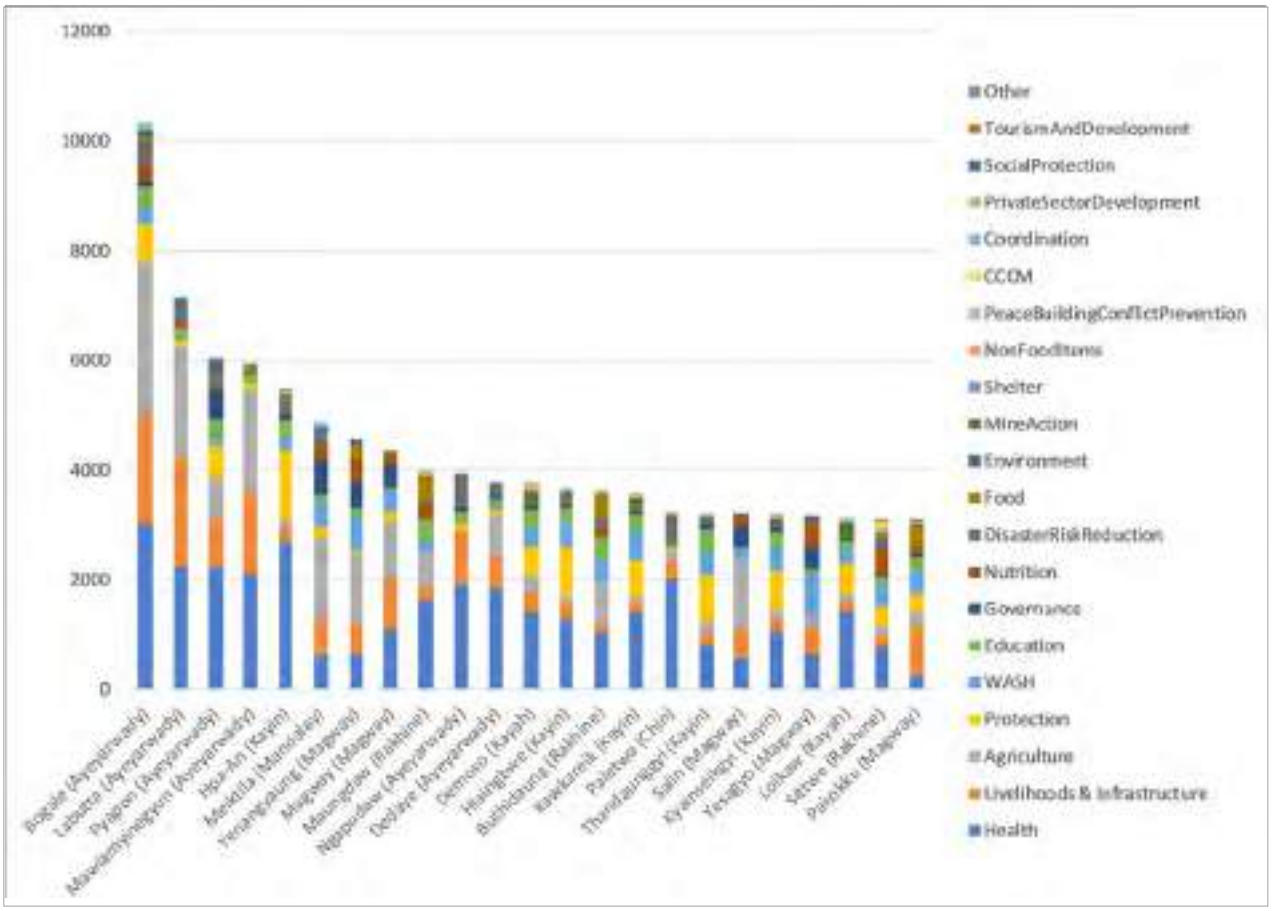


Figure 30 *Townships with the Highest Number of 3W Activities 2014-2016 – MIMU*



SHELTER AND HOUSING

Key Findings

- 82% of all households use earth, thatch, bamboo or wood for their walls. Houses with only bamboo walls make up more than half of all housing units in the country.
- Agricultural townships in Magway, Mandalay and Sagaing Townships have the greatest number of houses with dirt and bamboo floors.
- Ayeyarwady and Rakhine are the most exposed to climate risks; both areas have outsized proportions and needs when it comes to poor roofing and wall materials which are the least likely to withstand cyclonic events or heavy flooding.

With poverty and vulnerability often evident through a paucity in living conditions, housing quality provides a useful indication of vulnerability. 82% of all households across Myanmar use earth, thatch, bamboo or wood for their walls; houses with bamboo walls, alone, make up more than half of all housing units in the country and are mostly indicative of rural contexts. While use of these materials in themselves does not indicate vulnerability, the risks to residents increase when these weaker structural materials are paired with either improper building techniques or poor roofing materials.

Figure 31 *Households with Thatch and Bamboo Roofing* – 2014 Census*

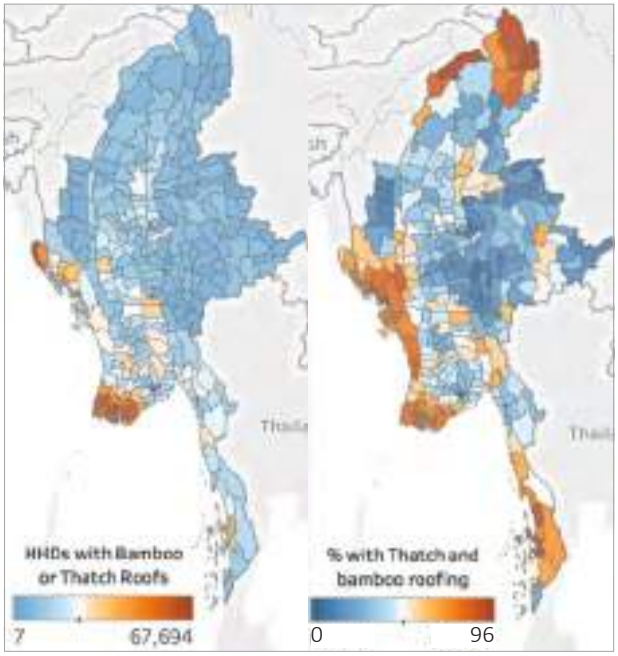
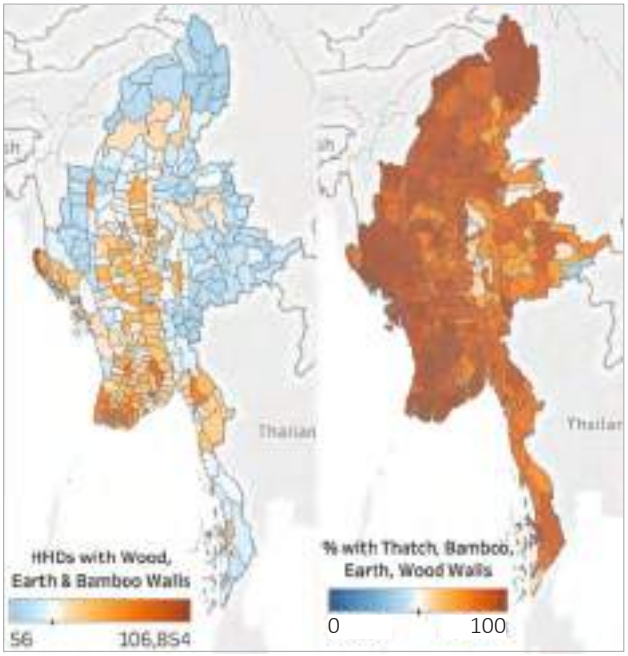


Figure 32 *Households with Wood, Earth and Bamboo Walls* – 2014 Census*

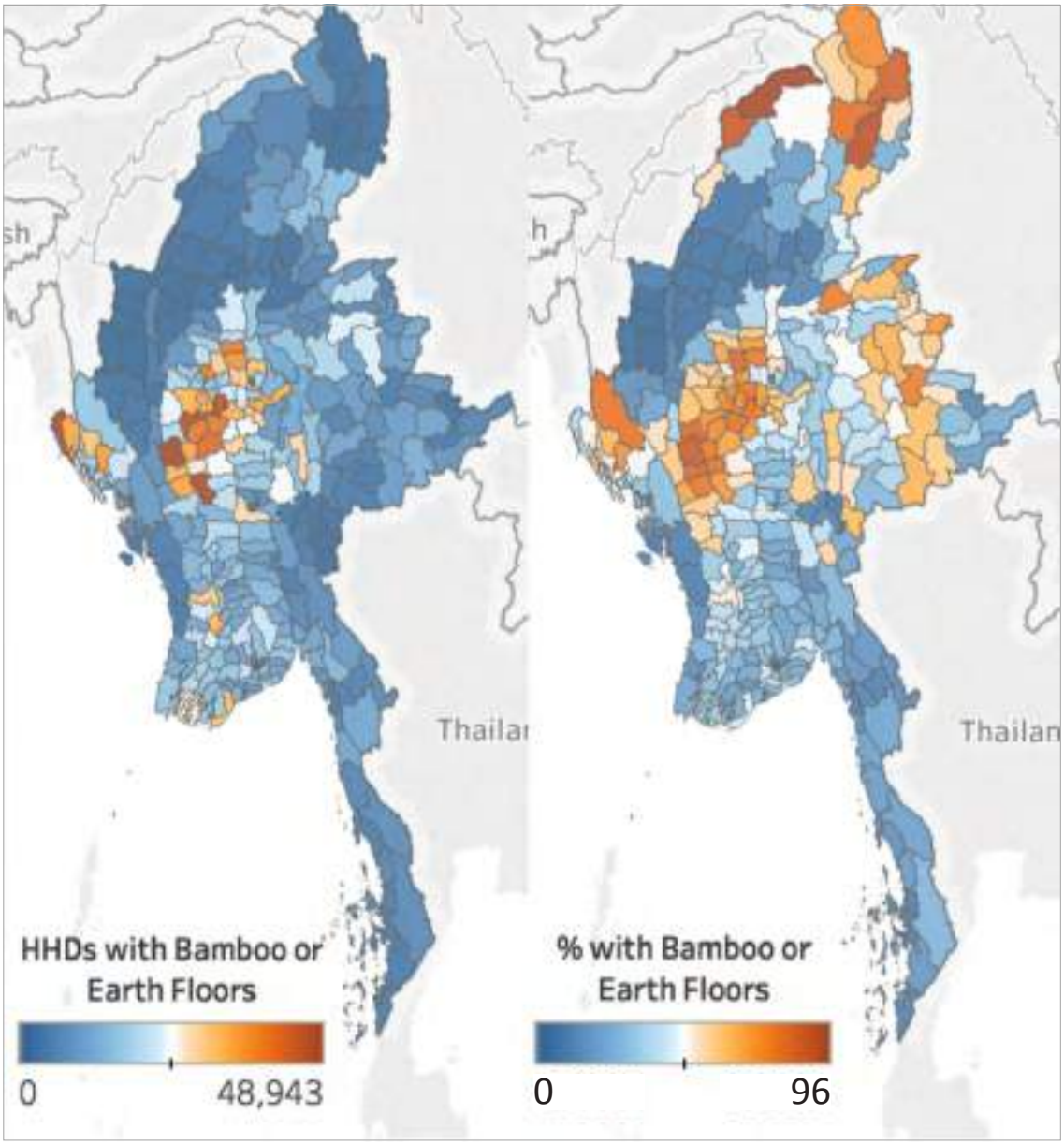


**Based on Census-enumerated population only.*

Rakhine and Ayeyarwady have the highest rates of poor roofing and wall materials which are unlikely to withstand cyclonic events or heavy flooding. The confluence of climate risk and the longer-term impact of major disaster is a particular issue for Ayeyarwady where populations are exposed to massive climate risks, including rising sea levels, salinisation and extreme weather events such as cyclones and intense rainfall. The townships most affected by cyclone Nargis, including Ngapudaw, Labutta, Bogale, Pyapon, Mawlamyinegyun, Pathein, Myaungmya, Dedaye, Wakema and Kyaiklat, all remain extremely vulnerable to hydro-meteorological hazards.

Townships with the greatest number of households with dirt and bamboo floors are located in northern Rakhine and in the interior of the country, in agricultural townships in Magway, Mandalay and Sagaing. Floor type is a typical indicator for poverty used in proxy means tests as poor-quality flooring materials indicate not only a lack of physical resilience but also a dearth of major assets such as refrigerators, televisions and other electro-domestic products or improved means of transportation. Dirt floors prove to be ideal carriers of contaminants which cause diarrhea, skin, and respiratory diseases, which in turn contribute to malnutrition, and also require more of the householders' time to maintain in clean and good condition. Replacing dirt floors with concrete has been found, elsewhere, to decrease bouts of diarrhea and medical expenditures, while freeing up female household members whose time cleaning floors was reduced from 6 hours a week to one hour.[56]

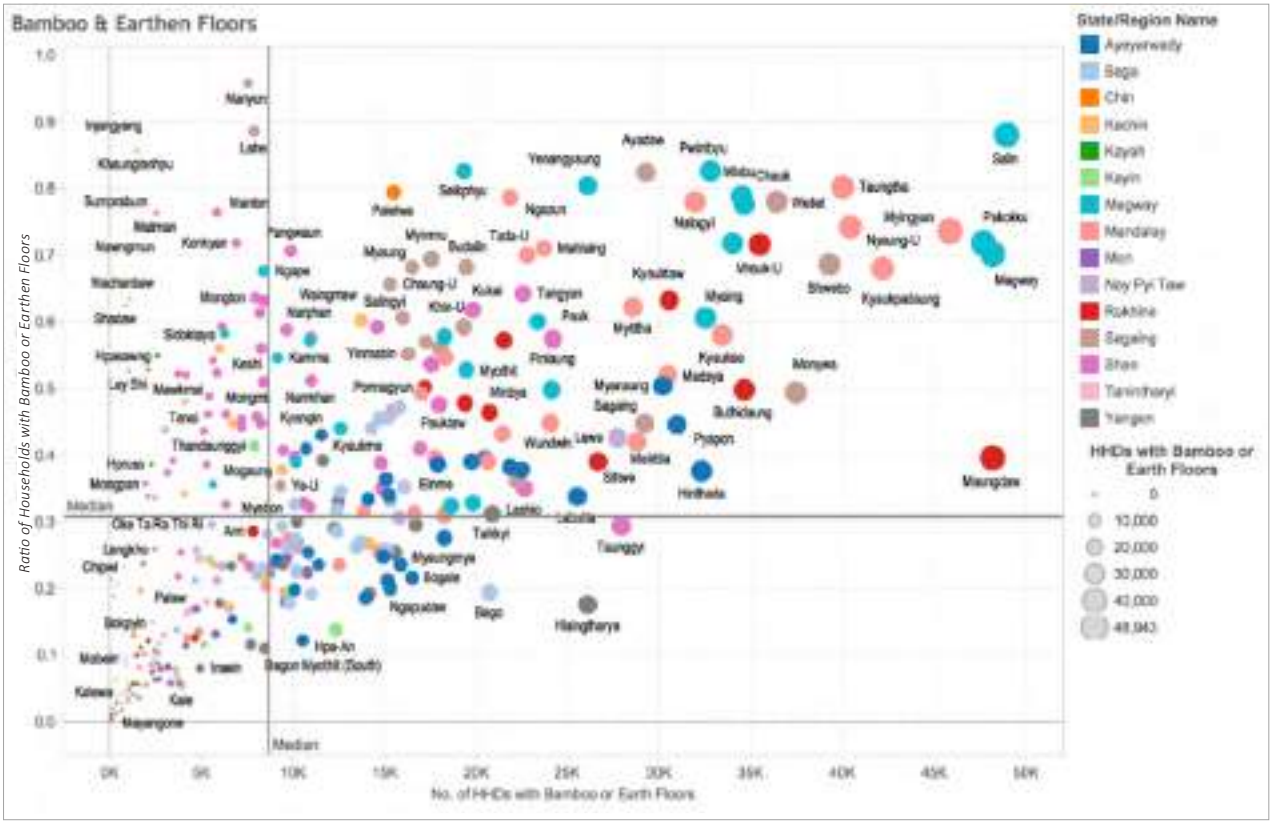
Figure 33 *Households with Bamboo or Earthen Floors* – 2014 Census*



**Based on Census-enumerated population only.*

[56] Health from the Ground Up, Dhaka, Bangladesh. Archive Global. Retrieved from http://archiveglobal.org/bangladesh/ June 2017.

Figure 34 *Households by Township with Bamboo and Earthen Flooring* – 2014 Census*



*Based on Census-enumerated population only.

WATER RESOURCE MANAGEMENT AND SANITATION

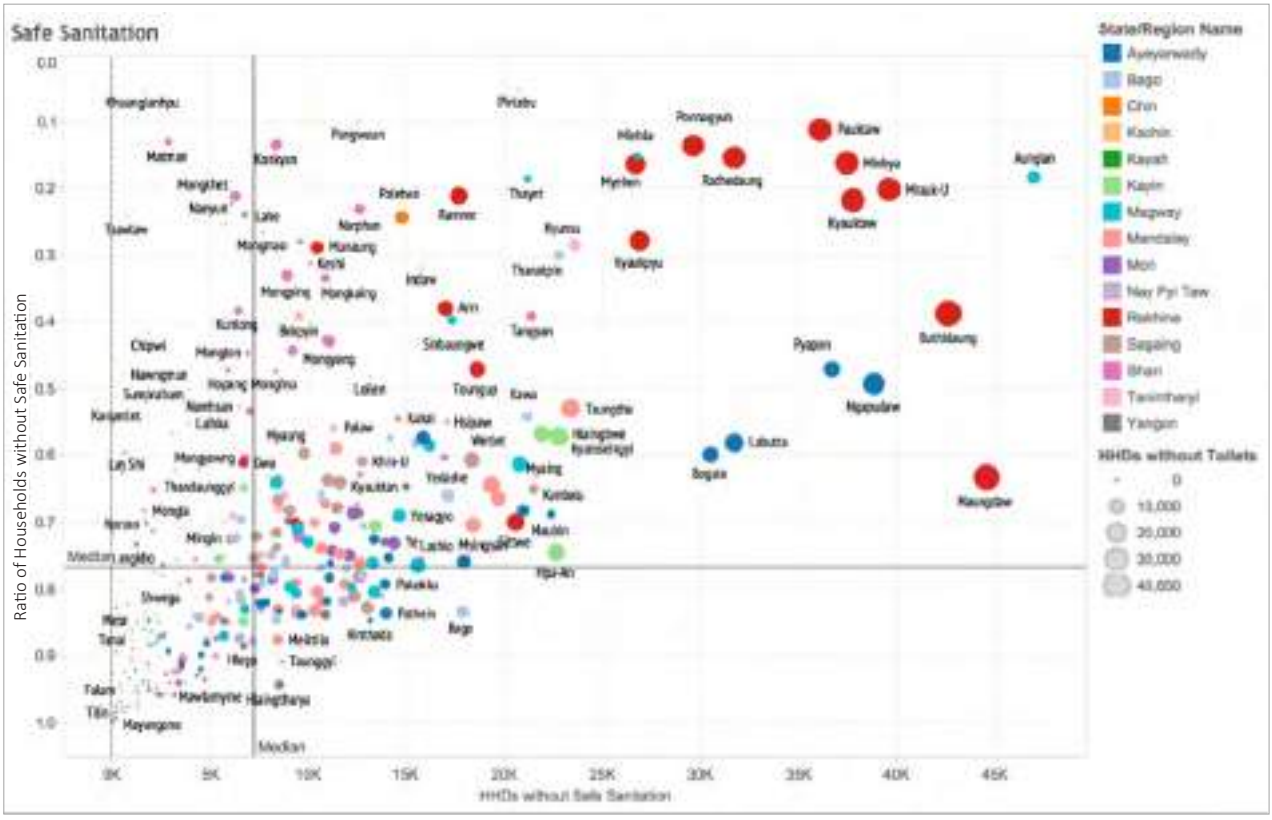
Key Findings

- Nationwide, 26% of households lack safe sanitation and 31% lack access to improved drinking water.
- Rakhine is a clear outlier with the lowest levels of safe sanitation.
- Areas of Ayeyarwady, Bago, Rakhine and Yangon have the least access to improved water sources.

The 2014 Census indicates that 26.3% of all households countrywide lack safe sanitation,[57] **and 31.1% lack access to improved drinking water.** As can be seen from Figure 40, Ayeyarwady and Rakhine once again have some of the populations most in need; the multi-dimensional nature of the vulnerabilities for these areas calls for area-based (as opposed to sector-wide) programme planning and implementation.

Sanitation needs are particularly high in Rakhine, even in the absence of information from non-enumerated areas in its northern townships. A further 15% of townships have particularly high levels of populations in need; these are mostly in Rakhine, or in areas like Khaunglanphu in Kachin and Pinlebu in Sagaing where more than 90% of the population lacks access to safe sanitation. A combination of conflict, marginalisation and repeated exposure to climate risks contribute to these differences.

Figure 35 *Prevalence and Incidence of Unsafe Sanitation* – 2014 Census*



**Based on Census-enumerated population only.*

[57] Safe sanitation is considered as flush toilet and water seal (improved pit latrine), as per data collected in the 2014 Population and Housing Census. Unsafe sanitation includes traditional pit latrines, bucket/surface latrines, other types or no latrine.

Figure 36 *Households with Improved Drinking Water* – 2014 Census*

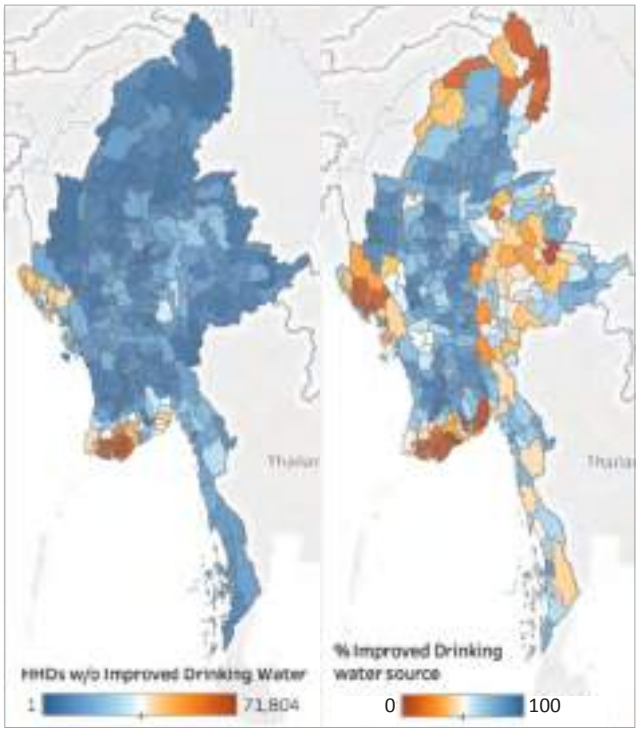
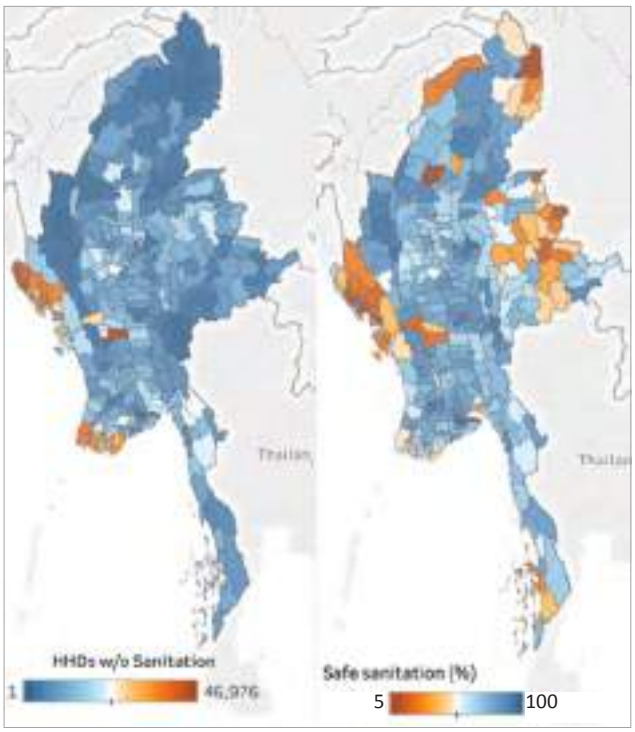


Figure 37 *Households with Safe Sanitation* – 2014 Census*



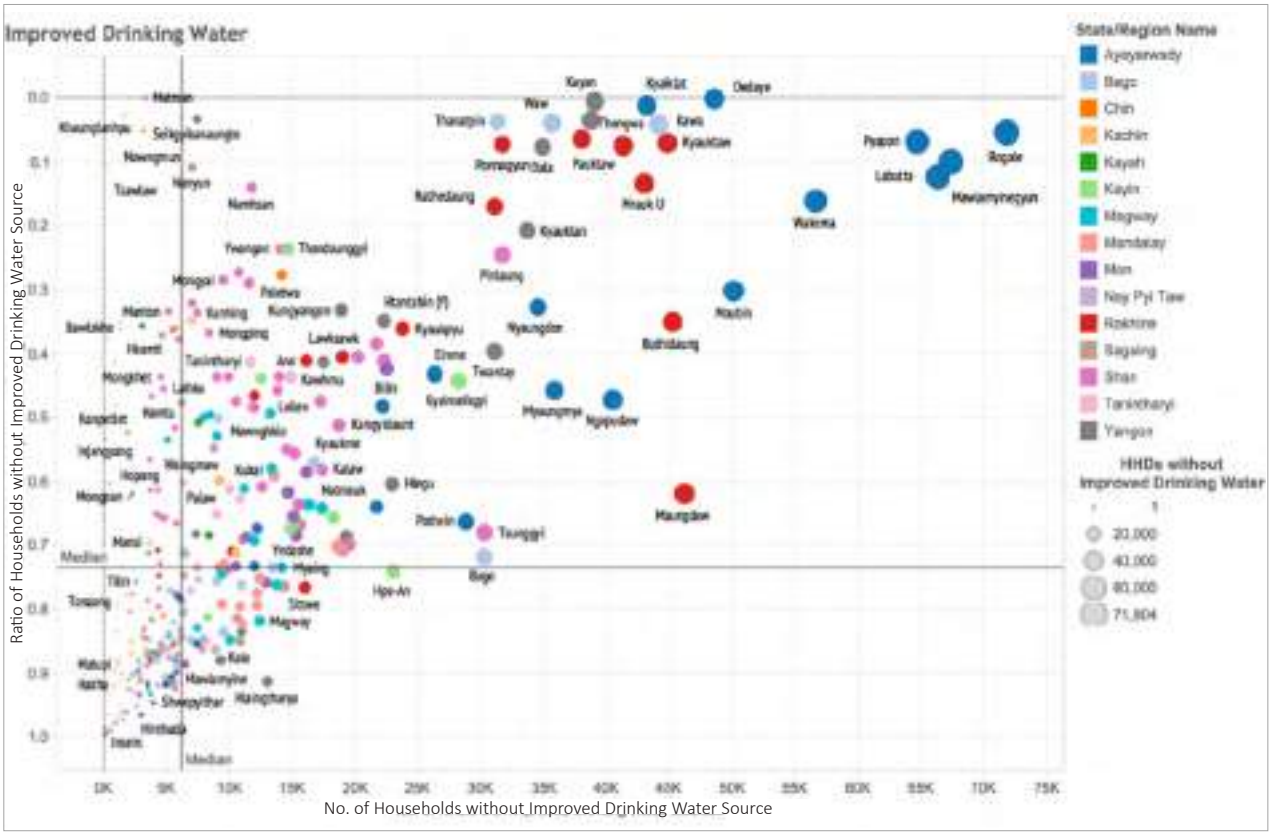
Over 3.4 million households (31%) lack access to improved drinking water sources.[58] These households are overwhelmingly located in Ayeyarwady, Shan and Rakhine, which together contain 49% of all households countrywide without improved drinking water. Rakhine and Ayeyarwady are of particular concern as many of the unimproved drinking water sources are anticipated to be heavily impacted by increased salinisation caused by climate change and human-driven degradation of the natural environment. Deltaic parts of rural Yangon, such as Thongwa and Kayan, also suffer from similar problems. More research and area-specific experimentation is necessary to develop long-term solutions to the current and worsening drinking water problems.

Areas with water and sanitation needs to coincide with those with shelter needs, indicating the need to improve geographic targeting and cross-sector analysis. This also highlights the need for area-based programming strategies for the design of response and resilience programmes in these areas, especially in emergency programmes. Despite the increased sensitisation of the government and local populace after major disasters in both Rakhine and Ayeyarwady, weaknesses due to underinvestment in the physical resiliency of housing as well as the lack of sustainable water and waste management infrastructure are still to be addressed. These should be considered in tandem through settlement-based programming approaches or multi-sector aid packages.

The number of affected households or individuals must be considered when comparing the situation across townships. Percentages can mask these numbers as can be seen in Figure 44, which compares townships with the highest number of households without access to safe drinking water, alongside the percentage of their residents with access to improved drinking water.

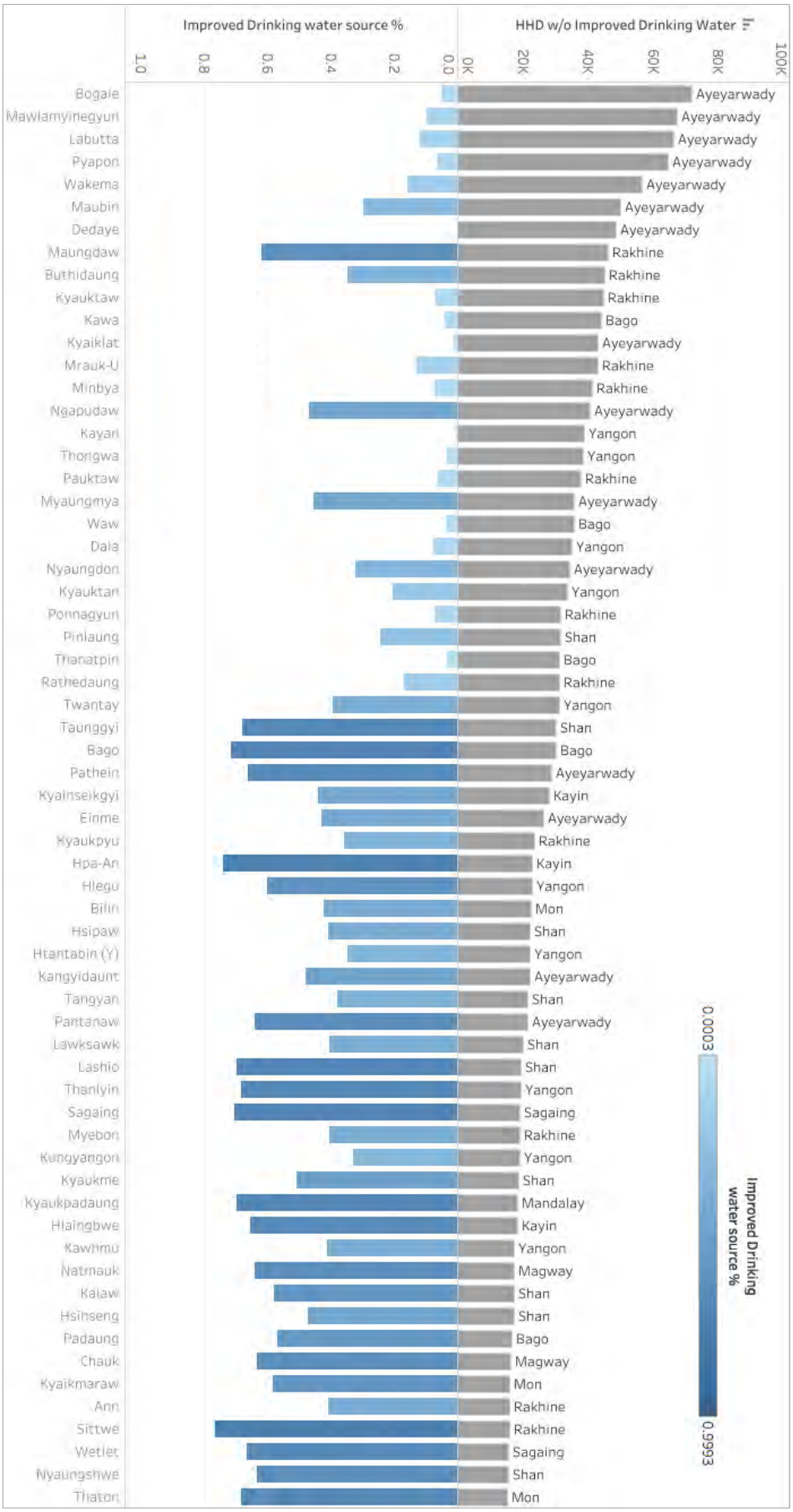
[58] Improved drinking water sources include tap/piped water, tube well or borehole, protected well or spring, bottled or purified water as per data collected in the 2014 Population and Housing Census. Other (unimproved) drinking water sources include un-protected well or spring; pool, pond, lake, river, stream, canal, waterfall, rain water, tanker or trucked water.

Figure 38 *Prevalence and Incidence of Unimproved Drinking Water Sources* – 2014 Census*



**Based on Census-enumerated population only.*

Figure 39 *Comparison of Townships with the Lowest Access to Safe Drinking Water**



** Based on Census-enumerated population only.*

HEALTH AND NUTRITION

Key Findings

- As of 2013, just 30,000 doctors and 55,000 nurses and midwives served approximately 51 million people. The coverage and availability of health services varies significantly between urban and rural areas.
- The Maternal Mortality Ratio and Under-5 mortality in Myanmar are more than double the average for ASEAN, while infant mortality is 2.6 times the ASEAN average.
- Children in households with unimproved toilets have a 51% higher chance of dying before the age of 5 than in households with improved toilets, and children with unsafe drinking water have an 18% higher chance of dying than those in households with safe drinking water.
- Myanmar's leading causes of morbidity and mortality are largely due to communicable diseases and injuries which are both treatable and preventable with improved health coverage.

The lack of publicly available health and nutrition data at township level and below is a major impediment to detailed analysis. The extensive, annually-collected, Health Management Information System data is not readily available and the last countrywide, township level data shared is for 2011. No other data of this granularity (i.e. at township level or below) is available. The recently completed Demographic and Health Survey provides state/region-level information and cannot be used for analysis at lower levels.

Despite significant improvements in maternal healthcare, Myanmar's maternal, infant and under-five mortality rates are far higher than other countries in the ASEAN region. While Myanmar's maternal mortality has fallen significantly – from 520 per 100,000 live births in 1990 to 282 in 2014, it remains double that of the rest of ASEAN. Myanmar's infant mortality across areas enumerated in the 2014 Census was 2.6 times the regional average and around 1.6 times the average for all developing countries globally,[59] whereas under-five mortality is more than double the ASEAN average. These rates are extremely high even taking income levels into consideration; a comparison by the World Bank adjusted for Myanmar's GDP per capita to that of other ASEAN countries indicated that infant mortality rates should be approximately 30% lower than the current levels. Myanmar's life expectancy at birth (64.7 years) is also the lowest among ASEAN countries.[60]

Concealed within these very high mortality rates is significant variation at the sub-national level with wide geographic, ethnic and socio-economic disparities. Data from the 2014 Census indicates infant mortality rates to be higher than the national average in 29 of Myanmar's 74 districts, whereas the Union average for Myanmar is, in itself, three times the ASEAN average. The highest recorded infant mortality is in Ayeyarwady's Labutta district which has double the Union rate of infant mortality, followed by Mindat district in Chin. Magway, Sagaing and Tanintharyi also have particularly high early years mortality. Gaps in census enumeration meant that data was not available for parts of Rakhine – however, the number of children dying before the age of 1 year (65 per 1000 live births) and before reaching 5 years (75 deaths per 1000 live births) are both higher than the national average.[61]

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[59] Department of Population, Ministry of Labour, Immigration and Population (2015). *The 2014 Population and Housing Census: Thematic Report on Mortality, Volume 4-B.* The Infant Mortality Rate is the number of deaths of children under one year of age per 1,000 live births.
[60] Ministry of Health and Sports (2016). *National Health Plan 2017-2022.*
[61] Department of Population (2015). *The 2014 Myanmar Population and Housing Census: Rakhine State Report, Volume 3-K.* Nay Pyi Taw: Ministry of Immigration and Population.

Myanmar's mortality is largely due to communicable diseases and injuries which are both treatable and largely preventable, with pregnancy and childbirth-related factors among the leading causes of mortality and morbidity. Given that adequate allocations towards preventive care can drastically improve the burden of disease on an already strained healthcare system, further exploration of detailed breakdowns of health expenditures would provide valuable insights for planning.

Figure 40 *Mortality Indicators, Myanmar (2014 Census) compared to Regional and Global Indicators*

Mortality Indicator	Myanmar*	Southeast Asia	Developing Countries	Developed Countries	World
Maternal mortality ratio	282	140	230	16	210
Crude death rate	9.6	6.9	7.4	10.0	7.8
Life expectancy at birth	64.7	70.3	68.8	78.3	70.5
Male life expectancy	60.2	67.5	66.9	75.1	68.3
Female life expectancy	69.3	73.2	70.7	81.5	72.7
Infant mortality rate	62	24	39	5	36
Under-five mortality rate	72	30	54	6	50

Figure 41 *Townships with the Highest Infant and Under 5 Mortality across Myanmar – 2014 Census**

Rank	State/Region	District	Township	Both sexes		Male		Female	
				IMR	U5MR	IMR	U5MR	IMR	U5MR
1	**Ayeyarwady**	Labutta	Pyinsalu Town	170	204	184	220	155	187
2	**Chin**	Mindat	Samee Town	145	172	160	188	130	155
3	**Chin**	Mindat	Paletwa	129	153	139	164	118	140
4	**Magway**	Pakokku	Seikphyu	128	154	146	174	110	132
5	**Magway**	Minbu	Sidoktaya	119	143	132	158	106	127
6	**Ayeyarwady**	Labutta	Labutta	119	143	131	157	106	127
7	**Sagaing**	Katha	Banmauk	118	136	124	144	111	128
8	**Magway**	Pakokku	Pauk	115	137	131	157	98	118
9	**Ayeyarwady**	Phyapon	Bogale	115	138	128	153	102	122
10	**Sagaing**	Katha	Pinlebu	113	132	120	139	107	123
11	**Tanintharyi**	Kawthoung	Pyigyimandaing Town	113	133	114	133	113	134
12	**Chin**	Mindat	Kanpetlet	110	131	120	141	101	120
13	**Ayeyarwady**	Phyapon	Ahmar Town	109	131	123	147	96	115
14	**Shan**	Minesat	Mongton	108	125	113	130	104	119
15	**Shan**	Minesat	Hmone Hta Town	108	125	111	128	105	120

* *Township values are based on enumerated populations in the 2014 Population and Housing Census.*

Figure 42 *Stunting in Children Under 5 Years of Age by States and Regions – DHS 2015-2016*

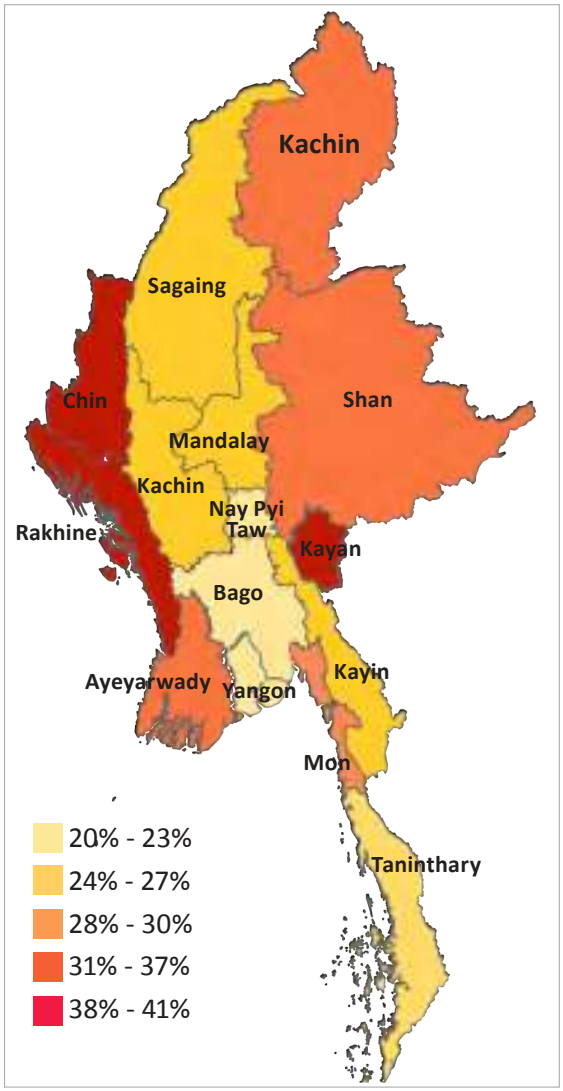
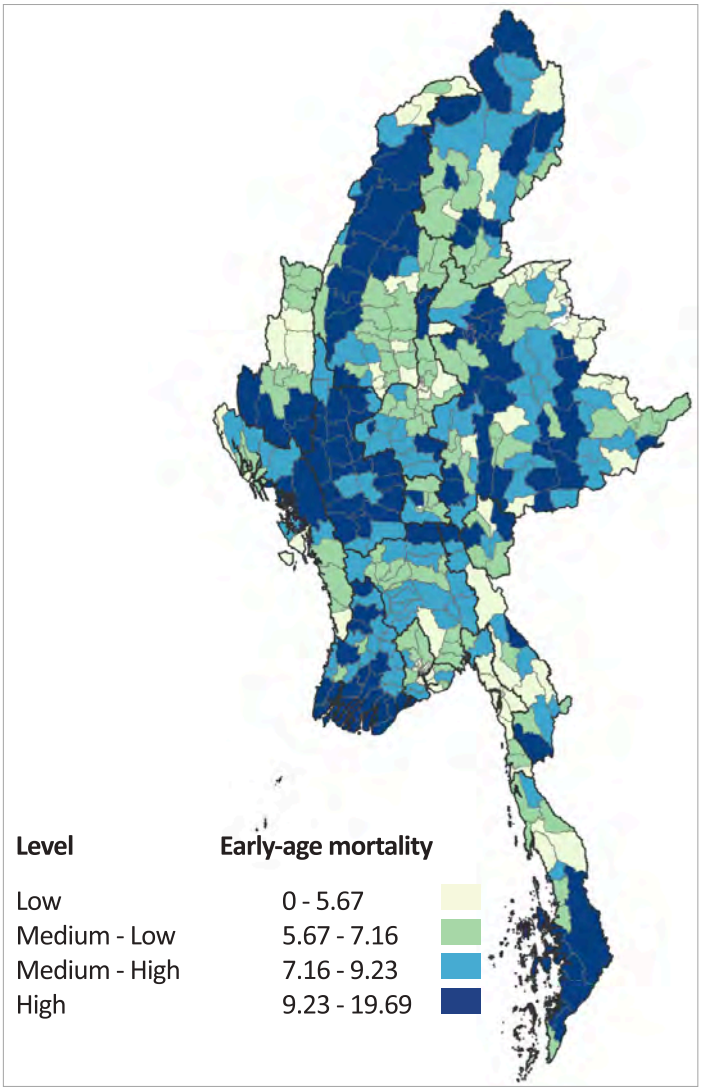


Figure 43 *Early-age Mortality by Township and Sub-township* – 2014 Census*[62]



**Based on Census-enumerated population only.*

While health spending has increased dramatically in recent years, its impact on health outcomes has still to be fully assessed. Public spending on health in Myanmar in 2009 was noted in the National Health Plan as the lowest in the world at just 0.2% of GDP, but has been slowly increasing, reaching just over 1% in 2014 and 3.65% in 2016, which is still low by global and regional standards.[63] Government health reforms initiated over 2011 to 2014 to achieve universal health coverage in line with the Myanmar Health Vision 2030 are also showing results, including a 35-fold increase in the spending on essential supplies and medical equipment, a reduction in out-of-pocket payments from 80% to 60%, a 25% increase in the number of doctors and nurses between 2011 and mid-2015, and improvements in the fight against malaria, tuberculosis, and HIV/AIDS.[64] Nevertheless, out-of-pocket spending by households remains the dominant source of financing for health and can push households into poverty as well as prevent many from seeking necessary health care.

[62] Department of Population, Ministry of Labour, Immigration and Population (2015). *The 2014 Population and Housing Census: Thematic report on Mortality Volume 4-B.* Early-age mortality is defined in this instance as the percentage of children that died among those who were ever born to women aged 20-34.
[63] Ministry of Health and Sports (2016). *National Health Plan 2017-2021.*
[64] Government of the Union of Myanmar (2015). *Myanmar Post-Disaster Needs Assessment of Floods and Landslides*

Figure 44 *Leading Causes of Mortality and Morbidity 2012 – Ministry of Health*

Rank	Single Leading Cause of Mortality	%	Single Leading Cause of Morbidity	%
1	HIV/AIDS	6.6	Other injuries (specified and unspecified)	10.0
2	Septicaemia	6.1	Other complications of pregnancy and delivery	6.9
3	Other injuries (specified and unspecified)	5.4	Single spontaneous delivery	6.0
4	Slow foetal growth, foetal malnutrition and disorders related to short gestation and low birth weight	4.6	Diarrhoea and gastroenteritis of presumed infectious origin	5.8
5	Other diseases of the liver	4.0	Other viral diseases	3.8
6	Other respiratory diseases	4.7	Other pregnancy and abortive outcomes	2.6
7	Intrauterine hypoxia and birth asphyxia	3.4	Gastritis and duodenitis	2.4
8	Heart failure	3.3	Malaria	2.4
9	Respiratory tuberculosis	3.2	Cataract and other disorder of the lens	2.4
10	Intracranial haemorrhage	2.9	Other acute upper respiratory infections	2.0
11	Other heart diseases	2.8	Pneumonia	1.8
12	Intracranial injury	2.7	Other conditions during the perinatal period	1.7
13	Malaria	2.6	Toxic effects of substances of chiefly non-medicinal sources	1.6
14	Pneumonia	2.6	Fractures of limbs bones	1.5
15	Stroke, not specified as haemorrhage or infarction	2.5	Diseases of the appendix	1.5
--	All other Causes	43.6	All other Causes	47.6

Considerable challenges remain - the 2014 Census indicated that children in households with unimproved toilets have a 51% higher chance of dying before the age of five years, while those without safe drinking water have an 18% higher chance of dying compared to those with these amenities. Clearly the efforts to achieve universal health coverage will also require investment in other sectors, including community development, transport and communication, private sector participation, public education, public finance and governance, including at township level.

The recent Myanmar Demographic and Health Survey[65] found high levels of anemia and under-nutrition among Myanmar's children and women. Anemia affected 76.4% of children aged 6-11 months, 74.8% of children aged 12-23 months, and almost half of women of reproductive age (46.6%). The highest prevalence of anaemia among children was in Sagaing Region (71%), followed by Yangon Region (66%) and Tanintharyi Region, Ayeyarwady Region, and Rakhine State (62% each). Shan State had the lowest prevalence of anaemia among children (40%). In terms of nutrition, 29% of children under the age of 5 were found to be stunted and 8% severely stunted (chronic undernourishment) whereas 7% are wasted and 1% severely wasted (acute under-nutrition). A further 19% are underweight. Nevertheless, this indicates improvement in child nutrition since the 2009-2010 Multiple Indicators Cluster Survey when 35% of children under 5 years of age were stunted, 8% were wasted and 23% were underweight.

Once again there are significant disparities: children in rural areas are more likely to be chronically under-nourished (32% stunting) than those in urban areas (20%). Stunting among children is highest in Chin State, at 41%, with 13% severely stunted. The nutritional status of children in Rakhine State was found to be the worst in the country, with 38% of children stunted (18% severely stunted), 14% wasted, and 34% underweight. The survey also confirmed that higher levels of household wealth and mother's education corresponds to lower numbers of children who are stunted and underweight.

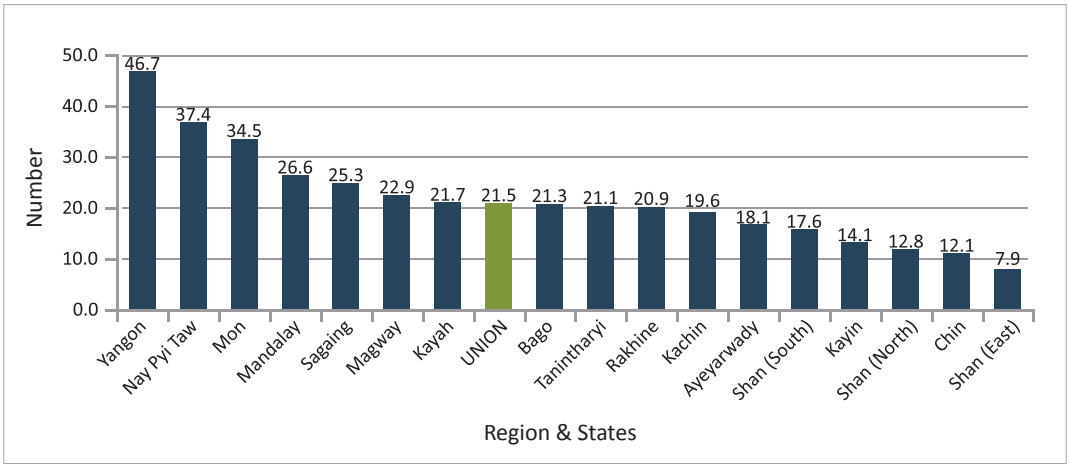
[65] Ministry of Health and Sports and DHS Program (2016). *Myanmar Demographic and Health Survey, Key Indicators Report 2015-2016.*

The World Bank's 2015 Public Expenditure review confirmed very low levels of basic healthcare services in Myanmar – as of 2013, there were just 30,000 doctors and 55,000 nurses and midwives to serve more than 51 million people,[66] and less than half of these doctors were working in the public sector. 2012 data indicates that Myanmar had 0.6 physicians per 1,000 residents in 2012, comparing favourably with that of Cambodia and Lao PDR (both hovering around 0.2 physicians/1,000 people).[67] The review also highlighted the need for upgrading and refurbishment of many facilities, in addition to addressing issues of transport for effective service delivery, supervision and monitoring, referral for those in need of emergency care and strengthening the training of midwives and nurses for basic and emergency obstetric care.

Access to trained healthcare providers remains significantly lower in rural areas of Myanmar. 2013 statistics from the Ministry of Health indicated that many of the trained voluntary health workers were not functioning - only 60% of the community health workers and 71% of auxiliary midwives were active, 57% of the traditional birth attendants were untrained, and close to half of those who had been trained had dropped out.[68] The dependence on these health workers remains very high, however 60% of all recorded deliveries in 2013 took place at home, 34% of them by skilled birth attendants, 10% by auxiliary midwives and 8% by traditional birth attendants.[69]

The provision of preventive and curative medical services varies widely across states and regions. Field visits by qualified health personnel to provide health services including antenatal care, immunisation, environmental sanitation activities and health education in 2013 were found to be lowest in Shan and Chin States, but also under the Union average in Kayin, Kachin, Ayeyarwady and Rakhine.

Figure 45 *Average Frequency of Field Visits to Villages/Wards in 2013 – Ministry of Health*



Despite these limitations, extensive emergency services were mobilised in response to the widespread flooding in 2015. The 2015 floods also served as the first major test of the Ministry of Health's Early Warning Alert and Response System (EWARS) for disease outbreaks. Despite the floods occurring in peak-dengue season with high risk of outbreaks of vector and water-borne diseases, aggressive approaches to identification and treatment of cases, as well as prevention, meant that there were no outbreaks of communicable diseases. The Post-Disaster Needs Assessment noted, however, the likelihood of increase in existing disparities in the availability of health services in affected areas in the wake of the disaster.[70]

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[66] World Bank Group (2015). *Myanmar: Public Expenditure Review.*

[67] Physicians per 1,000 persons, World Bank, retrieved from http://data.worldbank.org/indicator/SH.MED.PHYS.ZS, World Health Organization's Global Health Workforce Statistics, OECD, supplemented by country data.

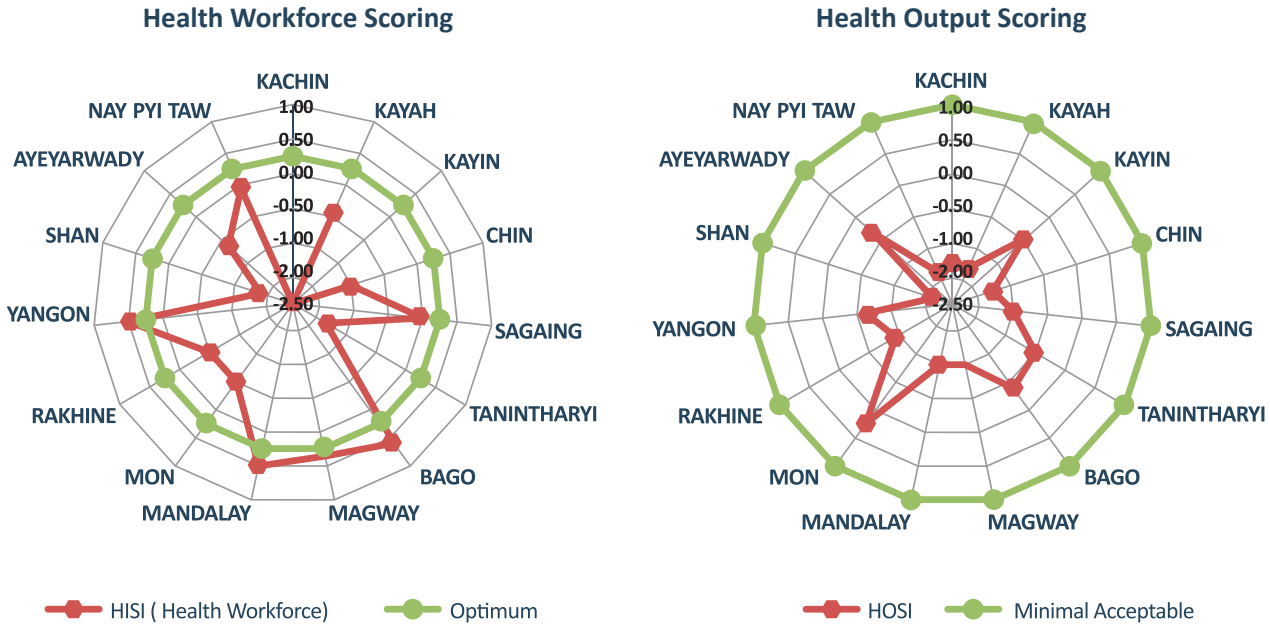
[68] Department of Health Planning (2015). *Public Health Statistics 2013.* Nay Pyi Taw: Ministry of Health.

[69] Ibid.

[70] Government of the Union of Myanmar (2015). *Myanmar Post-Disaster Needs Assessment of Floods and Landslides.*

Myanmar's recently released National Health Plan 2017-2022 confirms continued disparities in the availability of essential public health services across states and regions.[71] A scoring of the government health workforce in late 2016 indicated sub-optimal levels in 11 of 15 states and regions, with the situation most dire in Kachin, Shan, Tanintharyi, Chin and Ayeyarwady (see Figure 51). The Health Output Scoring Index which reflects capacity to deliver basic essential public health services based on hospital bed occupancy rate, new TB case detection rate and EPI coverage indicated that none of the 15 states and regions achieved the minimum acceptable level, with Shan, Kachin, Kayah and Chin figuring particularly poorly. The degree of functionality of health facilities has yet to be factored into these calculations.

Figure 46 *Health Output Scoring among States/Regions, November 2016 - National Health Plan*



The new National Health Plan for the period 2017-2021 recognises the many challenges faced by Myanmar's health system. It identifies the need to address the availability and distribution of inputs, including human resources, physical infrastructure, essential medicines and supplies, and financial resources, as well as to resolve weaknesses in key functions such as supportive supervision, referral, supply chain, health management information system, and public financial management. It also notes that limited oversight, leadership and accountability further exacerbate these challenges, and acknowledges the need to significantly increase investment as well as partnership with health providers outside the public sector, including private-for-profit clinics, ethnic health organisations and non-governmental organisations.

Strategies to strengthen universal coverage include geographic prioritisation based on township performance (the Health Input and Output Scoring Indices used in developing the National Health Plan), along with prioritisation of provision of a package of basic services to all, which can be extended as capacities increase. There is also a new focus on inclusive planning at the local level with Township Health Plans, to be grounded in information on which services and interventions reach which communities, where gaps are and who could fill them. The health financing strategy will also include a review of the need for additional support to reduce out-of-pocket spending on health by poor and vulnerable households.

[71] Ministry of Health and Sports (2016). *National Health Plan 2017-2022.*

EDUCATION

Key Findings

- While 90% of Myanmar's population over 15 years of age are literate, literacy is lower in rural areas and shows significant variation across states and regions.
- Close to half a million children aged 7-15 years in 2014 had never attended school; Shan State accounts for 18 of the 19 townships countrywide where more than half of children have never attended school.
- Less than a third of students enrolled in grade 1 reach grade 11, and there is a consistent two-thirds failure rate in the upper secondary education graduation examination.

89.5% of people over 15 years of age are literate, but with disparities by age, gender, and geographic locations.[72] Overall 92.6% of men and 86.9% of women are literate, however it remains higher in younger generations with youth literacy rates of 94.5% for males and 93.5% for females. Gender differences are less stark up to 50 years of age after which the differential increases more sharply with decreasing lower literacy among older women due to previous inequalities in educational opportunities. Chin, Rakhine and Shan had the largest gender differences (over 10%), and the lowest overall differences at state level reported in Yangon, Tanintharyi and Ayeyarwady (under 4%). Illiterate households are more prevalent in rural areas, and highest in Shan (24.9%), Kayin (17.1%) and Chin (10.7%).

Literacy is lower in rural than urban areas, and varies significantly across states and regions. Persons living in urban areas are more literate (95%) than those in rural areas (87%), while literacy rates were found to be highest in Yangon, Nay Pyi Taw and Bago, and lowest in Chin, Kayin and Shan, all three of which reported levels below 80%. The overall literacy rate was particularly low in Shan State (64.6%) where just 40% of women were reported as literate. Youth literacy rates were reported to be higher than 90% in all states and regions other than Shan (76.8%) and Kayin (86.8%).

4,536,830 persons in Myanmar were found to have no formal educational attainment at all in the 2014 Census. 61.3% of the population aged 25 and over have no formal education or have attended only primary school, while just under half a million children aged 7-15 years in 2014 have never attended school. Non-attendance was three times higher in rural areas (6%) than in urban areas (2%).[73] The Census results also confirmed the close relationship between literacy, along with the level of educational attainment, employment prospects and household standard of living: lower wealth quintiles accounted for a third of illiterate persons compared to 7.4% illiteracy in the highest wealth quintile.

Levels of educational completion vary widely across the country: data from the 2014 Census indicates that Maungdaw, even with the under-enumeration, had the greatest number of persons over 25 years without middle school education (149,383), followed closely by Hlaingtharya, Bago and Hpa-An townships. Hlaingtharya township also has the highest number of children and youth aged 5 to 29 years not attending school countrywide (229,659) - double that of Bago, the next highest township, and followed by Taunggyi, Dagon and Shwepyithar.

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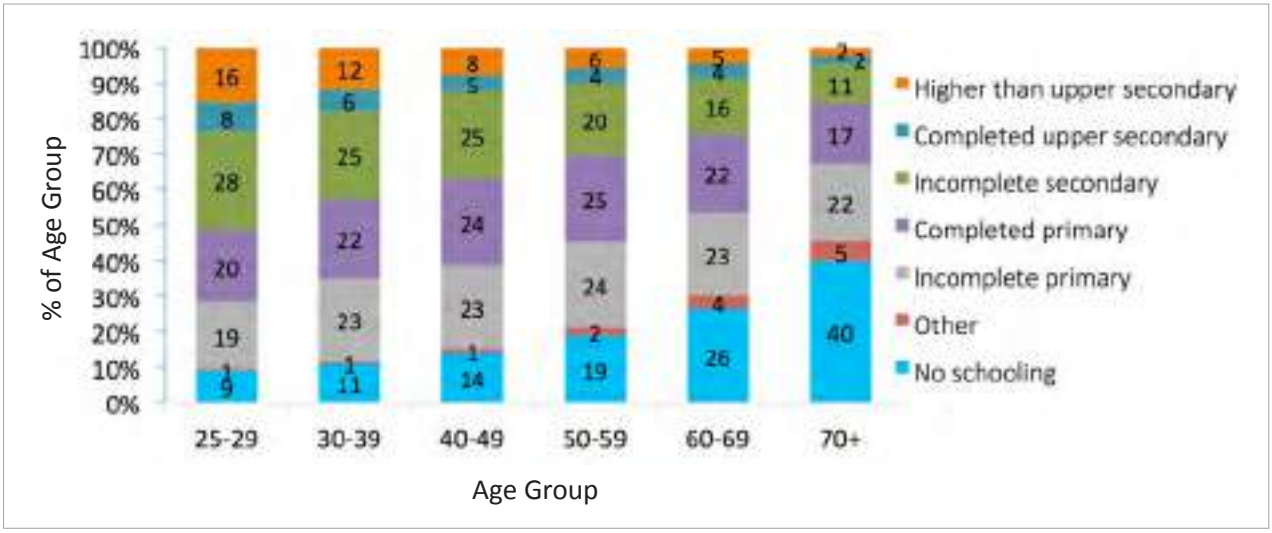
[72] Department of Population, Ministry of Labour, Immigration and Population & UNFPA (2017). *The 2014 Myanmar Population and Housing Census: Thematic Report on Education. Census Report Volume 4-H.*
[73] Ibid.

Figure 47 *Highest Level of Education Attained by Age Cohort 2014* – Census*



**Based on Census-enumerated population only.*

Persons in remote and isolated areas, and older people, are more likely to have no formal education: an ILO survey[74] found that approximately 20% of households have no member who could read or write, with rates in rural areas (23.4%) more than double those in urban areas (11.6%). As indicated by the Census data, lack of educational attainment is largely confined to older persons and has been decreasing steadily in younger age groups.

Shan State accounts for 18 of the 19 townships countrywide where more than half of children never attended school. According to the 2014 Census, 44.9% of adults in Shan State have no schooling at all, while the highest percentage of persons who have never attended school is in Mongkhet Township where 85% of children never attended school.

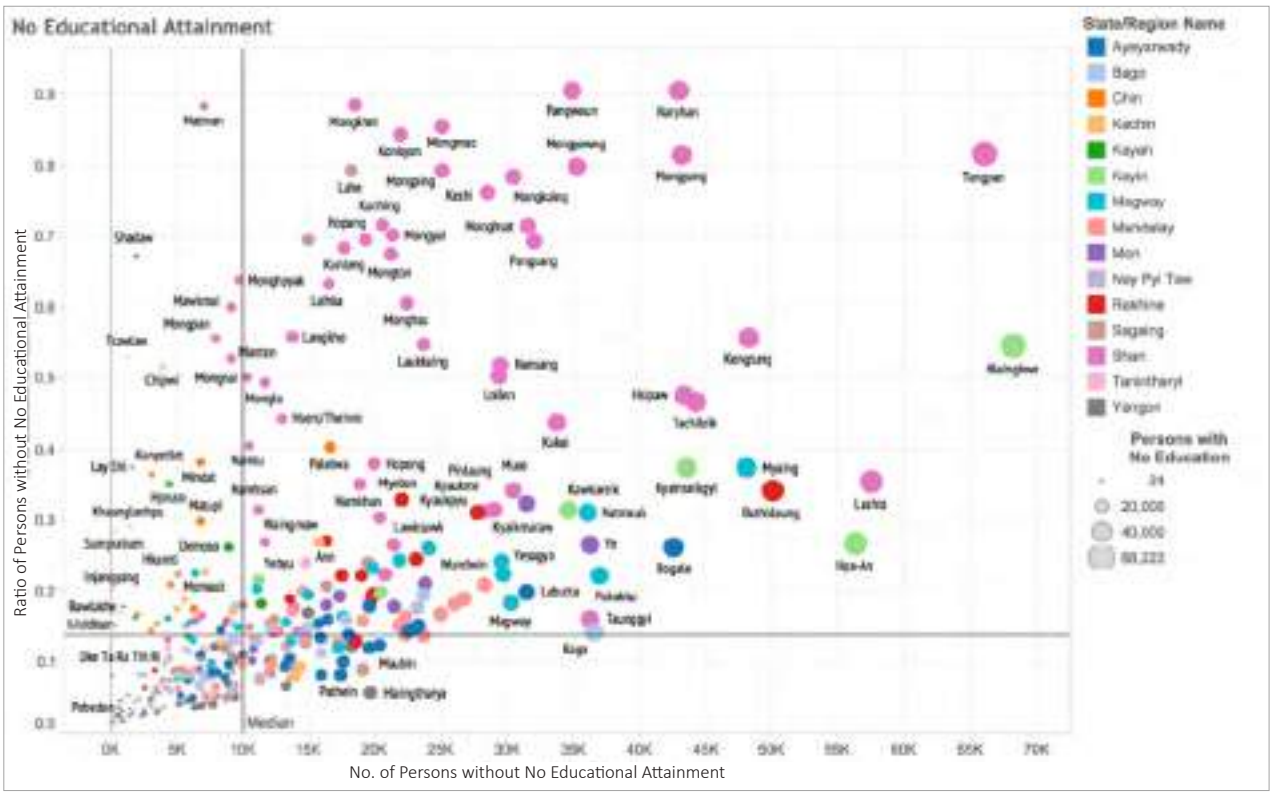
Whereas Mongkhet has the highest percentage of persons who have never attended school (85%), the largest numbers of these deprived populations are in Tangyan and Narphan townships. Tangyan and Pangsang, followed by Narphan and Mongkaing townships have the greatest differences between male and female access to education, whereas the gender balance in Mongkhet is more even. In other contexts, when funding for education (and for many other expenditures) is constrained, males are typically afforded more opportunities than their female peers; further studies are needed to determine the exact reasons for the gender disparities across different population groups in the Myanmar context.

Other townships with particularly high numbers of persons with no education are in Kayin, Magway and Rakhine, namely Hlaingbwe, Hpa-an and Kyainseikgyi (Kayin State), Myaing (Magway Region), Buthidaung and Maungdaw (Rakhine State). 35.7% of the population of Maungdaw (91,419 persons) included in the Census were found to have no formal education – these figures would be expected to be higher given the gaps in enumeration.

Important interventions in these areas include ensuring access to education and other basic services, as not only are these areas outliers in terms of educational attainment but also in terms of access to improved drinking water and safe sanitation. Many of these areas are inside self-administered zones and several, including Konkyan, Keshi and Mongyawng, are notable for being the locations of multiple clashes, with the resulting instability possibly contributing to low investment in basic infrastructure and services in these areas.

[74] Ibid.

Figure 48 *Prevalence and Incidence of Persons with No Formal Education by Township* – Census 2014*



NOTE: *Maungdaw township is outside the scale of this chart with over 91,000 persons with no formal education among the enumerated population in the 2014 Census. The actual figure with non-enumerated population would be higher.*

Figure 49 *Townships with Highest Rates of Children Never Having Attended School* – Census 2014*

State/Region name	Township name	Never attended					
		Total %	Male %	Female %	Both sexes #	Male #	Female #
Shan	Mongkhet	85.3%	84.39%	86.19%	18,009	8,614	9,395
Shan	Matman	71.7%	70.88%	72.55%	7,000	3,337	3,663
Shan	*Narphan*	*68.4%*	*64.68%*	*72.08%*	43,253	20,511	22,742
Shan	Mongping	67.0%	67.13%	66.93%	20,983	10,161	10,822
Shan	Pangwaun	65.9%	62.95%	68.89%	35,804	16,897	18,817
Shan	*Mongyang*	*64.6%*	*61.99%*	*67.16%*	32,202	15,145	17,057
Shan	*Mongmao*	*61.4%*	*57.75%*	*64.99%*	22,799	10,722	12,077
Shan	Tangyan	61.4%	61.59%	61.18%	49,887	23,113	26,774
Shan	*Pangsang*	*60.5%*	*56.71%*	*64.01%*	27,228	12,107	15,121
Shan	Mongkaing	56.9%	55.97%	57.68%	17,362	7,592	9,770
Shan	Monghsat	56.6%	55.11%	58.07%	27,804	13,958	14,206
Shan	Mongyawng	55.4%	52.97%	57.79%	17,973	8,571	9,402
Shan	*Keshi*	*54.0%*	*57.24%*	*51.47%*	17,227	8,095	9,132
Shan	Kunhing	53.5%	55.10%	52.17%	11,818	5,545	6,273
Sagaing	*Lahe*	*52.9%*	*49.26%*	*56.40%*	14,634	6,613	8,021
Shan	Mongla	52.6%	50.29%	54.84%	6,723	3,155	3,568
Shan	Mongyai	52.0%	53.44%	50.86%	13,347	5,871	7,476
Shan	*Konkyan*	*51.3%*	*46.63%*	*56.31%*	16,516	7,854	8,662

**Based on Census-enumerated population only.*

Enrolment and completion rates remain low among those who do attend school. Analysis by the Asian Development Bank of school enrolment data[75] indicates high dropout rates; more than 80% of young people complete primary education, but only 44% complete lower secondary education and just 18% complete upper secondary education. Of the students who enrolled in grade 1 in 2002/2003, only 28% reached grade 11, and there is a consistent two-thirds failure rate each year on the upper secondary education graduation exam. Outdated curricula, pedagogy and assessment are contributing factors, and private tutoring – widely used to supplement the education system - is the largest component of household spending on education.

Analysis of available data also allows a better understanding of areas and ages with the greatest risk of dropout. ADB analysis[76] shows that data from the Education Management Information System (Ministry of Education), the 2014 Census and the 2010 Integrated Household Living Conditions Survey all tell a similar story; whereas about 95% of children finish at least one grade of primary school, of every 5 children enrolled, 4 complete primary school, 2 finish middle school, and less than 1 in 5 (around 18%) will eventually pass the matriculation exam used to determine successful high school completion and university entrance (where this may include multiple attempts in subsequent years). The pattern differs by geographical area; in eastern Shan, many children never complete primary school but those who do continue through at least middle school. By contrast, primary school completion in Sagaing is better, but children are less likely to complete middle school.

Children from rural families, poor or otherwise disadvantaged groups are less likely to transition from primary to secondary school, or to successfully complete their secondary education.[77] Relatively few reach tertiary levels: the 2014 Census indicated only 7.3% of the population aged 25 and over to have a university-level degree, with proportionally more women achieving a postgraduate degree (63%) than men (37%).[78] The dynamics of areas in which economic corridors coincide with higher rates of middle school dropouts could also be explored.

There are few assessments of educational outcomes, although one study indicated that 9% of sampled third graders in Yangon could not read a single word and a further 12% had limited comprehension.[79] The results for the remaining, and much poorer, regions of the country are anticipated to be significantly worse. Gaps in critical skills such as critical thinking, problem-solving and communication among youth who have completed secondary and higher education have been reported by employers to leave graduates ill-equipped for employment.[80]

The Ministry of Education is stymied in improving its services by a number of factors. The World Bank has highlighted limited administrative and performance data, leading to confusion on spending priorities, limited capacity to analyse policy and budget linkages, limited teacher training and insufficient and weak teacher specialisation. Other problems include the inability to add more necessary years of schooling, poor ability to expand coverage to marginalised persons and those in remote areas, and lack of Early Childhood Care and Development.[81] The recently released National Education Strategic Plan emphasises intended strategies to address issues of quality, curricula, teaching capacity, monitoring, and low enrolment of children in remote and rural areas in primary and middle schools.[82]

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[75] Asian Development Bank (2015). *Myanmar Comprehensive Education Sector Review Phase 2: In-Depth Analysis. Supplementary Annex: Updated Analysis of Education Access, Retention, and Attainment in Myanmar, with a Focus on Post-Primary Education.*
[76] Dr Christopher Spohr, ADB. Personal communication.
[77] Asian Development Bank (2017). *Summary - Improving Post-Primary Education Outcomes in Myanmar.*
[78] Department of Population (2017). *The 2014 Myanmar Population and Housing Census: Thematic Report on Education. Census Report Volume 4-H.*
[79] Education Global Practice (2015). *Myanmar Early Grade Reading Assessment for the Yangon Region.* GEDDR East Asia and Pacific: World Bank.
[80] Asian Development Bank (2015). *Myanmar Comprehensive Education Sector Review Phase 2: In-Depth Analysis. Supplementary Annex: Updated Analysis of Education Access, Retention, and Attainment in Myanmar, with a Focus on Post-Primary Education.*
[81] World Bank Group (2015). *Myanmar: Public Expenditure Review.*
[82] Ministry of Education (2016). *National Education Strategic Plan 2016–21.*

Figure 50 *Transition of Grade 1 Entrants for the School Year 2002/03 Across Grades – ADB (from EMIS data)*

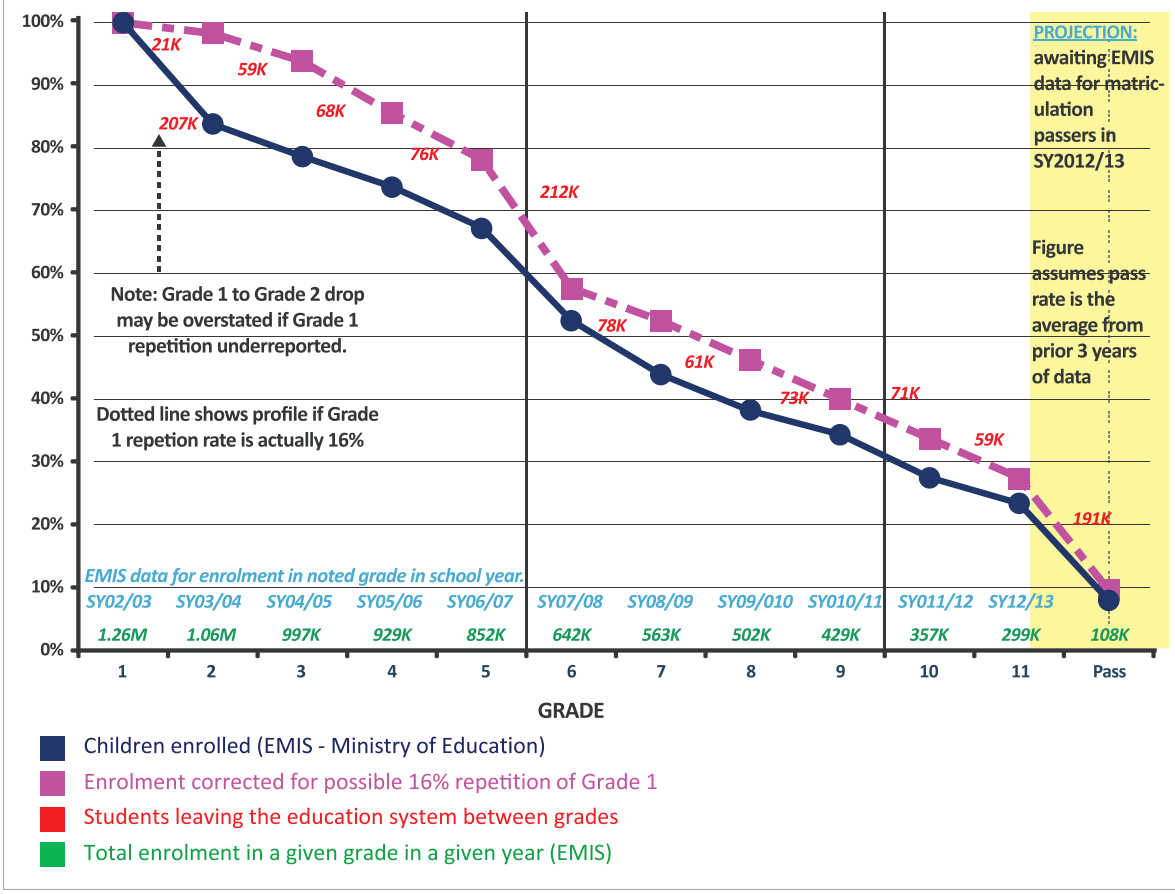
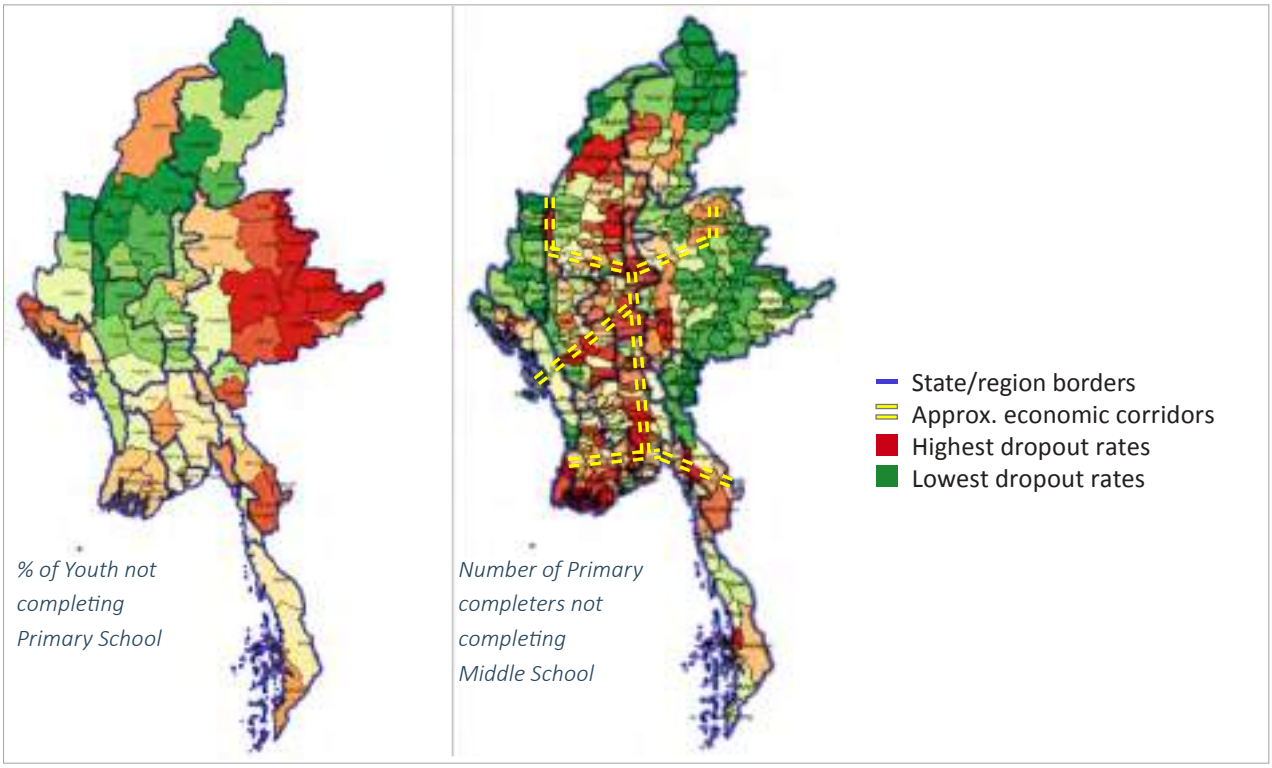
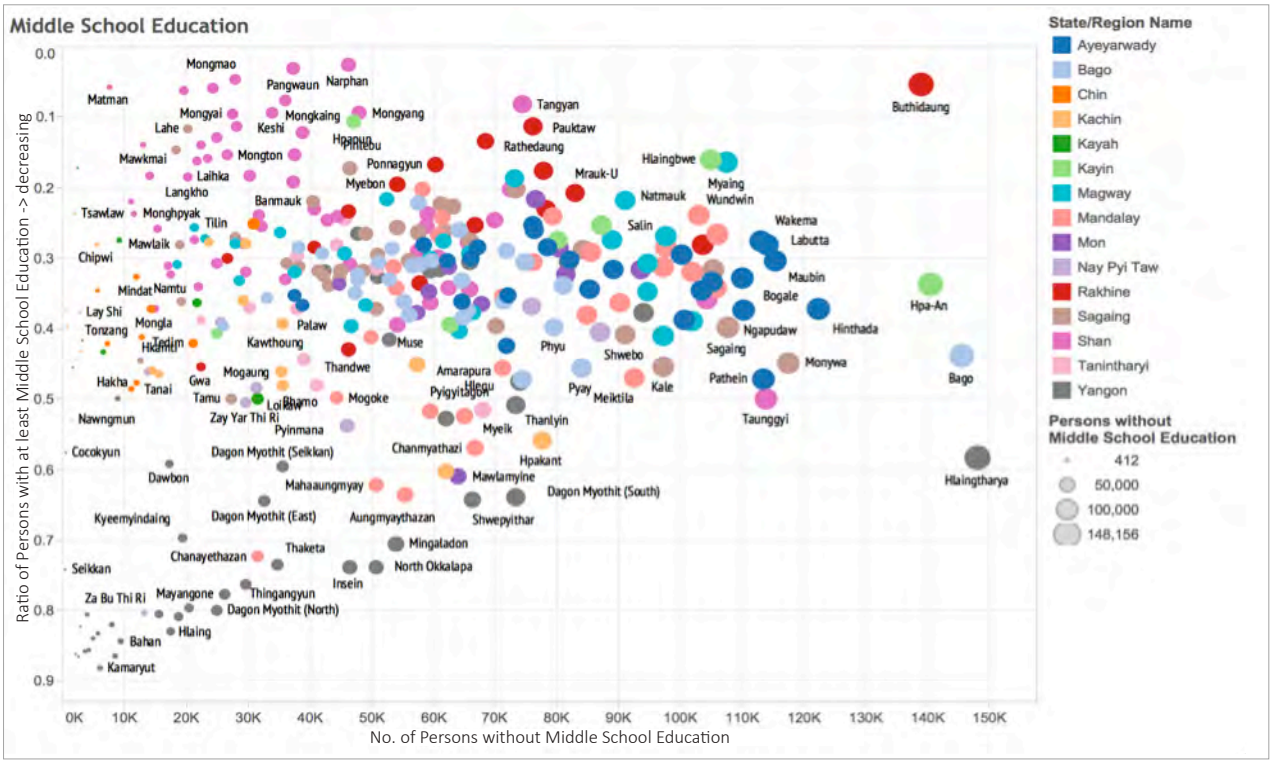


Figure 51 *Geographic Dimensions to Dropout – ADB*[83]



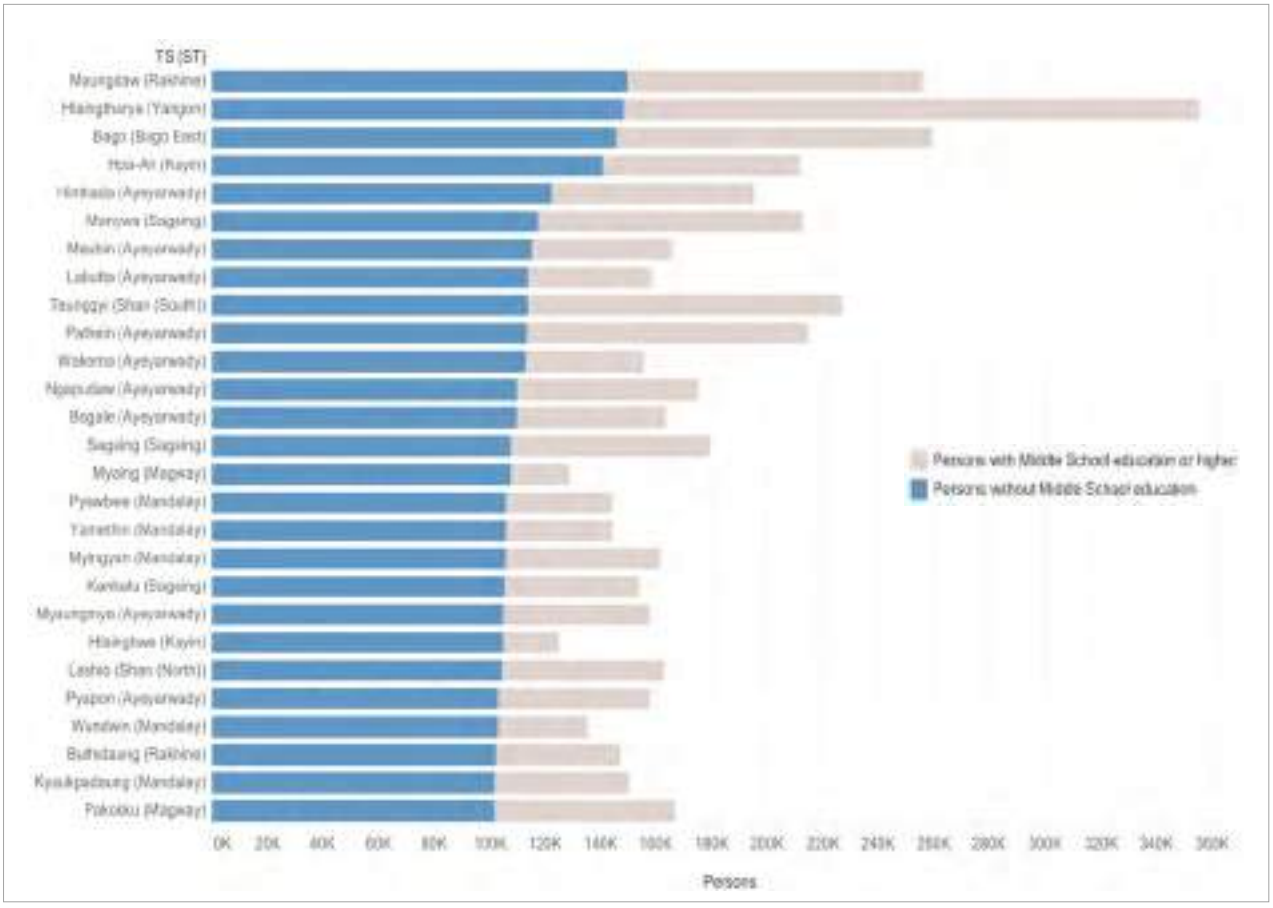
[83] Spohr, C (2017). *Evidence to Guide Myanmar's Secondary Education Subsector Curriculum Reforms.* (Presentation). Asian Development Bank.

Figure 52 *Prevalence and Incidence of Persons Without Middle School Education* – Census 2014*



*Based on Census-enumerated population only.

Figure 53 *Townships with the Highest Number of Persons Aged 25 and over without Middle School Education* – Census 2014*



*Based on Census-enumerated population only.

Educational reforms implemented since 2011 have included steps to redress decades of under-investment: public spending increased by a reported 351% between 2011/12 and 2015/16, albeit from a very low base, while civil servants' salaries increased nearly fourfold between 2011/12 and 2014/15.[84] Primary and secondary school fees have been eliminated and expanded stipend programmes introduced for some students; this only partially resolves the education problems which are exacerbated by poverty, with many households unable to cope with competing out-of-pocket expenditures such as transportation to school in rural areas, and the need for additional labour.

Support is needed to strengthen the ability of the Ministry of Education to monitor learning outcomes and raise attendance and completion rates, not only by incentivising attendance but expanding outside the traditional reaches of the education sector. The World Bank's Public Expenditure Review states that economic issues are the primary factors driving non-attendance, including the need for additional family labour. This also requires attention to the differing reasons for not attending school as noted above.

The situations of those not attending school and those never attending school are quite different; those never having attended school are much more likely to be affected by conflict and access issues, whilst areas where large numbers of students are not attending school or dropping out early tend to have more economic concerns.

Better public expenditure tracking is needed to gather evidence on how effectively funds are being used and if education interventions are having the desired effect. The World Bank also identified the need for skills building of district officers and principals on proper procurement procedures and accountability (under the Ministry of Education frameworks). Other important work includes supporting the Ministry of Education in the implementation of its township-level monitoring system, which will allow it to collect, report on and analyse much more granular data on students, teachers and learning outcomes.

[84] Ibid.

LIVELIHOODS AND HOUSEHOLD CONSUMPTION

Key Findings

- Wages remain very low; more than half the population work in the agricultural, forestry and fishery sectors with average earnings of 18% less than the Union average salary.
- Males are generally paid more than females; male daily wage earners are paid on average 47% more than females.
- The rural areas of Rakhine, Chin and Magway are clear outliers in terms of per capita household spending, with around 70% of the monthly budget spent on food.
- As many as 9.2 million people – 40% of villages, or 25% of the rural population – are estimated to be living in villages that are not connected by any road.

Myanmar's Labour Force Survey in 2015[85] notes that the country's working-age population is predominantly in rural areas (71%), and comprises more females (54%) than males. The Union level labour force participation rate (64.7%) masks considerable gender difference, with 80% of males in the labour force compared to 52% females. Income in rural areas is largely agriculture-based (almost half of households), with lower consumer expenditure and almost no disparity between different consumer groups. By contrast, the income for more than half of households in urban areas is from salaried employment, and urban areas have generally higher expenditure levels as well as greater disparities.

Levels of underemployment are significantly higher in rural areas. The Labour Force Survey also found that persons in rural areas experience much higher rates of underemployment than those in urban ones – 75.2% compared to 24.8%.

This survey also confirmed that wages remain very low, averaging MMK 124,100 (USD 121) a month per household head. Agricultural, forestry and fishery sectors account for over half of employed persons (54.2%) and have the lowest average income at MMK 101,100 per month. Salary levels are, on average, significantly higher salary in urban areas (MMK 147,600) than in rural areas (MMK 117,100). Males generally earn higher salaries than females; male daily wage earners were paid on average 47% more than females (MMK 4,900 per day compared to MMK 3,340).

44.6% of those with higher education (or in university themselves) have a preference for engaging in Science, Technology, Engineering, and Mathematics fields. These STEM graduates are usually a very important part of a nation's human talent pool and qualified graduates in these fields tend to expect larger incomes than in other industries. However, the average scientist or technician in Myanmar can only expect to earn 1.27 times more than the average farmer.[86] The occupational categories with the highest average income are Information and Communication (close to 1.9 times the monthly agricultural income), as well as Financial and Insurance Activities, and Construction. At the same time, technical and vocational education and training has not effectively met industry demands for practical skills (e.g. welding and construction-related skills), with challenges including low access – particularly for disadvantaged youth and workers – along with outdated, supply driven, and overly theoretical approaches.

[85] Ministry of Labour, Employment and Social Security, Central Statistics Organisation, International Labour Organisation (2016). *Key Findings of the Myanmar Labour Force, Child Labour and School-to-Work Transition Survey 2015*. The working age population is aged from 15 to 64 years.
[86] Ibid.

Figure 54 *Fields of Study of those with Higher Education – Myanmar Labour Force Survey 2015*

Field of study	% within Age-group (years)							
	15-19	20-24	25-29	30-34	35-39	40-44	45+	All (15+)
Education	5.1	1.8	1.8	1.5	1.2	2	5	2.6
Arts and Humanities	28.7	33.5	28.6	31.4	33.1	35.7	32	31.8
Social Science, Journalism and Information	10.3	7.3	8.5	14	10.5	6.3	7.6	9.1
Business, Administration and Law	3.9	3.9	9.1	8.5	3.1	1.7	5	5.5
Natural Sciences, Mathematics and Statistics	**32.1**	**38.3**	**38.2**	**33.9**	**41.1**	**46.3**	**37.7**	**38.2**
Engineering, Manufacturing and Construction	**11.9**	**9.1**	**6**	**5.2**	**5**	**3.8**	**5.7**	**6.4**
Agriculture, Forestry, Fisheries and Veterinary	1.5	1.9	1.2	2.1	3.5	3.2	3.6	2.5
Health and Welfare	4.3	2.4	2.9	1.5	1.1	0.4	3	2.2
Others	2	1.8	3.7	1.9	1.4	0.6	0.3	1.6

Figure 55 *Earnings by Industrial Sector - Myanmar Labour Force Survey 2015*

Industrial sector	Income per month under household head (1,000 Kys)					
	Basic Pay	Over-time	Fixed allowances	Bonus	Other	Total
Agriculture, forestry and fishing	89.6	1.2	1	7.6	1.7	101.1
Mining and quarrying	137.6	4	7	0.4	0	144.3
Manufacturing	105.9	4.5	3.9	5.6	0.6	119.5
Construction	154.8	3.6	2.4	3.7	1.7	166.6
Wholesale and retail trade; repair of vehicles, motorcycles	105.4	1.2	1.2	2.7	0.5	105.4
Transportation and storage	142.1	5.1	4.9	10.6	5.4	165.7
Accommodation and food service activities	90.8	1.6	1.5	7.1	0.5	102.7
Information and communication	165.5	12.5	6.9	2.7	0.6	188.1
Financial and insurance activities	158.0	5.1	5.8	7.8	0.4	172.7
Professional, scientific and technical activities	102.1	8.8	12.2	3.1	0.9	128.6
Administrative and support service activities	109.4	5	12.5	5.2	1.7	123.9
Public administration, defence; compulsory social security	112.8	7.6	15	2.2	1.4	137.4
Education	101.0	5.6	17.6	2	1.1	123.4
Human health and social work activities	103.8	3	9.6	5.2	1.2	116.6
Other service activities	116.1	2.6	2.3	7.3	1.7	128.1
All Myanmar average	**109.7**	**4.1**	**6.6**	**5.2**	**1.4**	**124.1**

Agricultural household heads earn the least of all sectors. Other rural non-farm income activities, such as petty trade, tourism, hostelry and the repair of motor vehicles and small machinery, may provide little difference in income from engaging in agriculture itself though with greater seasonal stability and less intense forms of manual labour. From a resilience standpoint, the diversification of income streams is still an important livelihoods outcome. Unsurprisingly, persons in rural areas experience much higher rates of underemployment than those in urban ones – 75.2% compared to 24.8%, likely due to the seasonality and inconsistency of agricultural and rural labour compared with the higher proportions of salaried employment in urban areas.

Rural households are twice as likely to be indebted as urban households. The Myanmar Labour Force Survey found 35% of all households to have an outstanding loan of 10,000 Kyats or more at the time of the 2015 survey, with rural households more likely to be in debt (41%) than urban households (20%). Groups which suffer additional stigma, discrimination and socio-economic exclusion may also be severely disadvantaged – households with a family member who has HIV, for example, were found to have lower incomes, fewer assets, lower home-ownership, more household debt and must pay a higher rate of interest than households that are not affected by HIV.[87]

Out-migration is very common and it can be very difficult for local firms to compete with the demand for skilled workers from other parts of the region. The Labour Force Survey found that a quarter of persons had changed their place of residence for employment, and an estimated 6% of households had a least one family member living abroad – the vast majority for employment. Preventing further loss of valuable human capital is an urgent priority, requiring Myanmar to better understand and address the main reasons for people's dissatisfaction with their current employment: primarily, low wages and poor working conditions,[88] including enforcement of the minimum wage.

Food costs dominate household spending, even in the more affluent urban areas. Township level data on consumption patterns is not available but a 2012 CSO survey[89] provides a rare insight into monthly spending habits across urban and rural areas: On average households spent 63% of their monthly income on food and beverages, much of it on rice (15.2%), meat (8.2%), and vegetables (6.4%). Among the highest of the non-food expenditures were local travelling expenses (5.7%), and fuel and light (5.4%). Urban areas tended to be doing much better than rural areas, however even the most affluent urban areas spent almost 60% of their money on food.

The lowest per capita expenditures countrywide were in rural Chin and rural areas of Rakhine and Magway, with much of this spent on food. The CSO 2012 survey found households in rural Rakhine to be spending the largest proportion of their monthly budget just on food (71%). Rural areas with the highest monthly expenditures per capita in 2012 were Tanintharyi and Yangon. Despite the rapid change in Myanmar since this data was collected, rural areas in many states remain vulnerable to food insecurity, which can be triggered by relatively minor shocks and stresses.

Unconditional cash transfers in some of the poorer areas would likely entirely circulate within the local economy, given the limited household expenditures in many of these areas. Any regularly-disbursed additional financial resources would immediately be directed towards increasing consumption, especially given that no area spends less than 55% of its household budget on food. What does remain to be investigated, though, is the ease of access to markets in many rural areas and other opportunities to improve resilience and reduce the vulnerable population.

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[87] National AIDS Programme and UNDP (2017). *The Socio-Economic Impact of People Living with HIV at the Household Level in Myanmar.* Nay Pyi Taw; Ministry of Health and Sports.
[88] Ministry of Labour, Employment and Social Security, Central Statistics Organisation, International Labour Organisation (2016). *Key Findings of the Myanmar Labour Force, Child Labour and School-to-Work Transition Survey 2015.*
[89] Central Statistics Organisation (2015). *Myanmar Statistical Yearbook 2015.*

Figure 56 *Household Consumption Review 2012 as Percentage of Household Total - CSO*

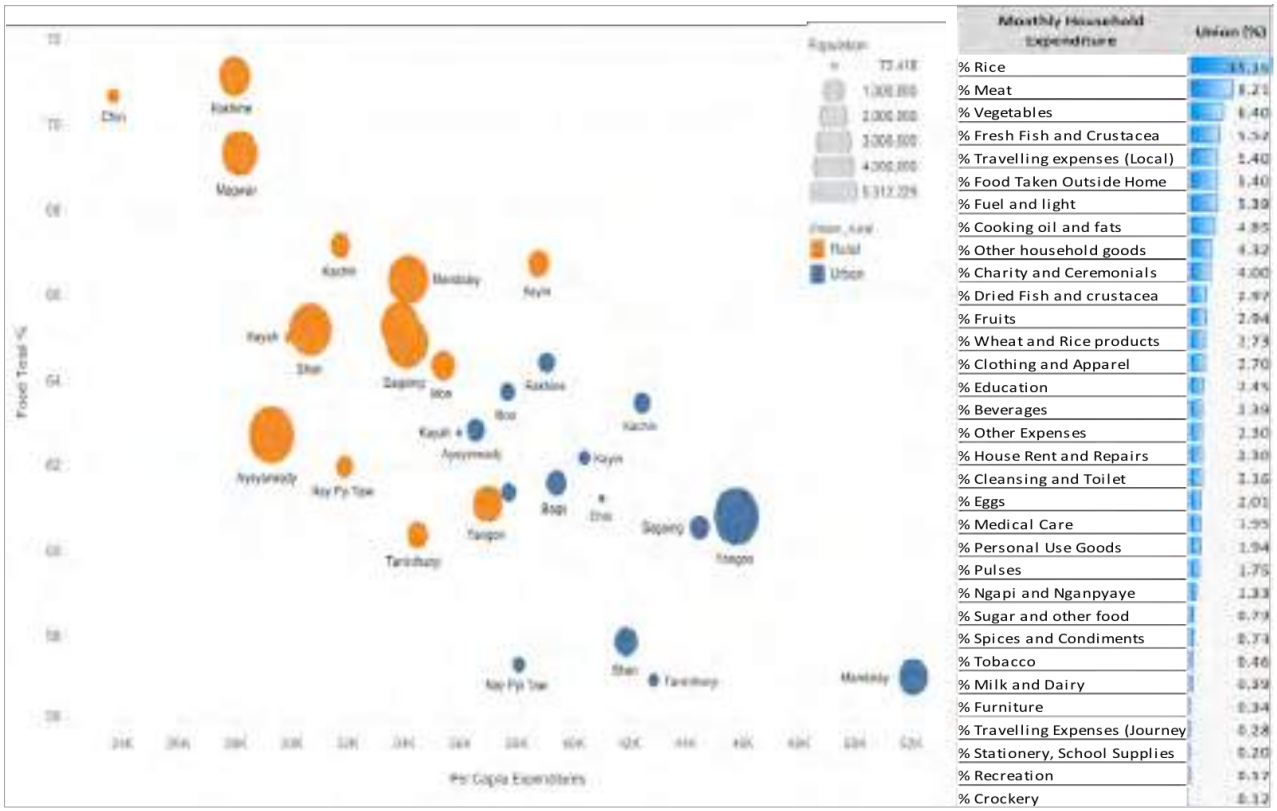


Figure 57 *Household Consumption as a Percentage of Household Total – CSO 2012*

State/Region	Household size (2012)	Kyats per capita expenditures	Food total %	Fuel and light	Travel	Clothing and personal goods	Hygiene and sanitation	Household goods	Housing	Education and school supplies	Medical care	Recreation	Charity and ceremonials	Other HH goods	Tobacco	Other expenses	Non-food total %
Chin Rural	5.60	23,704	70.67	7.13	2.04	4.14	2.15	1.42	2.21	1.08	3.39	0.04	3.26	0.88	0.41	2.05	38.00
Rakhine Rural	4.82	27,945	71.15	6.62	3.04	4.66	1.88	0.97	2.21	2.22	1.14	0.47	2.21	0.44	1.39	2.04	39.74
Magway Rural	4.50	28,166	69.31	4.53	4.14	4.04	2.06	2.74	2.06	2.22	2.14	0.13	3.82	2.18	0.48	2.37	43.87
Ayeyarwady Rural	4.52	29,281	62.73	8.12	5.10	5.30	2.18	2.92	2.44	1.99	1.64	0.11	4.77	2.36	0.63	2.10	52.61
Kayah Rural	5.22	29,891	65.02	4.15	5.31	6.16	2.87	3.45	2.39	1.96	1.82	0.18	3.93	2.54	0.26	2.50	51.86
Shan Rural	4.89	30,680	65.20	5.90	5.76	3.92	2.15	5.29	1.72	2.26	1.40	0.07	3.91	4.91	0.51	1.92	52.04
Kachin Rural	5.83	31,765	67.15	5.61	7.03	4.13	1.97	1.50	1.63	2.53	1.84	0.09	4.17	1.19	0.42	1.92	48.03
Nay Pyi Taw Rural	4.30	31,883	61.95	6.19	6.37	5.23	2.20	3.84	1.63	2.33	2.27	0.06	4.81	3.44	0.72	2.38	55.80
Bago Rural	4.57	33,895	65.25	5.48	4.07	4.88	2.05	3.82	2.02	2.21	2.19	0.22	5.03	3.37	0.54	2.26	49.75
Sagaing Rural	4.99	34,089	64.89	4.25	6.25	5.09	2.25	4.62	1.30	2.33	1.96	0.17	4.66	4.02	0.37	1.91	53.45
Mandalay Rural	4.80	34,140	66.37	3.54	5.46	4.45	2.18	5.26	1.96	2.55	1.60	0.17	4.66	4.78	0.48	1.31	51.34
Tanintharyi Rural	4.50	34,480	60.37	8.62	5.85	4.14	2.00	6.44	1.87	1.69	1.87	0.17	4.80	6.18	0.74	1.44	57.75
Mon Rural	4.72	35,400	64.35	7.49	7.03	5.55	2.01	0.97	1.38	2.82	2.26	0.28	3.59	0.81	0.49	1.78	52.02
Kayah Urban	4.97	35,946	62.77	4.51	5.72	4.32	3.98	5.32	2.12	2.61	1.75	0.07	3.20	4.84	0.13	3.49	55.19
Ayeyarwady Urban	4.08	36,546	62.86	5.89	4.36	5.43	2.22	5.46	2.83	1.58	1.37	0.19	3.96	4.86	0.37	3.47	53.96
Yangon Rural	4.63	36,960	61.12	5.21	8.17	4.77	2.42	2.91	3.37	2.94	2.22	0.11	4.26	2.49	0.43	2.08	57.68
Mon Urban	4.69	37,679	63.72	6.13	5.94	4.39	2.33	3.29	2.06	3.37	2.46	0.19	3.53	2.95	0.30	2.29	53.27
Magway Urban	4.56	37,705	61.37	4.68	4.97	4.48	2.43	5.68	3.16	3.08	2.03	0.41	3.41	5.24	0.30	4.00	56.84
Nay Pyi Taw Urban	4.50	38,072	57.33	5.35	6.73	6.32	2.50	4.78	0.87	3.72	3.43	0.06	4.91	4.36	0.34	3.65	64.21
Kayin Rural	4.76	38,784	66.73	4.12	4.77	5.55	2.78	3.19	1.43	2.53	2.00	0.18	3.61	2.81	0.38	2.76	49.34
Rakhine Urban	5.25	39,084	64.41	6.82	5.17	5.29	2.11	1.06	3.48	4.22	1.56	0.22	1.80	0.55	0.43	3.42	51.32
Bago Urban	4.50	39,388	61.61	4.43	4.22	5.25	2.06	6.90	3.02	2.87	2.73	0.16	4.06	6.39	0.38	2.32	57.64
Kayin Urban	5.31	40,401	62.17	3.88	5.77	5.25	2.95	3.77	2.52	3.03	2.47	0.41	4.09	3.29	0.48	3.21	55.65
Chin Urban	5.08	41,021	61.22	4.56	4.34	4.66	2.23	2.53	4.44	3.11	3.72	0.20	4.95	1.97	0.21	3.79	53.38
Shan Urban	5.17	41,873	57.87	5.80	5.35	5.11	2.36	8.92	2.37	3.34	1.64	0.08	3.62	8.49	0.36	3.20	64.87
Kachin Urban	5.50	42,452	63.46	5.76	7.34	4.27	2.15	2.77	2.34	3.24	2.79	0.09	3.69	2.46	0.27	1.84	54.17
Tanintharyi Urban	4.88	42,863	56.95	9.30	5.68	4.49	1.81	9.85	1.63	2.11	1.86	0.20	4.00	9.43	0.63	1.50	65.19
Sagaing Urban	4.80	44,474	60.55	4.05	7.71	5.32	2.13	5.78	1.47	4.23	1.47	0.22	4.47	5.19	0.18	2.42	62.49
Yangon Urban	4.42	45,819	60.80	4.56	6.96	3.62	2.15	5.31	4.38	3.43	2.61	0.14	2.65	4.84	0.30	3.09	58.52
Mandalay Urban	4.81	52,066	57.04	4.49	7.05	4.13	1.89	12.15	2.00	2.96	1.45	0.13	4.22	11.78	0.21	2.30	69.27

Infrastructure spending continues to grow and provides many jobs, but with a lack of workers. This is evident in the salary levels, with only finance and ICT professionals earning more than construction workers. Development agencies appear less well-placed to take advantage of emerging opportunities in infrastructure based on the current activity base: just 5.2% (or 333 out of 6,327) of all reported 3W activities between 2012 and 2016 pertained to non-farm income and infrastructure. Support to vocational skills related to these activities is also an important area to consider.

Lack of transport infrastructure, isolation and poverty remain impediments to improved livelihood opportunities. Analysis by the Asian Development Bank[90] noted that lack of investment in transport infrastructure development had left Myanmar well behind its ASEAN peers; an estimated 20 million people, or 40% of the population (including over half of the rural population), do not have access to an all-season road.

As many as 9.2 million people – 40% of villages, or 25% of the rural population – are estimated to be living in villages that are not connected by any road. Myanmar's Rural Access Index, which indicates the proportion of the rural population living 2 km from an all-season road, is as low as 36%, bringing it close to that of Afghanistan (34%). There are large disparities, however, with relatively high levels of access for rural populations in some states and regions, most notably Mon (73%), Mandalay and Yangon (60%). The lowest levels of access are in Chin where just 11% of the rural population are estimated to have basic road access, as well as in Rakhine (15%), Kayin (16%) and Kachin (18%). This compares to 23% - 40% in other areas. Disasters can also seriously damage infrastructure that is available and Chin and Rakhine states, already seriously compromised in terms of transport infrastructure, were among the worst affected by the 2015 floods and landslides accompanying cyclone Komen.

Figure 58 *Rural Road Access by State/Region – ADB 2016*

State / Region	Rural Road Access Index
Mon	73
Mandalay	61
Yangon	60
Magway	39
Bago	37
Kayah	35
Tanintharyi	34
Sagaing	28
Ayeyarwady	24
Shan	23
Kachin	18
Kayin	16
Rakhine	15
Chin	11

[90] Asian Development Bank (2016). *Myanmar Transport Sector Policy Note. Rural roads and Access.*

AGRICULTURE AND FOOD SECURITY

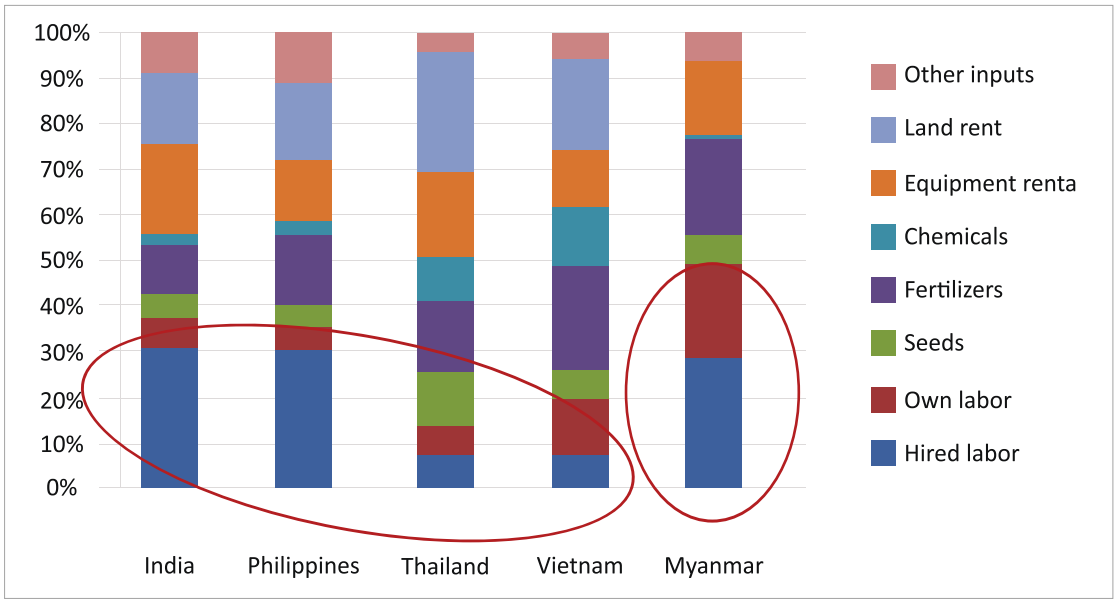
Key Findings

- 54.2% of the workforce are employed in agriculture, fishing and forestry, however Myanmar has the lowest agricultural profits and the lowest agricultural wages in the ASEAN region.
- Factors for this low productivity include low rates of farm mechanisation, minimal use of pesticides and fertilisers, and heavy reliance on manual labour.
- Paddy is by far the most water-intensive of all major crops in Myanmar and presents a significant strain on the water resources of many areas, while being less profitable for smallholding farmers.

Myanmar's agricultural profits are the lowest in the ASEAN region: an estimated USD 3.6 billion in profits were generated from a total of 34 million acres of harvested agricultural land, based on harvest and yield data shared by the Ministry of Agriculture, Livestock and Fisheries and the estimates for crop prices from LIFT's 2016 Farm Production Economics Survey. This translates to a profit of only about USD 108.15 per acre, or USD 267.25 per hectare. By comparison, a hectare of monsoon paddy in Vietnam yields a net margin of about USD 450 and monsoon rice in Indonesia can fetch net margins of above USD 1,500 per hectare. Seen another way, one day of work to harvest rice was estimated to generate only 23 kg of paddy in Myanmar, compared to 62 kg in Cambodia, 429 kg in Vietnam, and 547 kg in Thailand.

Myanmar also has the most labour-intensive process and the lowest agricultural wages – approximately half of what might be expected in Cambodia or India. Factors for low agricultural productivity include a lack of services such as research and rural infrastructure, low rates of farm mechanisation, minimal use of pesticides and fertilisers and a heavy reliance on manual labour which further limits income.[91] There is a dearth of good quality agricultural inputs: certified seeds, for example, make up less than 1% of available stock. Myanmar's irrigated crop area is also relatively low at 15% in 2015, compared to 30% in Thailand, 50% in China and 70% in Vietnam.[92]

Figure 59 *Comparison of Farming Inputs in ASEAN - LIFT*



[91] Zorya S. (2014). *Myanmar: Analysis of Farm Production Economics (presentation).* Nay Pyi Taw: LIFT.
[92] Livelihood and Food Security Trust Fund (2016). *Myanmar: An Analysis of Farm Production Economics.*

Profits from producing paddy vary significantly across different areas of the country, and are far lower than in neighbouring countries. Despite diversity in crops, rice remains the most important agricultural commodity of Myanmar with monsoon paddy as the main crop for both small and large farms. Wet-season rice yields remain very low and can vary significantly from one area to another; a 2013 survey by LIFT[93] found yields of 2.4 tons per hectare in Sagaing, 3.8 in Ayeyarwady and 3.0 in Bago. By contrast, areas with comparable conditions along the Mekong Delta in Vietnam logged yields between 6 and 7.5 tons per hectare. Paddy prices also vary; wet paddy prices in Shan were found to be 68% higher than in Ayeyarwady at the time of the LIFT study. Overall, paddy takes up 51% of the area harvested but accounts for only 31% of the total profit.

Farm size was found to be an important determinant of profitability. While small farms had higher yields, they were unable to turn this into higher profits whereas larger farms could adopt more modern technologies to cut costs. Female-headed households were found to have lower profits than male-headed households. Myanmar's farmers also have to compete for labour with the growing service, retail and wholesale sectors, driving up production costs.

Agricultural income alone cannot bring smallholding farmers out of poverty. According to the Myanmar Labour Force Survey, 54.2% of the workforce is employed in agriculture, fishing and forestry – sectors which continue to diminish in terms of their share of the economy (though not in terms in their share of the workforce). The LIFT survey concluded that farmers in Myanmar with one hectare of farmland producing two crops a year were still unable to pull all members of their households out of poverty. Myanmar's Labour Force Survey found more than one fifth of households to possess land of less than 0.2 acres, whereas land possession averaged 1.38 hectares per household in rural areas.[94] Among Myanmar's ASEAN peers such as Thailand and Vietnam, the most important and effective poverty alleviation interventions have come from improved farming practices and undertaking difficult agricultural reforms.

Paddy, produced on a large-scale in Myanmar, presents a significant strain on the water resources of many areas. Paddy already suffers from inconsistent rainfall and unpredictable monsoons, and was found to be less profitable than expected through being costlier to produce in most of Myanmar's agro-ecological zones – particularly during the cool and dry seasons. Areas with irrigation and working capital can potentially turn a profit with dry season rice paddy; however, drier areas without must instead depend on less costly crops such as pulses and oilseeds. Other countries in the region, once so dependent on rice, are diversifying to other crops including maize, pulses and oilseeds. Redesign of public programmes to stimulate changes in farming practices could support Myanmar to further diversify its agricultural base so as to increase profits while protecting the agricultural industry from the whims of climate change.

The townships with the highest net margins per acre harvested tend to have largely divested themselves from growing monsoon rice; many have focused instead on maize, one of the most profitable crops identified in the LIFT analysis. Another notable commonality amongst the areas making the most profitable use of land in this survey is their dependence on unpaid family workers. The extent to which variability in cropping is one of the main predictors of resilience in the agricultural sector needs additional research.

The expansion and improvement of agricultural extension services will be key to needed structural changes. According to LIFT, though farmers widely use urea and compound fertilisers in paddy production, they often do so at insufficient rates with inappropriate compositions. Farmers in Myanmar applied only half the rates of nitrogen and phosphorus used in other Asian countries, while also overusing nitrogen and phosphorus at the expense of potassium, resulting in poor productivity. 1 kg of nitrogen yielded only 30 kg of paddy in Myanmar, compared to 72kg in Thailand.

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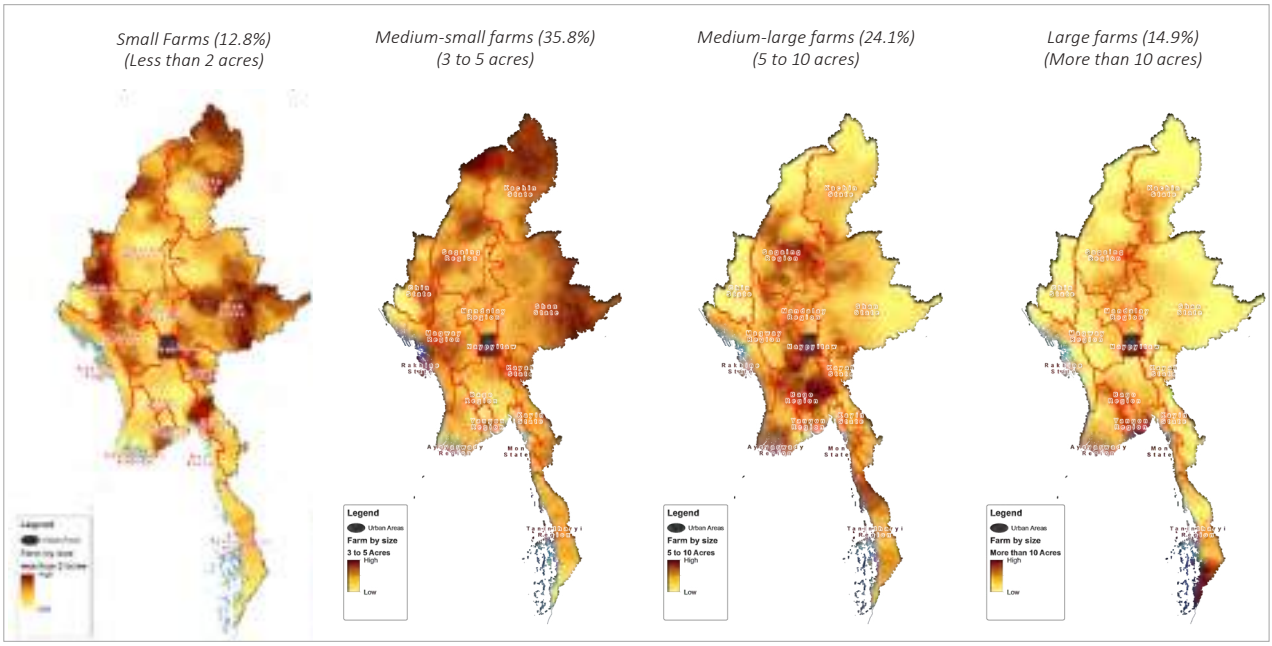
[93] Ibid.
[94] Ministry of Labour, Employment and Social Security, Central Statistics Organisation, International Labour Organisation (2016). *Key Findings of the Myanmar Labour Force, Child Labour and School-to-Work Transition Survey 2015.*

Figure 60 *Indication of Farm Size – WFP*



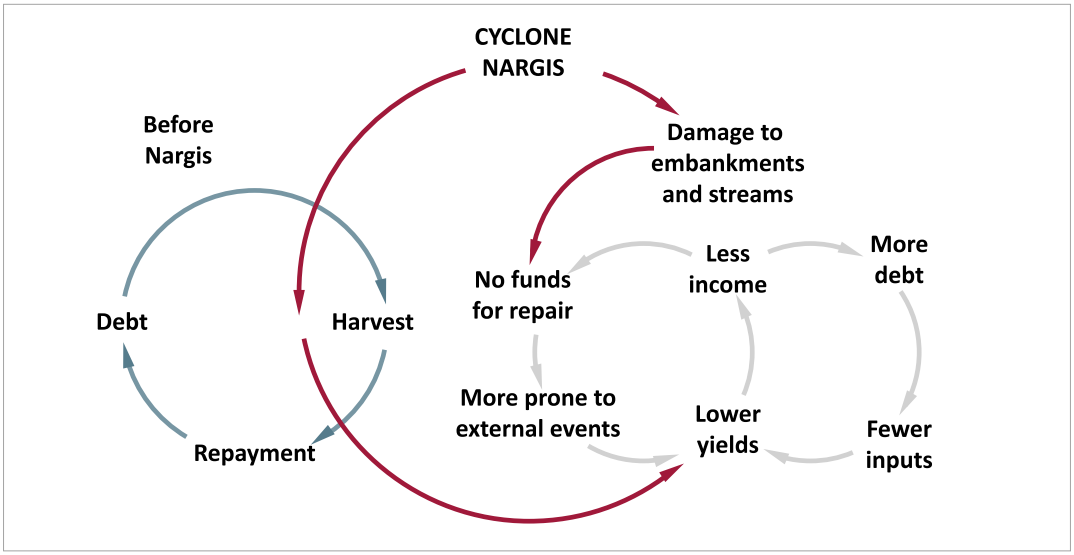
Agricultural sector weaknesses increase the vulnerability of agriculture-dependent families to climate shocks and stresses. A review of the impact of cyclone Nargis[95] found that there had been no real recovery five years after the event, with affected persons more vulnerable to environmental degradation and catastrophes. The cyclone severely disrupted the agricultural cycle of debt, harvest and repayment on which farmers depended, leaving many to take on additional debt from a wide range of sources. In addition to direct losses, yields were lower due to the combination of saltwater intrusion and the deaths of draught animals; many farmers had to sell their paddy directly after harvest to meet their consumption needs, at much lower prices than they ordinarily would have received. This led to the widespread adoption of harmful coping mechanisms such as selling land and livelihood inputs and assets; reducing food intake; and overborrowing.

Cyclone induced environmental degradation – primarily saltwater intrusion and river erosion – was worsened by farmers' inability to reinvest in livelihood inputs. The need to prioritise consumption over agricultural inputs further depressed agricultural yields and crop quality, allowing insects and other vectors to infect much of the cultivable land, and causing productivity to plummet further. The majority of those interviewed five years after the cyclone were still struggling (irrespective of their wealth quintile) and their incomes had yet to rise above pre-Nargis levels.

Nargis was a devastating blow for many affected communities and their lack of recovery underscores the long-term impact of cyclonic and other major climatic events on income trajectories. Insufficient short-term support spurred a cycle of negative coping mechanisms, and the lack of long-term productive investments (to make up for the lost economic potential) left affected persons with little ability to meet their basic needs - let alone exit poverty and the debt traps that were almost impossible to avoid. Many were left with no choice other than to double down on unsustainable livelihood strategies that further strained an already degraded environment.

[95] Enlightened Myanmar Institute, World Bank & GFDRR (2014). *Another Nargis Strikes Every Day: Post-Nargis Social Impact Monitoring Five Years On.*

Figure 61 *The Impact of Cyclone Nargis on the Agricultural Cycle – EMI, WB & GFDRR*



Mitigative actions can limit the long-term economic and environmental damage of climate-related shocks to those whose livelihoods depend on the agricultural sector. A shift of focus from paddy production to broad-based agricultural support will be essential to better leverage agriculture for poverty reduction. Further investments are needed in water resource management and irrigation infrastructure, cold storage facilities, seed processing plants, and agricultural extension services, as well as cost-sharing schemes which would enable rural poor households to access small farm machinery. Short-term, immediate and large-scale cash-for-work/cash distribution can support the post-disaster consumption needs of smallholder farmers and landless households, and stem the sale of productive assets, while easing access to credit, restructuring outstanding loans and recapitalising clients can also aid in economic recovery. Production can be stabilised by distributing and replacing inputs, raising embankments and land reclamation works to counteract the effects of environmental degradation caused by the disaster as steps to restore land to its previous productivity.

Section III
VULNERABILITY: KEY FINDINGS

Based on the Vulnerability Index developed in this review, an estimated 44% of the population (22.7 million persons in Myanmar) have some form of vulnerability. These people experience varying combinations of:

- **Poor housing materials:** Of the total 11,169,526 households in Myanmar, 33% (3,716,057) still have homes where the floors are either bamboo or earth and 35.8% (4,004,019 households) have bamboo or thatch roofs.
- **Lack of education and poor educational attainment:** 4,369,423 (16.2%) persons above the age of 15 have no formal educational attainment and 2,061,917 youths and children (9.5% of school-and-college-age population) had never attended school at the time of the 2014 Census.
- **Lack of safe sanitation and improved drinking water:** 1,695,934 households, or 15.1% of all households countrywide have no toilet. 26.3% (2,937,985 households) lack safe sanitation and 31.1% (3,474,538 households) lack access to improved drinking water.
- **Direct exposure to conflict:** The residents of 68 townships have experienced live conflict and displacement to varying degrees over January 2015 – December 2016.[96] 5.6 million persons live in townships which have experienced at least 2 clashes in this period.

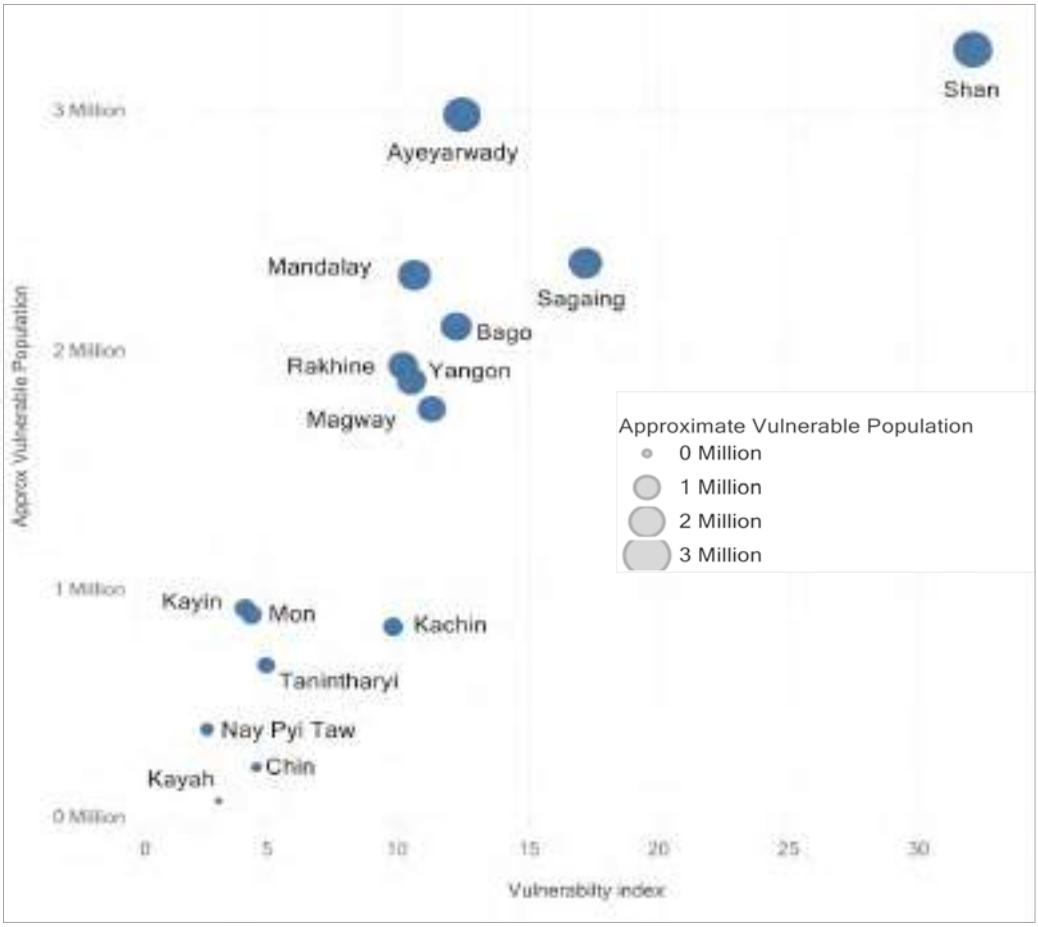
These vulnerable persons, their circumstances and needs will be the focus of the remaining parts of this report, which also highlights the uneven distribution of vulnerability and vulnerable persons throughout the country. It is important to note, however, that the 2014 Housing and Population Census which forms the basis for much of this analysis provides population estimates for non-enumerated areas but no detailed data on other indicators. This affects mainly Maungdaw district in Rakhine and, to a lesser degree, areas of Kachin and Kayin. Information from localised studies suggests that levels of vulnerability, particularly in Rakhine, would be still higher with inclusion of this data.

Shan and Ayeyarwady have the largest populations of vulnerable persons, a function of both their size and relative vulnerability in comparison to the other states and regions. Figure 61 below compares the number of persons considered vulnerable using the Vulnerability Index by state and region. As noted, gaps in health and nutrition data meant that this has not been included in the Vulnerability Index – it is likely that areas with particularly poor health and nutrition indicators would have a still higher vulnerability rating.

Numbers of vulnerable population must be considered alongside levels of vulnerability, requiring analysis and monitoring below state/region level. Focusing on state/region level indicators can mask townships with particularly low or high development indicators, as can be seen in Figure 62, which shows the variation of vulnerability across townships in each state/region. Each township is represented by a dot, the size of which reflects the approximate number of vulnerable population in that township. The vertical spread of township dots indicates the variation in vulnerability across a given state/region with higher Vulnerability Index scores reflecting higher levels of vulnerability. This chart also compares the average levels of vulnerability across townships with the grey boxes indicating the vulnerability scores of 25%-75% of the vulnerable population in that particular state/region, around which most townships would be expected to be clustered if they were similar.

[96] Refers to townships experiencing active conflict in this period and not all townships in contested areas.

Figure 62 *Number of Vulnerable Persons by State/Region*[97]



State/region level data indicates that Yangon, Nay Pyi Taw and Mandalay have the least vulnerability, although there is wide variation in terms of the number of vulnerable persons and their level of vulnerability. All states and regions have a blend of townships falling into different typologies; some townships however, such as Paletwa and Nanyun, fall well outside the average ranges for Chin and Sagaing respectively. At state/region level, Yangon and Shan show the widest variation in vulnerability across townships, followed by Mandalay, Chin and Rakhine. Magway and Nay Pyi Taw showed the least variation across townships. Shan, Rakhine and Kayah had the highest concentration of townships with larger numbers of vulnerable persons (as can be seen from the red dots indicating approximate numbers of affected population).

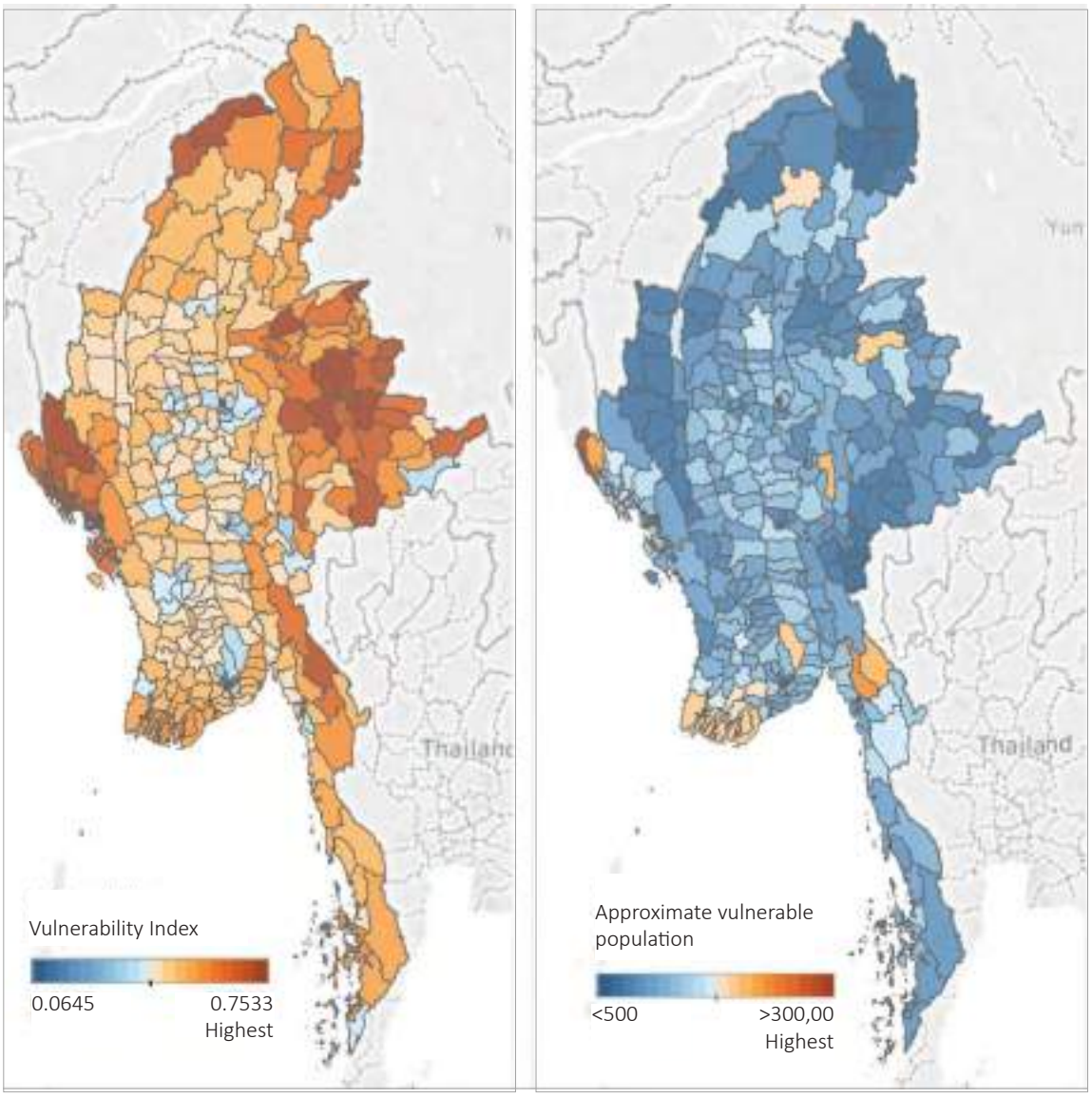
Comparison of townships yields more useful information and is the focus of this analysis. The scatterplot below includes all 330 townships countrywide, linked by colour to their state or region. Each point in the plot represents an individual township and where it sits on two scales: the first, its incidence of vulnerability, and the second, the number of vulnerable persons in that township based on the Vulnerability Index drawn from Census and ACLED datasets. Note that lower scores indicate higher levels of vulnerability. Those townships with low vulnerability and low numbers of vulnerable population fall in the lower left quadrant, while those with higher numbers of more vulnerable population based on this Index fall in the upper right quadrant.

[97] Township values, other than population numbers, are based on Census-enumerated population and may not fully reflect non-enumerated populations.

Based on the Index using 2014 Census data, Maungdaw is a clear outlier due to its large number of vulnerable persons. Since a significant number of the population in Maungdaw was not enumerated in the Census, and this analysis does not include casualties and displacement linked with events in late 2016, these numbers are expected to be conservative. Its size and poor living conditions cause it to dominate the upper-right corner quadrant of the scatterplot below which tends to consist of more heavily-populated vulnerable areas (see Figure 65 which reflects the vulnerability score and number of vulnerable persons in each township, countrywide). This section is comprised mostly of townships from Rakhine (red colour), Shan (pink), Ayeyarwady (blue) and the parts of Kayin (green) most exposed to conflict in the period reviewed.

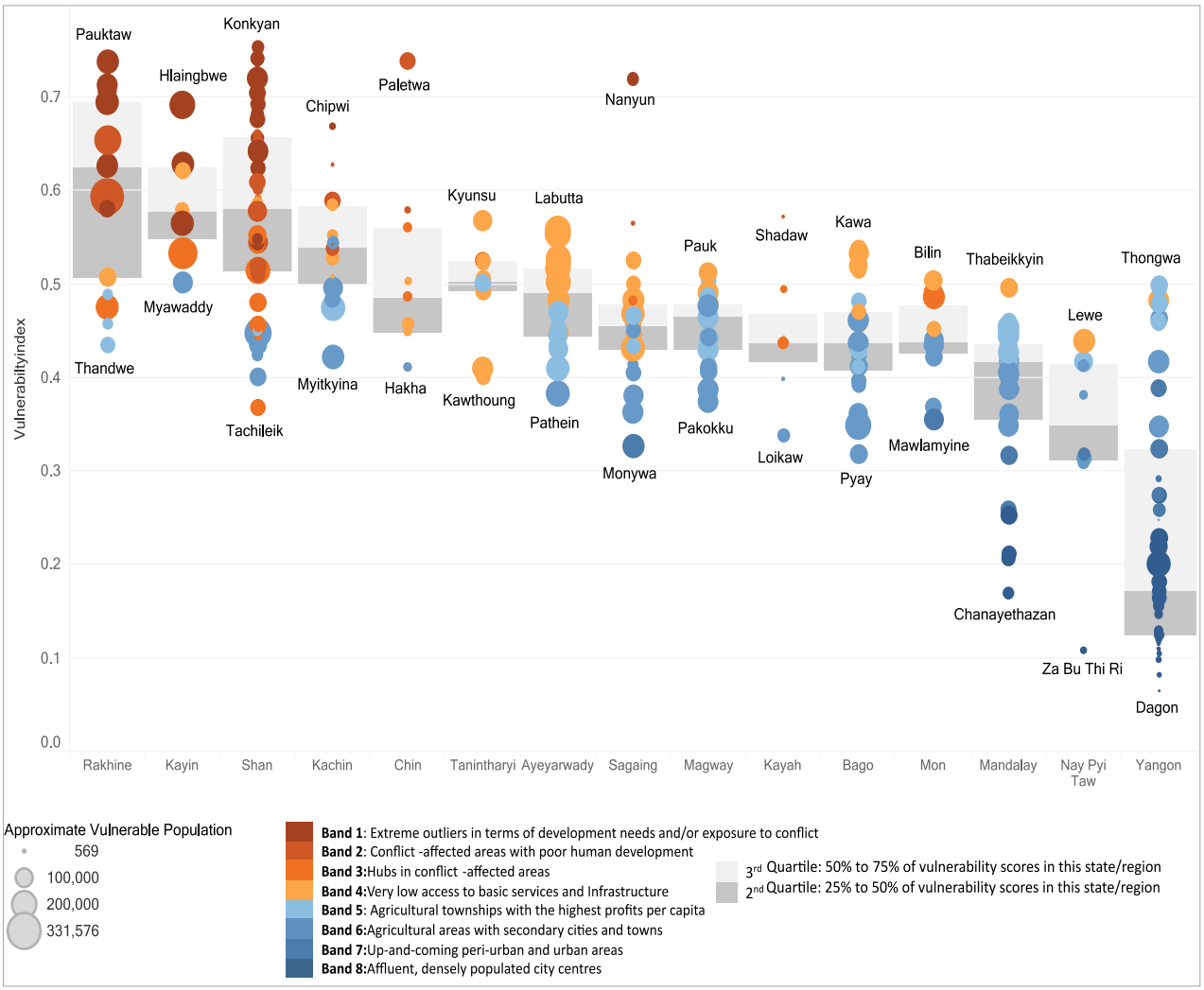
Townships whose high incidence of vulnerability is compounded by their small population size and sparseness are clustered in the bottom-right corner of Figure 65. This group contains mainly areas in Shan and some of the more remote parts of Sagaing. Due to their relatively higher levels of exposure to conflict and geographic remoteness, improvements to basic services will likely come last to these areas, if at all.

Figure 63 *Township Vulnerability Index and Approximate Vulnerable Population**



**Township values, other than population numbers, are based on Census-enumerated population and may not fully reflect non-enumerated groups.*

Figure 64 *Range of Vulnerable Populations Across Townships in Each State and Region**



**Township values, other than population numbers, are based on Census-enumerated population and may not fully reflect non-enumerated groups.*

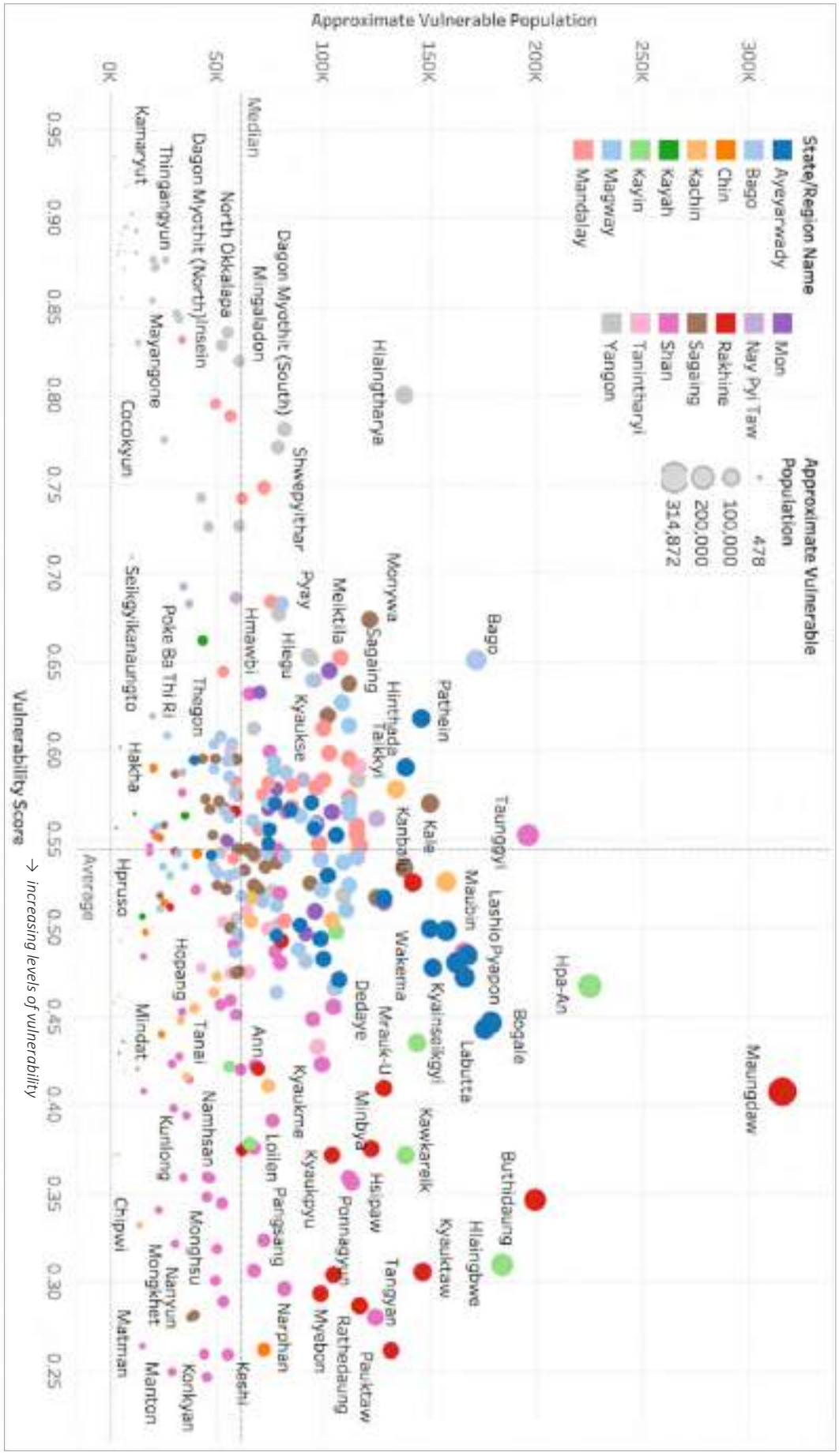


Figure 65 *Vulnerability by Township**

* *Township values, other than population numbers, are based on Census-enumerated population and may not fully reflect non-enumerated groups.*

The poor living conditions of the most vulnerable areas are anticipated to persist as many of these townships lack the necessary population density to attract investment and employment opportunities. Furthermore, given the poor state of accessibility, additional efforts are necessary to offset and subsidise the cost of providing goods and services to these areas.

Though in many datasets Chin State has been recognised as the poorest and most vulnerable area, a more detailed look reveals significant variation. Many townships in Chin actually fall above or around the average for all townships on most Census indicators, with the exceptions of electrification and child dependency ratio. Paletwa, Kanpetlet and Mindat have the highest levels of vulnerability, but Paletwa stands out as faring particularly poorly, adding to our understanding of the situation across Chin State.

Child dependency ratios, and consequently total dependency ratios, are more than 80% in many parts of Chin (Kanpetlet's total dependency ratio is 0.91). This indicates that raising incomes alone will not sufficiently change living conditions; for every dollar wages are raised, per capita incomes go up by around only USD 0.40.

Figure 66 *Chin State Selected Census Indicators, Wealth Ranking and Vulnerability Ranking*

Township name	Electricity for lighting %	Safe sanitation (%)	Thatch and bamboo roofing %	CGI roofing %	Population never attended school %	With at least primary school %	With at least middle school %	Child dependency ratio	Wealth ranking: 330 TS (World Bank)	Vuln. ranking: 330 TS (MIMU)
Paletwa	5.19%	24.29%	58.5%	38.80%	19.3%	59.70%	25.08%	73.3	5	8
Kanpetlet	12.12%	53.99%	63.0%	34.80%	11.2%	63.58%	34.57%	83.4	20	52
Mindat	4.14%	84.93%	34.1%	64.49%	13.6%	61.93%	32.61%	80.9	84	69
Tonzang	12.53%	82.35%	26.4%	68.35%	7.9%	83.29%	42.11%	81.0	134	106
Matupi	13.63%	83.46%	18.9%	80.74%	9.5%	70.23%	37.18%	72.2	131	164
Tedim	18.84%	93.50%	5.7%	91.14%	7.3%	82.52%	42.04%	73.7	231	188
Thantlang	24.86%	89.02%	12.7%	86.96%	9.3%	79.19%	41.19%	73.3	221	201
Hakha	17.96%	97.39%	7.5%	92.07%	5.6%	84.62%	47.63%	58.5	273	247
Falam	33.71%	95.17%	6.2%	88.93%	5.0%	85.61%	48.50%	64.3	252	250
Township average across Chin State	31.31%	71.42%	35.58%	61.17%	11.76%	79.38%	36.70%	46.1		

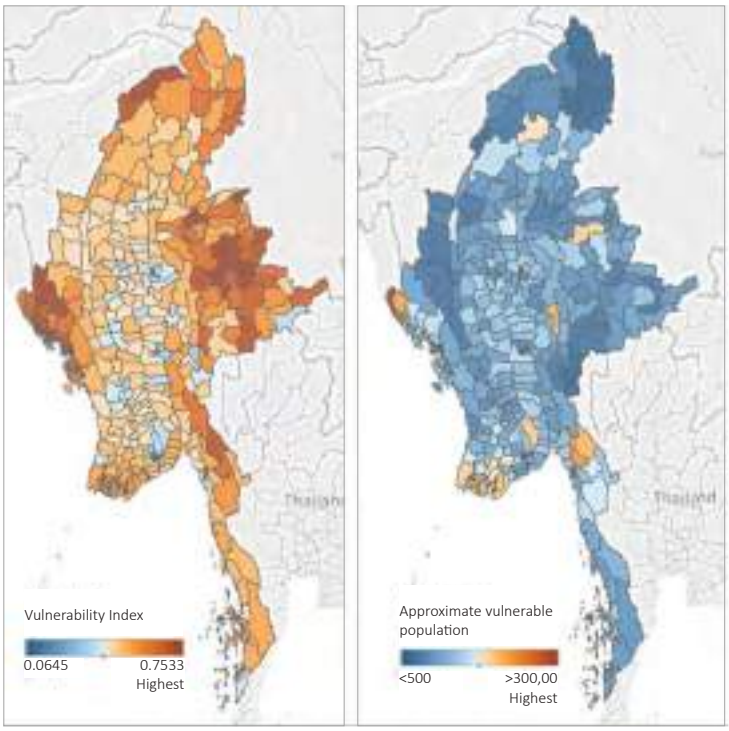
Section IV
ANALYSIS OF TOWNSHIP CLUSTERS

The Vulnerability Index allows a broad understanding of the diversity and distribution of vulnerable persons in Myanmar, both of which are critical factors to consider in developing strategies to address the various issues and risks affecting them. This composite index predicts for a range of underdevelopment, climate risk and conflict indicators. Whilst this model has been initially applied at township level, the logic would also hold true at village tract level were data at this level to be made available.

The MIMU-HARP Vulnerability Index produces similar results to other models used to reflect poverty levels. The results of the MIMU-HARP Vulnerability Index are similar to the World Bank's Township Wealth Ranking drawn from Census data,[98] and the World Food Programme's estimate of the incidence of poor households obtained from assessment and monitoring data from selected villages across the country between June 2013 and July 2015.[99] While these three approaches use differing scales, the overall picture is quite similar despite being arrived at independently by three different sources.

One key difference is the reflection of direct conflict-affected areas alongside other aspects of vulnerability in the MIMU-HARP Vulnerability Index, as can be seen by the darker coloured townships in Shan State and south-eastern Myanmar. As noted, this Index provides an indication of the overall number of direct conflict-day events over the period January 2015 to September 2016 but it does not reflect the frequency of conflict events or the duration of each conflict event. Even with this Index, however, there are many similarities – all three models indicate southern Chin to be much more vulnerable than northern Chin, for example, as well as indicating higher levels of vulnerability in Shan State, upper Sagaing, northern Rakhine, and parts of Kachin.

Figure 67 *Township Level Vulnerability Score and Approximate Vulnerable Population**

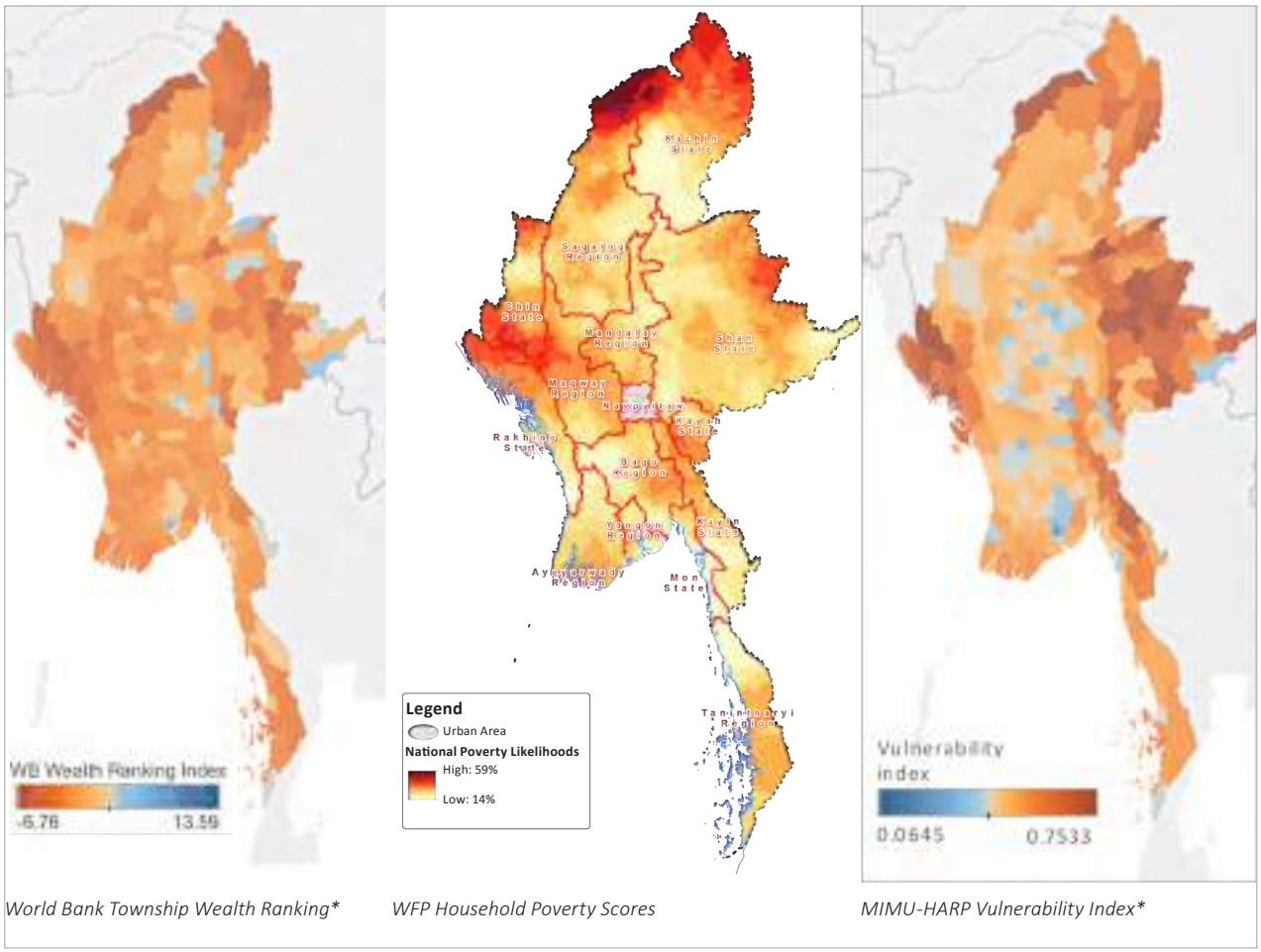


**Township values, other than population numbers, are based on Census-enumerated population and may not fully reflect non-enumerated groups.*

[98] The Township Wealth Ranking was used an indicative tool and the detailed methodology is not available.

[99] World Food Programme (2016). *WFP Food Security and Poverty Data: Key Findings from Rural Myanmar.* Yangon: Myanmar.

Figure 68 *Comparison of Indices of Poverty and Vulnerability*



*World Bank Township Wealth Ranking** *WFP Household Poverty Scores* *MIMU-HARP Vulnerability Index**

**Township values, other than population numbers, are based on Census-enumerated population and may not fully reflect non-enumerated groups.*

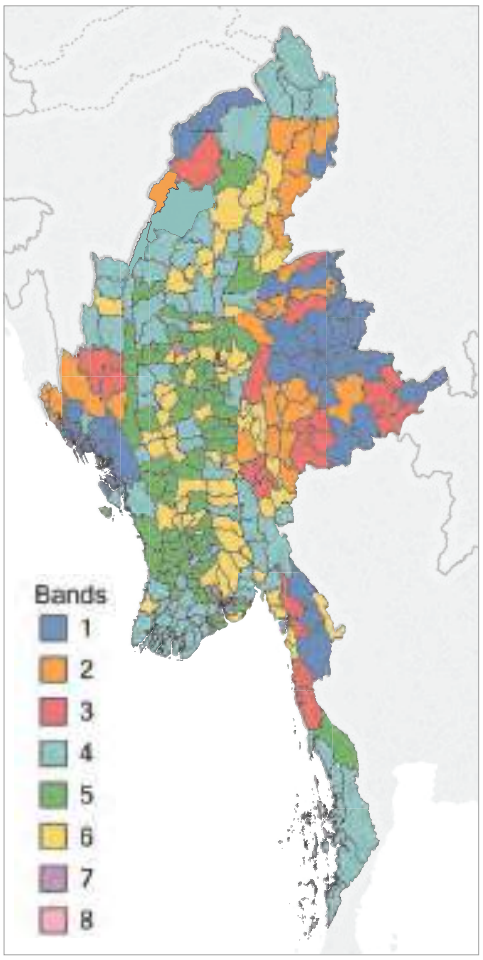
TOWNSHIP CLUSTERING

The 330 townships across Myanmar are clustered into 8 main typologies based on their shared key characteristics, with each township included in only one type. Using available data – including data from 2014-2016 and conflict-related indicators from 2015-2016 – the townships fall into 8 main groups, or typologies, which describe issues relating to conflict and underdevelopment. While there may be variation in the situation within any given township, there is insufficient data at lower levels to extend the analysis – hence each township falls within only one type. This same methodology could also be applied across village tracts were this level of data to be available.

The township clustering reveals similarities in vulnerability experienced across a series of townships. Type 1 for example comprises a number of townships from across the country which are among the most vulnerable in terms of development needs and/or exposure to conflict; Shan State is the most notable in this type with a high number of high number of afflicted townships. Other areas of the country also fall into this category, though with less affected townships, namely Rakhine, Kayin, Upper Sagaing and Kachin.

Each township is categorised in only one typology based on the characteristics which have come to light using available data. This does not suggest that any township is homogenous; a given township may have areas which would potentially fall within other typologies. The introduction of other, currently non-available township-level data such as nutrition indicators, could potentially adjust the positioning of some townships. The typology does nonetheless provide an indication of development needs for that particular township and indicates areas in which additional data could usefully be sought.

Figure 69 *Clusters of Townships Based on the MIMU-HARP Analysis**



Type 1: Extreme outliers in terms of development needs and/or exposure to conflict

Type 2: Conflict-affected areas with poor human development

Type 3: Hubs in conflict-affected areas

Type 4: Very low access to basic services and infrastructure

Type 5: Agricultural townships with the highest profits per capita

Type 6: Agricultural areas with secondary cities and towns

Type 7: Up-and-coming peri-urban and urban areas

Type 8: Affluent, densely populated city centres

**Township values, other than population numbers, are based on Census-enumerated population and may not fully reflect non-enumerated groups.*

Figure 70 *Selected Characteristics and Demographics by Typology**

Type		Count of townships per Type	Literate (%)	Child dependency ratio (%)	Highest education: none (%)	Highest education: at least middle school (%)	Absence of ID total (%)	Safe sanitation (%)	Improved drinking water source (%)	Conflict sub-Index	Floor type: bamboo or earth (%)	Roof type: thatch/ bamboo roofing (%)	Urban population (%)	Electricity (%)	Approximate vulnerable population[100] (no. of persons)
1	Extreme outliers in development needs and/or exposure to conflict	36	50.87%	58.80%	59.06%	15.64%	52.69%	35.17%	41.85%	43.79%	49.44%	42.01%	12.15%	19.02%	2,733,320
2	Conflict-affected areas with poor human development	25	67.35%	58.67%	42.56%	27.87%	26.29%	57.50%	44.33%	41.67%	53.89%	35.68%	20.47%	22.63%	1,519,749
3	Hubs in conflict-affected areas	21	70.09%	52.09%	36.83%	32.00%	23.72%	74.79%	61.48%	70.99%	23.65%	25.51%	28.33%	34.24%	1,402,254
4	Very low access to services and basic infrastructure	74	91.86%	53.41%	14.25%	33.43%	28.62%	68.53%	57.82%	91.22%	27.47%	52.62%	14.97%	11.62%	5,817,188
5	Agricultural townships with highest profits per capita	64	94.47%	39.72%	12.05%	31.17%	23.84%	73.84%	73.63%	96.29%	42.28%	40.20%	12.00%	15.23%	4,484,117
6	Agricultural areas with secondary cities and towns	65	92.78%	42.30%	12.69%	39.29%	23.84%	80.45%	75.88%	87.26%	34.89%	30.05%	28.21%	40.44%	4,957,216
7	Peri-urban and urban areas	11	95.49%	38.91%	7.42%	51.84%	25.49%	89.18%	73.71%	93.72%	27.95%	21.90%	64.66%	61.64%	734,867
8	More affluent, densely populated city centres	34	97.74%	25.65%	3.51%	76.15%	14.14%	96.65%	96.99%	97.25%	6.13%	4.11%	97.24%	94.76%	1,026,422

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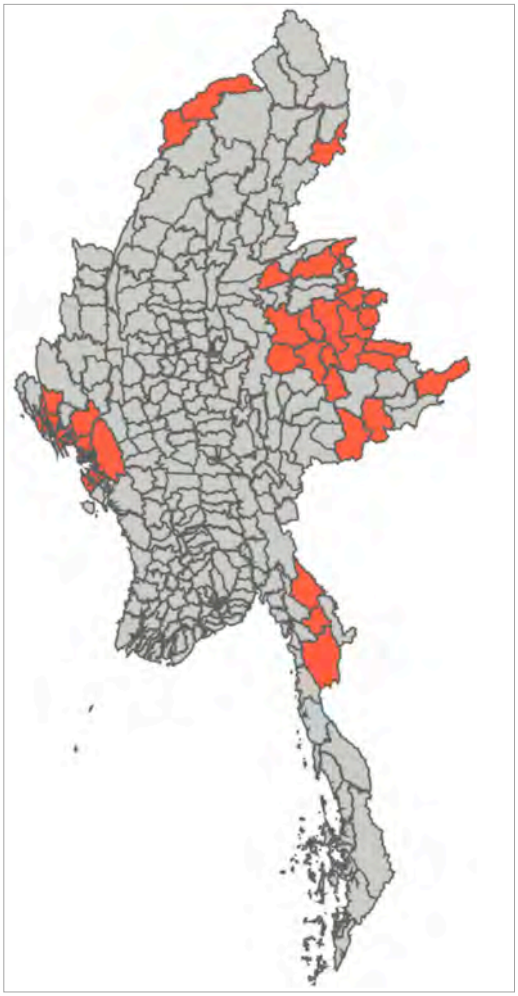
[100] The approximate vulnerable population is the % vulnerable population per township (an average of the various percentage factors in the Vulnerability Index), multiplied by the relevant township population. No thresholds are applied in this calculation, whereas thresholds are used in the decision tree to determine the placement of each township by type. Detail of the methodology is included in Annex.

TYPE 1
EXTREME OUTLIERS IN TERMS OF DEVELOPMENT NEEDS AND EXPOSURE TO CONFLICT[101]



Key characteristics*

- 2,733,320 vulnerable people
- 36 townships
- Access issues are very common in these townships, which tend to have some level of movement restriction and isolation.
- These townships are sparsely populated and have the lowest rates of urbanisation.
- People in these townships have the worst educational attainment, with an average of 50.87% being illiterate; this is particularly true for Shan State, and especially evident in Narphan and Pangwaun, where less than 10% of adults have completed primary school.
- These areas suffer from extremely poor sanitation.
- These townships have seen 167 battle events, 676 conflict fatalities and 32,602 chronically-displaced persons – or about 40% of all the violent conflict in the 2015-2016 timeframe.
- More than half of residents in these areas have no ID documents. These issues are experienced by 2.7 million people in these townships.

Types of interventions which may be relevant

- Ensure crisis-affected civilians in these areas are reached with life-saving interventions.
- Promote efforts toward peaceful and sustainable resolution of ongoing conflicts.
- Introduce multi-sector aid packages and investment in livelihoods to host communities and displaced persons.
- Increase investment to ensure any "temporary" shelters for differing groups and displaced persons are upgraded and made disaster-resistant, with permanent or semi-permanent solutions.
- Work with housing, land and property rights experts to develop durable tenure solutions with displaced communities and host communities.
- Build roads to link commercial centres in these areas, and prioritise access to markets over access to surrounding communities.

[101] This methodology clusters each township into only one typology based on its main characteristics drawn from analysis of publicly-available data. This does not suggest that any township is homogenous - a given township may have areas which would potentially fall within other categories.

- Restore basic services, such as healthcare, sanitation, formal education and improved drinking water as soon as situations have stabilised. This includes establishing larger infrastructure works such as electrification and reservoirs.
- Increase local government allotments and long-term social spending to shore up household consumptions.
- Support vocational training and re-skilling for selected workers in masonry, carpentry and other in-demand trades; this may be accomplished after several cycles of roving job and financial services clinics.
- Support civil registration and access to legal services to facilitate the obtaining of land titles, although the absence of any formal ID should not be a barrier to becoming a beneficiary.
- Create inter-agency beneficiary database and/or inter-agency IDP database if appropriate to do so.
- Begin planning for the restoration of a stable business environment; recapitalise affected businesses and re-incentivise investment in more urbanised areas such as Hopang, Kunhing, Laukkaing, Kukai and Kawkareik.

Townships in Type 1: Extreme outliers in development needs and/or exposure to conflict*							
KACHIN	Chipwi						
KAYIN	Hlaingbwe	Kawkareik	Kyainseikgyi				
RAKHINE	Ann	Kyaukpyu	Kyauktaw	Minbya	Myebon	Pauktaw	Ponnagyun
	Rathedaung						
SAGAING	Lahe	Nanyun					
SHAN	Hopang	Hsipaw	Keshi	Konkyan	Kukai	Kunhing	Laukkaing
	Manton	Matman	Monghsat	Monghsu	Mongkaing	Mongkhet	Mongmao
	Mongton	Mongyai	Mongyang	Mongyawng	Narphan	Pangsang	Pangwaun
	Tangyan						

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TYPE 2
CONFLICT-AFFECTED AREAS WITH POOR HUMAN DEVELOPMENT

*Key characteristics**

- 1,519,749 vulnerable people
- 25 townships
- Type 2 townships have extremely poor dependency ratios, indicating chronic vulnerability; this is particularly concentrated in parts of Chin, Shan and Kachin.
- Type 2 contains relatively less conflict than Type 1, with 280 conflict fatalities, 77,772 displaced persons and 108 battle events over 2015-16.
- Approximately 50% of households have bamboo or earthen floors, indicating a dearth of other assets.
- Despite its low population density, Type 2 is more urbanised than Type 1, containing towns such as Momauk, Loilen, Maungdaw and Nanasang.
- Persons in Type 2 have very poor literacy and educational attainment, with 42% of the population having no formal schooling.

Types of interventions which may be relevant

- Ensure crisis-affected civilians in these areas are reached with life-saving interventions.
- Promote efforts toward peaceful and sustainable resolution of ongoing conflicts
- Introduce multi-sector aid and development packages, including house upgrading, grants and loans for local businesses.
- Work with shelter engineers and housing, land and property rights experts to establish durable tenure in disaster-resistant “temporary” structures, including increased allocations for local governments to spend on all vulnerable residents.
- Large-scale infrastructure spending to link commercial centres with major highways. This would also include electrification or pre-electrification coverage expansion.
- Institute unconditional cash transfers to vulnerable persons, either by annual lump sum to support saving and investment, or monthly disbursement to support consumption.

- Permanently increase allocations for the local governments of these areas. Commitments to these areas must be long-term in nature. Much additional social spending would continue to be required as developing markets and improving livelihood opportunities will be extremely difficult in many of these areas due to their low population density.
- Establish a block-grant funding system to monitor and improve the quality of local government services.
- Re-skilling and retraining for those with limited formal educational attainments towards alternate income streams.
- Incentivise more diversified cropping, leaning away from paddy to maize and other much more profitable crop.

Townships in Type 2: Conflict-affected areas with poor human development*							
CHIN	Kanpetlet	Paletwa					
KACHIN	Injangyang	Momauk	Sumprabum	Tsawlaw	Waingmaw		
KAYAH	Shadaw						
RAKHINE	Buthidaung	Maungdaw					
SAGAING	Lay Shi						
SHAN	Hopong	Hseni/Theinni	Hsihseng	Kunlong	Kyaukme	Laihka	Loilen
	Mawkmai	Mongping	Namhsan	Namkhan	Namtu	Nansang	Pinlaung

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TYPE 3
HUBS IN CONFLICT-AFFECTED AREAS

Key characteristics*

- 1,402,254 vulnerable people
- 21 townships
- These townships are affected by conflict but to a lesser extent than those in Types 1 and 2. In all, 40 of the 1,096 conflict fatalities in 2015-2016 occurred in these areas.
- Better access to basic infrastructure than in Types 1 and 2.
- 75% have access to safe sanitation.
- 24% of houses have bamboo or earthen floors.
- 26% of houses have bamboo roofing.
- At least 32% of the adult population has completed middle school.
- Informal economies are especially important in these areas and concerted restriction of smuggling may trigger additional conflict as resources become more scarce and informal markets are disrupted.

Types of interventions which may be relevant

- Ensure crisis-affected civilians in these areas are reached with life-saving interventions.
- Promote efforts toward peaceful and sustainable resolution of ongoing conflicts
- Useful hubs for the dissemination of new farming techniques, tools and seeds.
- Establish stronger links with local media outlets and journalists to disseminate information, awareness and sensitisation of programming. The townships of Muse, Tachileik, Hpa-an, Kengtung, Lashio and Sittwe play a large role in disseminating information to persons in more rural areas with less media access.
- Increase investment in electrification, and prioritise connection to the grid.
- Incentivise the provision of financial services to commercial interests. Ensure that the residents of these more populous towns and hubs enjoy stability and economic growth.

Townships in Type 3: Hubs in conflict-affected areas*							
CHIN	Matupi	Mindat					
KAYAH	Demoso	Hpruso					
KAYIN	Hpa-An						
MON	Kyaikmaraw	Ye					
RAKHINE	Sittwe						
SAGAING	Hkamti						
SHAN	Kengtung	Langkho	Lashio	Lawksawk	Monghpyak	Mongla	Mongnai
	Mongpan	Muse	Pekon	Tachileik			
TANINTHARYI	Yebyu						

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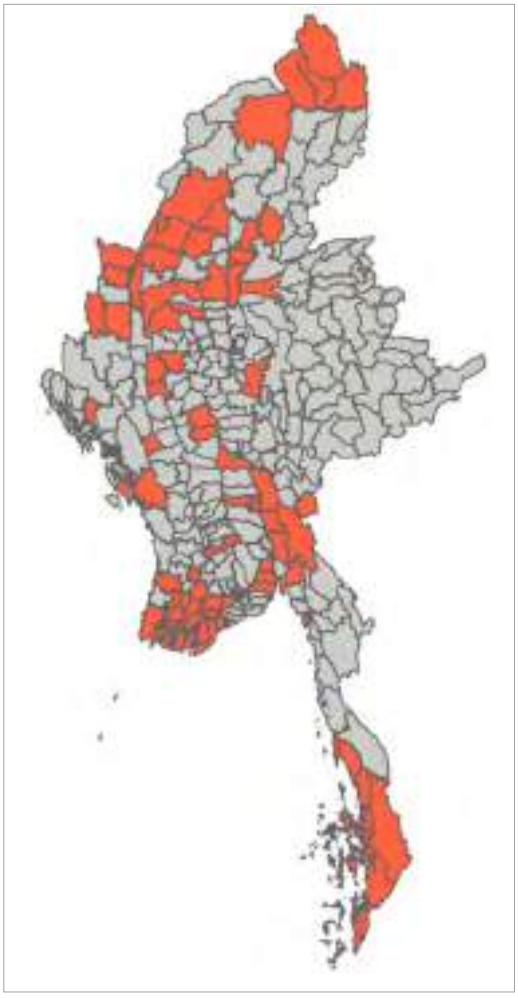
TYPE 4
VERY LOW ACCESS TO BASIC SERVICES AND INFRASTRUCTURE



Key characteristics*

- 5,817,188 vulnerable people
- 74 townships
- Type 4 is comprised of mainly rural areas, with low occurrence of conflict.
- 14% of the population in this group have no educational attainment (compared to 37% in Type 3).
- Only townships in or above Type 4 have literacy rates of over 90%.
- Townships in this group have the lowest average rate of electrification at 12%.
- More than half of all houses have thatch or bamboo roofs.
- 40% of these townships plant paddy almost exclusively (>80% of harvested area) which has the lowest net profit margin per acre of any agricultural type.
- With a very high child dependency ratio and minimal access to protected non-drinking water (indicative of the absence of irrigation), this group is largely comprised of townships which are overly reliant on their climate and the surrounding ecosystems, making them extremely susceptible to changing weather patterns and climatic shifts.

Types of interventions which may be relevant

- Introduce cycles of Build-Back-Better Workshops (for housing and toilets) and materials/cash distribution so that residents may improve the strength of their built environment.
- Support sustainable fishing and aquaculture in coastal areas.
- Expand financial services specifically to target non-agricultural activities, especially in coastal and estuarine areas.
- Invest in personnel, transportation and material to expand the reach of agricultural extension services, particularly in areas where the return on agricultural land is too low.
- Actively discourage paddy (except for the more profitable dry-season paddy where conditions will make this profitable). Oilseeds and pulses – which yield a much higher margin and are less water-intensive – will also be important for these townships, which are overly reliant on surface water.
- Increase community ownership and control over natural resources, mostly by digging tubewells and boreholes as well as sustainably expanding the coverage of irrigation. This might also include the construction of deeper, better designed community dams and water storage ponds.

- Design and implement easy-to-get, low-interest loan or lease schemes enabling farmers to acquire and share small-farm machinery. This should be done in tandem with each area's connection to the electrical grid or other solar, mini-hydro or pre-electrification services. While there is a need to raise farm productivity overall, the investment in large machinery, such as combine tractors, would most likely only directly support the large landholders who should be catered to with a different set of commercial loan options.
- Conduct river dredging and strengthen embankments to protect against extreme flood events as well as to clear out sediment deposits that have built up over the course of the past few disasters.

Townships in Type 4: Very low access to basic services and infrastructure*								
AYEYARWADY	Bogale	Dedaye	Einme	Kangyidaunt	Kyaiklat	Kyonpyaw	Labutta	
	Maubin	Mawlamyinegyun	Myaungmya	Ngapudaw	Pantanaw	Pyapon	Thabaung	
	Wakema							
BAGO	Htantabin	Kawa	Kyaukkyi	Letpadan	Oktwin	Shwegyin	Thanatpin	Waw
CHIN	Hakha	Tedim	Thantlang	Tonzang				
KACHIN	Khaunglanhpu	Machanbaw	Nawngmun	Puta-O	Shwegu	Tanai		
KAYAH	Mese							
KAYIN	Hpapun	Thandaunggyi						
MAGWAY	Myaing	Myothit	Natmauk	Ngape	Pauk	Seikphyu		
MANDALAY	Thabeikkyin							
MON	Bilin	Chaungzon						
NAY PYI TAW	Lewe							
RAKHINE	Mrauk-U	Ramree	Toungup					
SAGAING	Banmauk	Homalin	Kale	Kanbalu	Kani	Katha	Mawlaik	
	Mingin	Paungbyin	Pinlebu	Tabayin	Tamu	Taze	Tigyaing	
SHAN	Mongmit	Ywangan						
TANINTHARYI	Bokpyin	Kawthoung	Kyunsu	Launglon	Myeik	Palaw	Tanintharyi	
	Thayetchaung							
YANGON	Twantay							

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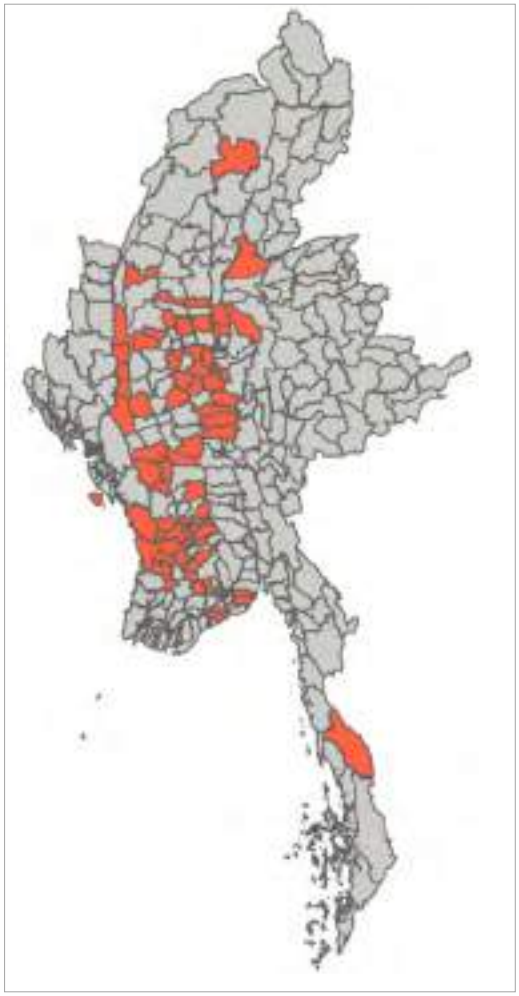
TYPE 5
AGRICULTURAL TOWNSHIPS WITH HIGHEST PROFITS PER CAPITA



Key characteristics*

- 4,484,117 vulnerable people
- 64 townships
- Overall the persons in this group have above-average literacy, safe sanitation and improved drinking water.
- Child dependency ratios are between 39-42%. Correspondingly, there are much higher labour force participation rates.
- Of all the types, Type 5 townships tend to generate the greatest average net margin per capita from crops, at USD 123, which is not only indicative of the productivity of labour but also of how much of the population is working in agriculture.
- The rate of urbanisation is very low.
- The rate of electrification is the second-worst in the Union (after Type 4).
- The lower child dependency ratio and much improved access to improved non-drinking water sources make these areas much more resilient than other groups of rural townships.
- Many of the townships in Type 5 are from the Dry Zone.
- There has been significant diversification away from paddy agriculture towards a mixture of oilseeds, nuts and pulses.
- Farmers who have diversified tend to earn more, not only from their land, but also their labour.

Types of interventions which may be relevant

- Encourage farmers to switch from water-intensive animals such as sheep and goats to poultry in order to further increase their resilience.
- To encourage larger returns on their land, people in these townships should begin to mechanise and actively seek financing for connection to the electrical grid, supplementing their connection with diesel-powered water pumps.
- Increase loan limits or provide buy/lease programmes for small farming implements such as hand tractors.
- Give commercial farmers access to greater lines of credit so that they can further mechanise their operations.
- Increase financing for non-farm livelihoods, such as eco-tourism, agricultural processing or warehousing and transport.
- Conduct thorough value chain analyses and identify wholesale markets and secondary cities and towns which could serve as commercial centres for the produce from these areas.
- Ensure that infrastructure follows environmental impact guidelines and that there are consolidated multi-ministry plans for droughts and water shortages. For this, a central approach to water resource management under the coordination of an inter-agency body is needed.

Townships in Type 5: Agricultural townships with highest profits per capita*							
AYEYARWADY	Danubyu	Hinthada	Ingapu	Kyangin	Kyaunggon	Lemyethna	Myanaung
	Nyaungdon	Yegyi	Zalun				
BAGO	Gyobingauk	Minhla	Monyo	Nattalin	Okpho	Paukkhaung	Thayarwady
KACHIN	Hpakant						
MAGWAY	Gangaw	Kamma	Mindon	Minhla	Salin	Saw	Sidoktaya
	Sinbaungwe	Taungdwingyi	Thayet	Tilin	Yesagyo		
MANDALAY	Kyaukpadaung	Madaya	Mahlaing	Myittha	Natogyi	Ngazun	Pyawbwe
	Singu	Tada-U	Taungtha	Thazi	Wundwin	Yamethin	
NAY PYI TAW	Tatkon						
RAKHINE	Gwa	Munaung	Thandwe				
SAGAING	Ayadaw	Budalin	Kalewa	Khin-U	Myaung	Pale	Wetlet
	Ye-U	Yinmabin					
SHAN	Mabein	Nawnghkio					
TANINTHARYI	Dawei						
YANGON	Htantabin	Kayan	Kawhmu	Kungyangon	Thongwa		

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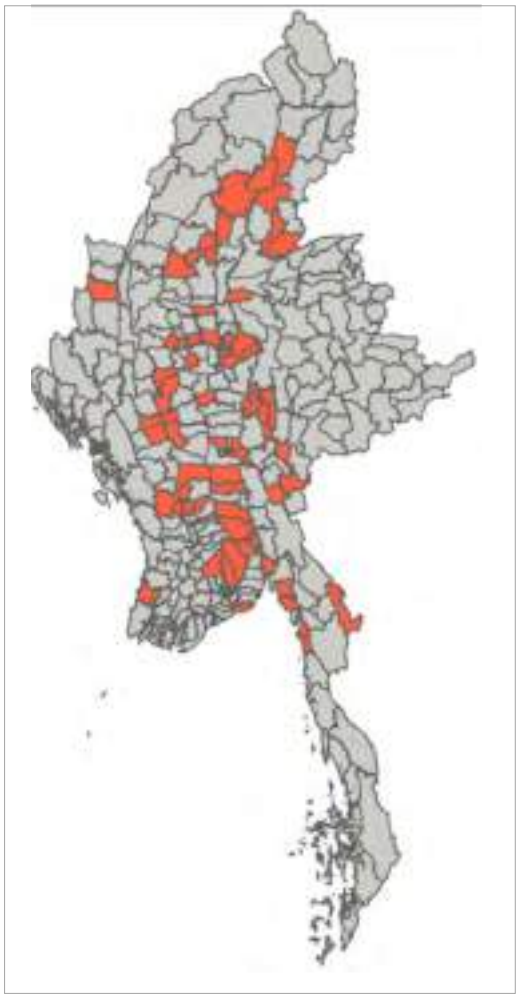
TYPE 6
AGRICULTURAL AREAS WITH SECONDARY CITIES AND TOWNS



Key characteristics*

- 4,957,216 vulnerable people
- 65 townships
- This typology has larger population centres and secondary towns and cities in the Dry Zone and agricultural belt.
- Collectively, these townships form the most populous urban and peri-urban areas outside of the downtown cores of Yangon and Mandalay. These areas include major towns and state/regional capitals such as Myitkina, Myawaddy, Sagaing, Bago, Pyay, Pyin Oo Lwin, Pathein and Taunggyi.
- About 40% of the population has access to electricity.
- 80% have access to safe sanitation.
- Almost 40% have completed middle school.
- As the commercial and political centres of much of the areas around them, these larger towns not only have to service their substantial needs for goods and services but also generate greater levels of interstate trade and link more of the hinterland with national and international markets.
- In spite of being major commercial and political centres, these townships are still home to about 24% of all harvested farmland in Myanmar and the interventions specified in the earlier two typologies for improving agriculture still apply.

Types of interventions which may be relevant

- Actively increase the complexity and range of goods and services available in each of these secondary towns, first by developing agricultural wholesale, logistics and storage capabilities to complement their surroundings, and then seeking to develop stronger links with Mandalay and Yangon so that there is a constant exchange of goods and services.
- These townships are also the perfect targets for food processing and agricultural processing facilities such as cold storage and seed processing plants. There is huge domestic demand for processed goods; furthermore, improved agricultural processing facilities will likely also increase the quality and value of produce.
- Develop media and awareness-raising strategies to court investors and financial institutions from Yangon and abroad. Substantial commercial lending capacity and debt packaging infrastructure will be necessary in order for entrepreneurs in these townships to secure the lines of credit necessary to make large capital investments and trial and improve operations.

- Larger lenders, such as microfinance institutions, as well as the Myanmar Agricultural Development Bank or other institutions with sub-offices in these areas, should insure their portfolios (and their clients) against extreme weather events and shifts in weather patterns.
- Large-scale agroforestry may also be considered throughout the Dry Zone, not just to stall desertification but also to provide shade for more fragile crops through methods such as taungya, to ensure that small farmers are not adversely impacted.
- Focus on urban planning, zoning and enforcement in these secondary cities in order to avoid overcrowding and bottlenecks around important municipal systems.
- Every effort should be made to integrate disaster-resistant and adaptive programming into existing and planned investments in irrigation, sewage, telecoms, transportation and electrical infrastructure.

Townships in Type 6: Agricultural areas with secondary cities and towns*							
AYEYARWADY	Pathein						
BAGO	Bago	Daik-U	Kyauktaga	Nyaunglebin	Padaung	Paungde	Phyu
	Pyay	Shwedaung	Taungoo	Thegon	Yedashe	Zigon	
CHIN	Falam						
KACHIN	Bhamo	Mansi	Mogaung	Mohnyin	Myitkyina		
KAYAH	Bawlakhe	Hpasawng	Loikaw				
KAYIN	Myawaddy						
MAGWAY	Aunglan	Chauk	Magway	Minbu	Pakokku	Pwintbyu	Yenangyaung
MANDALAY	Kyaukse	Meiktila	Mogoke	Myingyan	Nyaung-U	Patheingyi	Pyinoolwin
	Sintgaing						
MON	Kyaikto	Mudon	Paung	Thanbyuzayat	Thaton		
NAY PYI TAW	Det Khi Na Thi Ri	Oke Ta Ra Thi Ri	Pyinmana	Zay Yar Thi Ri			
SAGAING	Chaung-U	Indaw	Kawlin	Kyunhla	Myinmu	Sagaing	Salingyi
	Shwebo	Wuntho					
SHAN	Kalaw	Nyaungshwe	Pindaya	Taunggyi			
YANGON	Cocokyun	Hlegu	Kyauktan	Taikkyi			

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TYPE 7
UP-AND-COMING PERI-URBAN AND URBAN AREAS

Key characteristics*

- 734,867 vulnerable people
- 11 townships
- Although geographically close to primary urban cores of Yangon, Mandalay and Nay Pyi Taw, the socio-economic of these townships do not align with what we have come to expect from the majority of urban areas in Yangon.
- The populations are far younger than other downtown areas: child dependency ratios in these areas are 38.9% (compared to 25.7% in Type 8) which are much more similar to the ratios for Types 5 and 6.
- Access to basic services and improved housing are on average 27% lower than they are in Type 8.
- Educational attainment is almost half what it is in the rest of these primary cities.
- On average, people occupy far larger plots of land than those in downtown townships. These plots are more than ten times the land size of the average Type 8 township.
- 63% of the land is still used as farmland, producing a moderate USD 104 net margin per acre harvested: Hmawbi is a major supplier of produce to Yangon city.
- As major cities grew around them, these areas have been the last to develop.

Types of interventions which may be relevant

- As large plots of land in these townships are typically set aside for special economic zones or industrial areas, consider development of land – especially in Yangon – to add to the available housing stock and ease congestion. All development plans should be subject to public consultation in advance of decisions being taken.
- Ensure the identification of vulnerable residents, and establish the necessary case management and referral systems, prior to land development negotiations.
- Ensure communities in these areas are well informed on their housing, land and property entitlements and rights and have access to appropriate legal advice prior to these areas becoming attractive to property developers. This can limit land or titles being sold below their market valuation, undermining residents' capacities to satisfactorily relocate. Such vulnerable groups may otherwise end up homeless or living in makeshift shelters in slums.
- Ensure that the livelihoods of vulnerable persons living here are considered and factored into town development plans. This will often require up-skilling, especially if their previous occupation had been farming or other elementary trades.

- Ensure appropriate relocation arrangements are put in place which include packages with multiple housing options plus other compensations for relocation and alternative livelihoods training. Residents should consent to all relocation packages.
- Plan and construct all infrastructure – such as roads and highways, sewage lines and other major public works – prior to the development of these areas.

Townships in Type 7: Up-and-coming peri-urban and urban areas*						
MANDALAY	Amarapura	Pyigyitagon				
MON	Mawlamyine					
NAY PYI TAW	Poke Ba Thi Ri					
SAGAING	Monywa					
YANGON	Dagon Myothit (East)	Dagon Myothit (Seikkan)	Dala	Hmawbi	Seikgyikanaungto	Thanlyin

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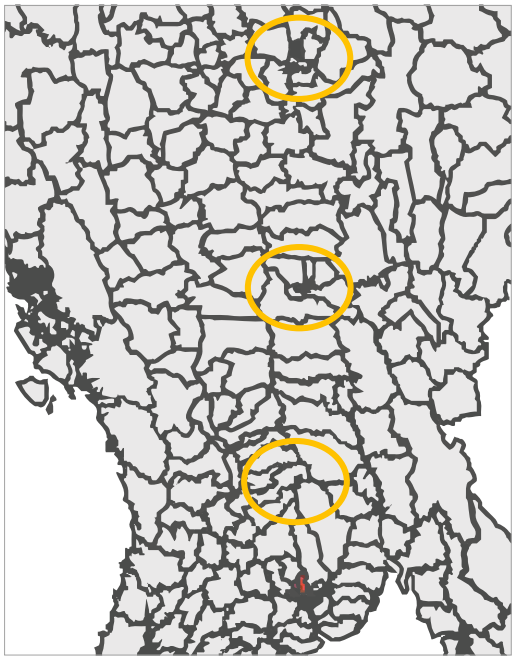
TYPE 8
MORE AFFLUENT, DENSELY-POPULATED CITY CENTRES



Key characteristics*

- 1,026,422 vulnerable people
- 34 townships
- This typology comprises the urban cores of Yangon, Mandalay and Nay Pyi Taw.
- Type 8 townships are far ahead of all other townships across major indicators, including educational attainment, living conditions and access to basic services.
- These areas are 150% more connected to the electrical grid than Type 7.
- This type's population density of 8,749 people/km^2 is also significantly larger than the Union-wide average of 79.88 km^2.

Types of interventions which may be relevant

- Scale up the provision of urban affordable housing programmes, including the establishment of a housing finance corporation (and the development of the necessary laws and frameworks) in order to grant the urban poor access to long-term loans, low-interest mortgages. Efforts should be made to develop sustainable funding mechanisms for replenishment, though concessionary interest rates should be available to the most vulnerable. The joint development of public lands with private sector partners provides one possible avenue for cost recovery.
- In cases of large-scale urban relocation and slum clearance, affected communities should be afforded free and accessible legal and administrative support to ensure that compensation is fair and administered without the need for formal title or documentation to receive compensation. It is also advisable to establish a front-facing government office to assist affected populations in their navigation of the public bureaucracy to expedite the award of compensation and to receive and resolve complaints.
- Discourage the creation of marginalised areas by ensuring that neighbourhoods have a mix of housing types. Ghetto formation and the subsequent segregation of races or classes is detrimental to the cohesion of a city.
- Develop a diverse range of predictable revenue sources, including the improved collection of property taxes and relevant fees, penalties and fines in order to improve technical capacity in the agency and invest in structural and large-scale changes – YCDC was incorporated under the outdated 1922 Rangoon Act. Regressive taxes such as VAT, should be avoided as they disproportionately penalise the poor.

Townships in Type 8: More affluent, densely-populated city centres*				
MANDALAY	Aungmyaythazan	Chanayethazan	Chanmyathazi	Mahaaungmyay
NAY PYI TAW	Za Bu Thi Ri			
YANGON	Ahlone	Bahan	Botahtaung	Dagon
	Dagon Myothit (North)	Dagon Myothit (South)	Dawbon	Hlaing
	Hlaingtharya	Insein	Kamaryut	Kyauktada
	Kyeemyindaing	Lanmadaw	Latha	Mayangone
	Mingaladon	Mingalartaungnyunt	North Okkalapa	Pabedan
	Pazundaung	Sanchaung	Seikkan	Shwepyithar
	South Okkalapa	Tamwe	Thaketa	Thingangyun
	Yankin			

**Township values, other than population numbers, are based on Census-enumerated population and may not fully reflect non-enumerated groups.*

Annex: Additional Notes on the Methodology

The basic workflow for this Analysis was as follows: (1) collect the data, assess its quality and viability, and re-structure it for the master dataset, (2) conduct exploratory data analysis to find patterns and relationships for closer examination and construct a working definition of vulnerability, (3) develop and trial models to predict for vulnerability, (4) apply the finalised model to develop findings, including on how the population may be clustered based on various characteristics, and (5) supplement the quantitative analysis with qualitative information based on the findings and dataset logframe.

The MIMU-HARP working dataset used for this Vulnerability Analysis is a township level, flat file developed specifically for this analysis. It aggregates information collected from 2014 to 2016 from publicly-available sources, and includes data on conflict, living conditions and agency coverage in Myanmar. The main data sources used in this Analysis were:

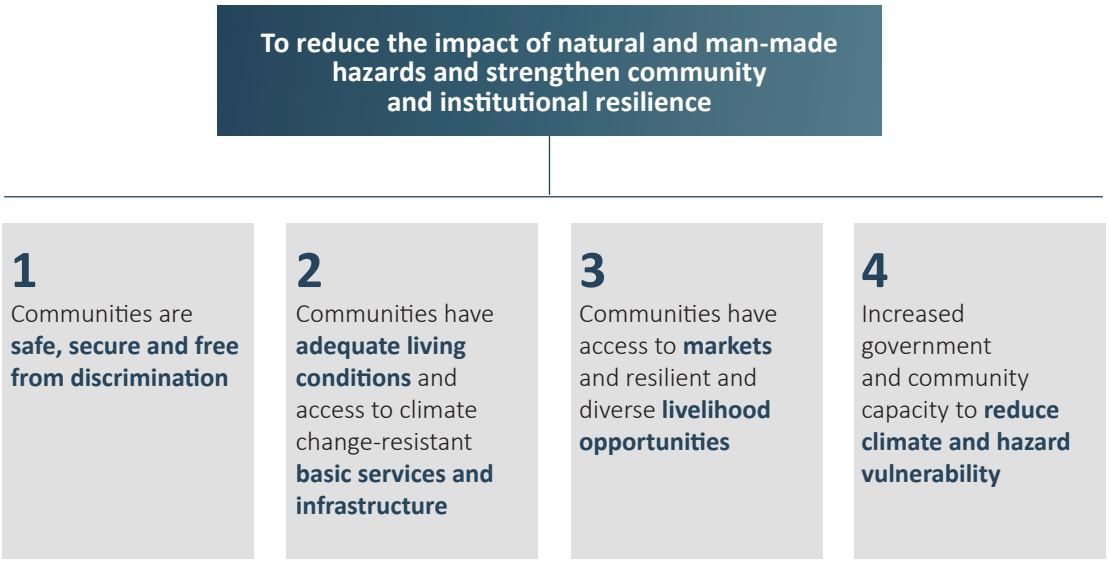
- Population and Housing Census 2014, Ministry of Labour, Immigration and Population.
- Agricultural data (various) 2016, Ministry of Agriculture
- Armed Conflict Location and Event Data Project 2015-2016 dataset
- Deciphering the Peace Process 2015, Myanmar Peace Monitor
- Food Consumption Index 2016, World Food Programme
- Incidence of Flood and Cyclonic Events 2008-2015, MIMU
- Myanmar: Analysis of Farm Production Economics 2016, LIFT
- Place codes, shapefiles and township and ward numbers 2016, MIMU
- Post-Floods-and-Landslides Needs Assessment 2015, Government of Myanmar, World Bank and United Nations Development Programme
- Rakhine State Needs Assessment 2015, Centre for National Diversity and Harmony
- Recovery Coordination Centre Dataset 2016, Government of Myanmar & United Nations Development Programme
- Shelter-NFI-CCCM Cluster Analysis September 2016, UNHCR
- State and Region GDPs 2015, Ministry of National Planning and Finance
- Township Wealth Ranking 2015, World Bank
- Union and State and Region Budgets 2011-2016, Open Myanmar Initiative
- Who, What, Where and When Data September 2016, MIMU

The dataset is structured around the three major drivers behind vulnerability in Myanmar, namely

- Climate risk and disaster management
- Conflict
- Underinvestment and underdevelopment

As a generic humanitarian and development logframe, it is intended to account for the range of preparedness, relief, recovery and development interventions currently ongoing or planned for Myanmar. The dataset is structured with one observation (township) per row and one variable per column.

Figure 71 *Dataset Logframe*



DEMOGRAPHICS AND BASIC STATISTICS

The basic demographic data and statistics used within the MIMU-HARP Working Dataset include:

- Total Population – Census 2014
- Place Codes – MIMU
- Number of Wards – MIMU
- Number of Village Tracts – MIMU
- Land Area – MIMU
- Population Density – Census/MIMU

A key problem is township population figures in Rakhine State in particular, and – to a far lesser degree – in Kachin and Kayin, where the estimates for unenumerated populations and corrected census totals exist only at the state and region level. For the purposes of this township level analysis, the census dataset has been adjusted to establish township estimates through applying the township population proportions from the 2011 Township Health Profile - the last year that this data was made publicly available, to the Census district population. This method allows for alignment with the Census figures whilst providing estimates for township populations which seem to hold up reasonably well when compared to restricted datasets, particularly when considering each township's share of the state/region population.

The major reference points for the method were the total state/region populations for both Ministry of Health and Census Data. In the instance of Rakhine, 797,763 persons reside in the 7 townships which did not experience enumeration issues: these figures have been left as they are. The remaining 2,391,044 persons were allocated amongst the problem townships based on their share of the population according to the 2011 Township Health Profile.

While this method enables an estimate of the population of the unenumerated townships, it does not resolve the lack of collection of data on the living conditions in these areas. The assumption used in this analysis, through lack of other options, is that the living conditions of enumerated and unenumerated populations in the same area are similar. This is less problematic for some areas such as Momauk, Mansi and Hpapun where data collected from other areas suggests similar levels of provision of basic services and infrastructure. It is more problematic for Rakhine State which has the largest unenumerated population.

A review of the Rakhine State Needs Assessment from the Centre for National Diversity and Harmony (CDNH) indicates that, overall, 19% of Rakhine persons are considered to have "very poor living conditions and incomes"; the corresponding figure for Muslim populations is 35%. With the unenumerated population in Rakhine State overwhelmingly comprised of Muslims, the vulnerability indicators for Rakhine State would be expected to be much higher than they currently are. It is not possible to conduct any further analysis as the limited sample sizes of the CDNH assessment means that it cannot be cross-referenced back to the Census.

After consulting with experts from other agencies, it was decided to leave components of the Vulnerability Index without any further adjustment (access to safe sanitation, child dependency ratio etc.). As it stands, even without capturing the living conditions of the unenumerated populations, townships in these parts of Rakhine tend to be clustered almost at the very top of all townships in the Union in terms of their vulnerability.

The remaining common operational data included in the Working Dataset was mainly sourced from MIMU, including Place codes, the number of villages and wards as well as the townships' land area, which is calculated from the MIMU shape files, as the most accurate set of digitised administrative boundaries currently available.

Township	Census enum. pop	Township health profile	% change	Census corrected	New % change	Share of pop%
Ann	119,714	114,490	4.56%	119,714	4.56%	3.75%
Buthidaung	*55,545*	*309,530*	-82.06%	*304,812*	-1.52%	9.56%
Gwa	66,015	62,070	6.36%	66,015	6.36%	2.07%
Kyaukpyu	165,352	171,720	-3.71%	165,352	-3.71%	5.19%
Kyauktaw	*173,100*	*214,300*	-19.23%	*211,034*	-1.52%	6.62%
Maungdaw	*40,785*	*540,030*	-92.45%	*531,799*	-1.52%	16.68%
Minbya	*169,208*	*198,610*	-14.80%	*195,583*	-1.52%	6.13%
Mrauk-U	*189,630*	*220,410*	-13.96%	*217,051*	-1.52%	6.81%
Munaung	56,966	64,300	-11.41%	56,966	-11.41%	1.79%
Myebon	*137,193*	*141,740*	-3.21%	*139,580*	-1.52%	4.38%
Pauktaw	*145,957*	*180,740*	-19.24%	*177,985*	-1.52%	5.58%
Ponnagyun	*129,753*	*152,360*	-14.84%	*150,038*	-1.52%	4.71%
Ramree	97,891	112,190	-12.75%	97,891	-12.75%	3.07%
Rathedaung	*111,974*	*166,720*	-32.84%	*164,179*	-1.52%	5.15%
Sittwe	*147,899*	*303,610*	-51.29%	*298,983*	-1.52%	9.38%
Thandwe	133,484	123,150	8.39%	133,484	8.39%	4.19%
Toungup	158,341	146,510	8.08%	158,341	8.08%	4.97%
Totals	**2,098,807**	**3,222,480**	**-34.87%**	**3,188,807**	**-1.04%**	

VULNERABILITY INDEX

Typically, to prioritise amongst affected areas after the onset of an emergency – and to recall the "ur"-formula for disaster risk – three major pieces of data are required: the magnitude of damage, the severity of damage and the incidence of pre-existing vulnerability. The combination of all three is needed in order to allocate resources fairly amongst the affected population.

This is relatively straight-forward in smaller and localised emergencies where the location of populations in need is known. In larger emergencies such as the 2015 countrywide flooding or cyclone Nargis in 2008, the population affected is so large that consideration of areas with population in need relies on secondary data or official government damage reports.

Better definition of the pre-existing vulnerability of populations in Myanmar would support earlier and better targeted emergency response by enabling a clearer understanding of potentially affected persons needing assistance whilst more detailed damage and loss data is being collected. Once damage and loss figures have plateaued, pre-existing vulnerability remains a key piece in determining mid-to-late relief phase allocations as well as the establishment of recovery priorities.

The approximate vulnerable population is the % vulnerable population (defined as the average of the various percentage factors in the Vulnerability Index), multiplied by the relevant (township) population. Well-being is defined as an average of these factors and vulnerability as the inverse of well-being. Given that this is not a decision tree (as per the approach followed by the township typologies), there are no thresholds.

CONFLICT INDEX

The Vulnerability Score combines units of measurement of human development with conflict, violence and disaster impacts in this period.[102] It incorporates a Conflict Index, drawn from the Armed Conflict Location and Event Data Project 2015-2016 (ACLED) dataset which is based on collation and triangulation of media reports. This data is an indicative public collection of data across a range of variables, including clashes/ battles, riots, recruitment activities of rebels, governments, militias, armed groups, protesters and civilians, and includes the dates, locations, event type, groups involved, fatalities, and changes in territorial control as gathered from a variety of sources. Of note is the approach used in this dataset to recording events as event-days – as such a two-day battle/clash will be recorded as two events, one on each day.

The ACLED data for Myanmar was manually cleaned and re-coded with 800 events matched to specific townships (discounting 2 events, because the source information was dubious and had incomplete location data) and they were associated with a specific issue or grievance. Over the period 2014-2016, these incidents represent 1,095 conflict fatalities, 538 clashes and 77 instances of violence against civilians. The ACLED dataset was combined with data on displacement from the NFI-Shelter-CCCM Cluster Analysis Report (UNHCR) in order to generate a Conflict Index which reflects a given township's share of clashes, fatalities, violence against civilians and IDP camp populations at the township level.

[102] A different approach is taken by The Asia Foundation in the study, *The Contested Areas of Myanmar: Subnational Conflict, Aid and Development*, which separates these measurements in its approach to reviewing of the situation in townships affected by active or latent conflict.

The Conflict Index is calculated using a four-step process. Recognising that many townships have no conflict recorded (from any factors), the Conflict Index compares only those townships with conflict/violence recorded in the ACLED dataset in 2015/2016. Four 'envelopes' are made from creating percentiles (of the maximum value) from the following statistics for each township (2015/16 data):

- Displaced population
- Number of events of violence against civilians
- Number of battles in the township
- Fatalities as a result of conflict within the township

The value of the four envelopes for each township are averaged, to produce Conflict Index B (per township), and the value multiplicative inverse (1/x) of Conflict Index B is obtained (per township),[103] where 1/0% = 620 and 1/0.05% = 615. A final envelope of Conflict Index B inverse is obtained. Resulting percentiles form Conflict Index C, which is the Conflict Index included as a component of the vulnerability score.

It should be recognised that conflict data is often incomplete – the actors might not be known, or an individual event's role within the larger conflict may be unclear. The exact locations of clashes are often not thoroughly recorded, making it challenging to understand and depict the spatial dimensions of an event.

Given the lack of clarity on fatalities during the escalations in Rakhine State in late 2016, the last official number of civilian deaths released by the government at the end of 2016 was used.

WORLD BANK'S TOWNSHIP WEALTH RANKING

The Vulnerability Index developed for the MIMU-HARP Working Dataset has also drawn on other recently established indices. The World Bank's Township Wealth Ranking developed in 2015 provides a countrywide overview by township although details of its methodology have not been shared. A Quality-of-Life Index used in the Post-Disaster Needs Assessment for the 2015 floods and landslides appears to draw on the Wealth Ranking together with the government's damage and loss prioritisation index. The Quality-of-Life Index is a composite tool consisting of:

- Number of available houses
- Number of patients treated in hospital
- Per capita GDP
- Number of school days attended
- Number of households connected to collective water supply and sanitation systems
- Number of households connected to the electricity grid

[103] Adjustments included manual correction of displaced Population in Puta-O and Ramree Townships such that these townships vary from the initial formula.

Applying the RandomForest R package, the 10 most important variables related to Township Wealth Ranking are:

Top 10 Variables (in order of importance)	%IncMSE (Mean Square-Error)
% of walls not thatch, earth or bamboo	24.39
% of roofs not thatch or bamboo	23.89
% of floors not bamboo or earth	23.27
% with electricity	14.71
% with at least high school education	12.80
% with no ID cards	12.53
Population density and urban population	10.39
% with at least middle school education	9.38
% literate	8.87
% of females who are literate	8.43

Additionally, these are the bottom 10 variables with which the Wealth Ranking does not perform well at predicting:

Bottom 10 Variables (in order of importance)	%IncMSE (Mean Square-Error)
Labour force participation	4.26
Disability prevalence rate – male	3.99
% with safe sanitation	3.14
Communications devices per household	2.54
Battle index	2.00
Displacement index	1.96
Conflict fatalities index	0.56
Mean household size	-0.15
% with improved drinking water source	-1.07
Violence against civilians index	-1.21

The Township Wealth Ranking does not predict well for many of these variables, especially those involving conflict, as it was not designed to do so. Nevertheless, the Township Wealth Ranking was an important set of values to the Working Dataset and was used to train the models, which eventually led to the construction of the Vulnerability Index.

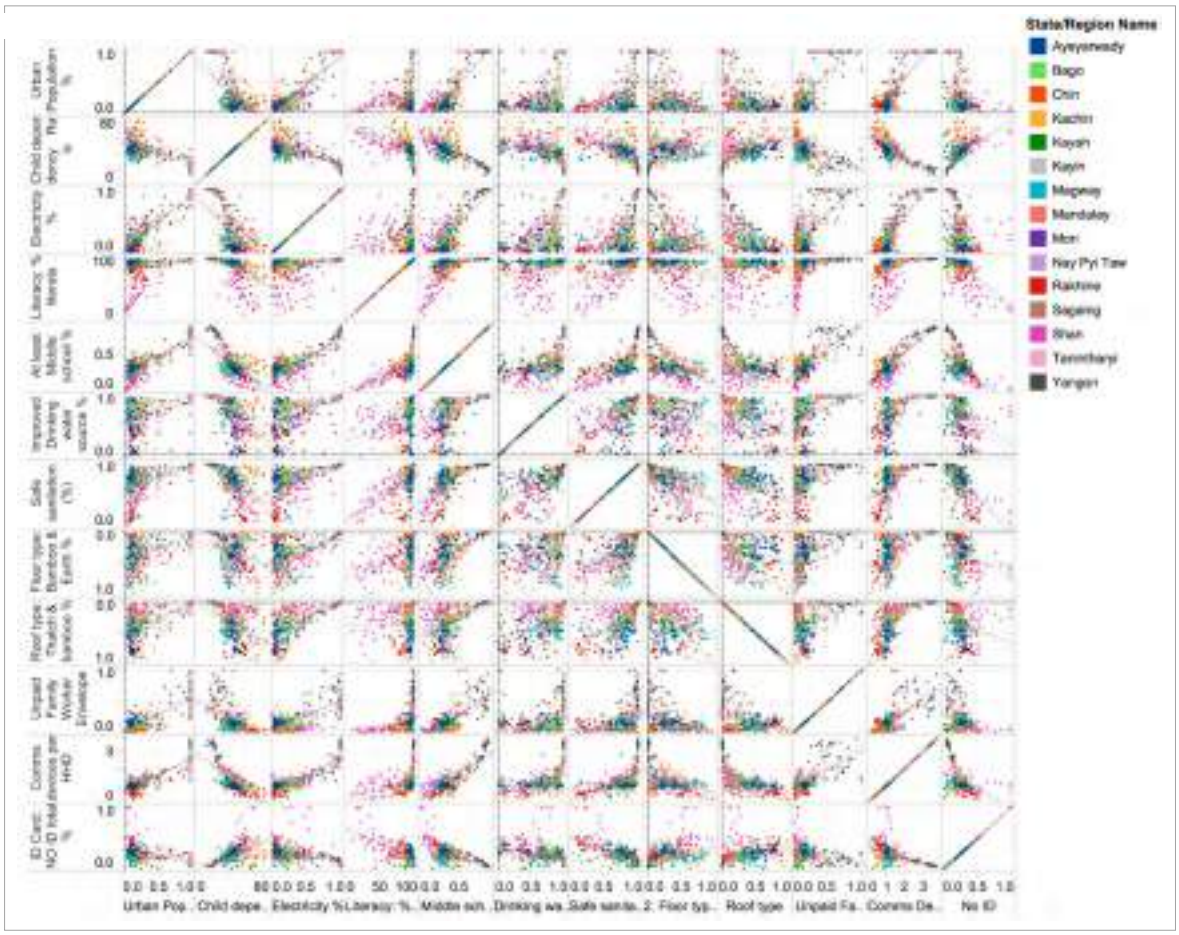
CORRELATIONS IN THE CENSUS DATA

The generation of correlation plots, such as the one below, provided roadmaps to the relationships within the dataset itself. Once all avenues had been sufficiently explored, a working definition of vulnerability was constructed from the dataset. The correlation plot below – where points are individual townships, coloured by state and region – summarises indicators from the Census and indicates a high degree of correlation amongst major indicators. This is logical as those without safe sanitation are more likely, for example, to live in rural areas and have more children, on average, than those with higher levels of educations and greater access to electricity.

Based on these correlations, vulnerability, in this document, has been defined based on a specific combination of conditions that indicate:

- Insecurity, frequent changes in context, lacking in freedom of movement
- Isolation, remoteness, sparse infrastructure networks and little communication with commercial centres
- Poor housing, lack of savings, insecure livelihoods, those heavily dependent on the environment around them for their survival and sustenance

Major Indicators - Census 2014



ITERATIONS, CRITERIA AND FINAL MODEL

The following specific criteria were used to determine the sufficiency of each iteration in order to evaluate iterations of the Vulnerability Index to reach a final model:

- F-values and performance against the major Census indicators
- Adjusted R-squared
- Qualitative review of RandomForest results

In all, 31 iterations were developed and evaluated. Using RandomForest, the score of the top and bottom 10 variables of the final selected Index were as follow:

Top 10 Variables – Vulnerability Index, RandomForest

Variables (in order of importance)	%IncMSE	IncNodePurity
% with no ID cards	15.28	0.15
% with at least high school education	14.13	0.45
% with at least middle school education	13.58	0.38
% with electricity	13.08	0.33
% female literacy	13.00	0.21
Child dependency ratio	12.97	0.19
% of walls not thatch, earth or bamboo	12.83	0.08
% of roofs not thatch or bamboo	12.14	0.08
% who never attended school	11.80	0.14
% urban population	10.96	0.34

Bottom 10 Variables – Well-being Index, RandomForest

For reference, %IncMSE refers to a variable's importance and IncNodePurity describes how useful it is in making a decision tree. The variables with which it was found to be least important:

Variables (most to least)	%IncMSE	IncNodePurity
Total population size	3.83	0.15
Communications devices per households	3.72	0.45
GDP per capita envelope	3.66	0.38
Labour force participation rate	3.26	0.33
Disability prevalence rate – male	3.15	0.21
Mean household size envelope	2.82	0.19
Female disability prevalence rate	2.72	0.08
Violence against civilians Index	2.55	0.08
GDP total envelope	1.85	0.14
% with improved drinking water source	1.2	0.34

The Adjusted R-squared for the Vulnerability Score used is 0.975. It performed the best of all the considered iterationts and is considered the best predictor for the data for both Conflict and Census data. Its equally weighted components are:

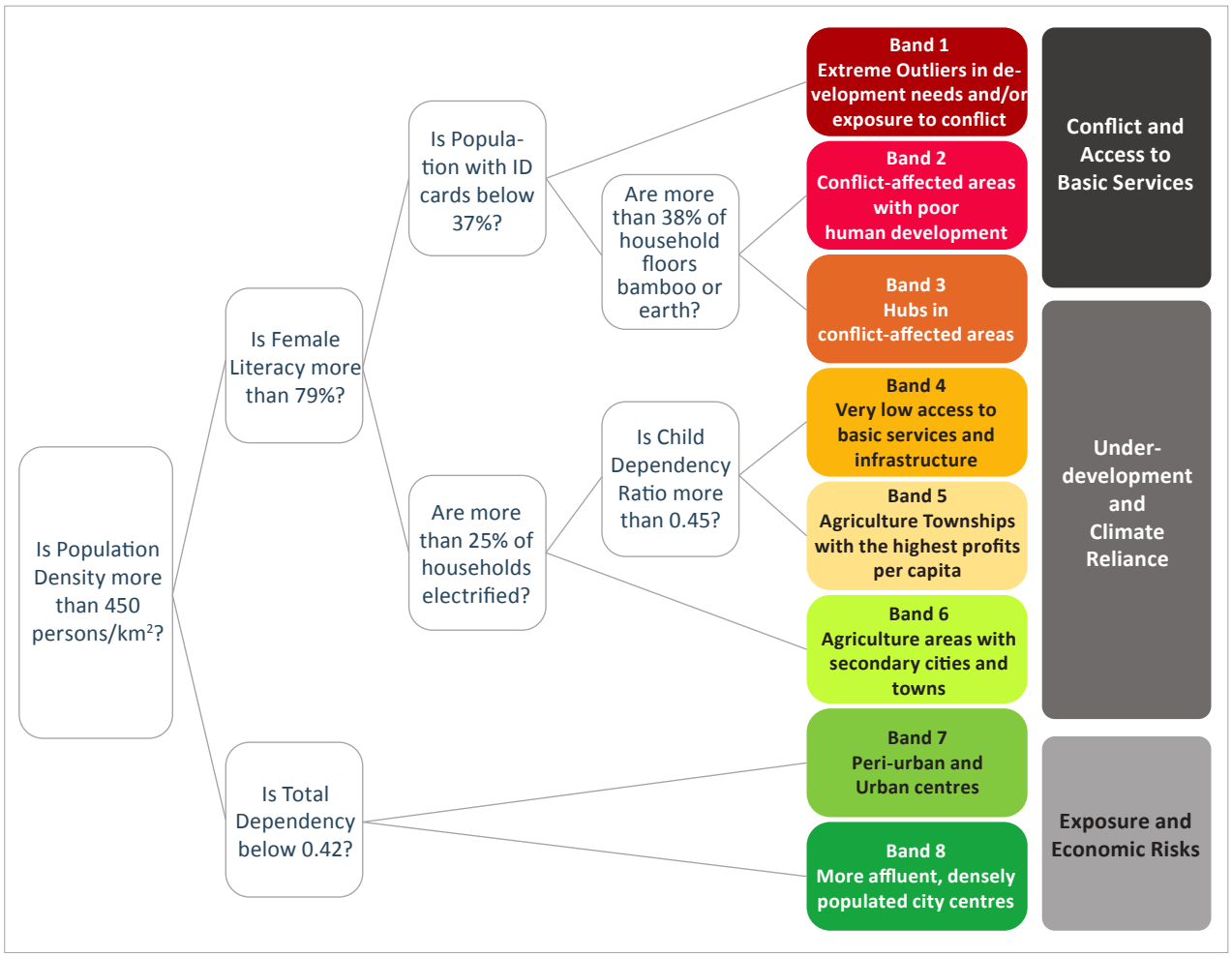
- % without formal ID
- Child dependency ratio
- Female literacy rate
- % with a middle school education
- % bamboo and thatch roofs
- % with safe sanitation
- Rate of electrification
- Conflict index (reflecting clashes, fatalities, violence against civilians and displacement)

CLUSTERING THE DATA INTO TOWNSHIP TYPOLOGIES

While the Vulnerability Index provides a useful outline of vulnerability/capacity, programme design cannot be based on a one-size-fits-all approach. Specific demographic characteristics such as population density must necessarily be a key factor in deciding on forms of appropriate programming.

The Rpart package was used to develop a decision tree, based on the Vulnerability Index and all other Working Dataset indicators. This decision tree was employed to break the townships into typologies; branches depicted by bold arrows indicate positive responses and the number of townships within each Type is listed in brackets. Some manual adjustment was done for marginal cases which fell into a typology with drastically different townships due to one or two indicators. This breakdown of townships tends to provide greater definition at the bottom end.

Figure 72 *Decision Tree Used to Define Township Clusters*



* denotes terminal node
1) root 330 6.47402300 0.5441732
2) PopDen..Urban.Pop < 0.49985 286 2.58516900 0.5034858
4) Literacy.Female....literate < 79.4 81 0.64083930 0.3969261
8) ID.Card..no.ID.total.. >= 0.37 36 0.11851430 0.3287344 *
9) ID.Card..no.ID.total.. < 0.37 45 0.22099830 0.4514794
18) Floor.type..Bamboo.or.Earth.. >= 0.3863 25 0.06276741 0.4074142 *
19) Floor.type..Bamboo.or.Earth.. < 0.3863 20 0.04900788 0.5065609 *
5) Literacy.Female....literate >= 79.4 205 0.66116160 0.5455899
10) Electricity....with. < 0.2515 138 0.28780330 0.5221795
20) Child.dependency.ratio >= 45.45 74 0.15933720 0.4985012 *
21) Child.dependency.ratio < 45.45 64 0.03900557 0.5495575 *
11) Electricity....with. >= 0.2515 67 0.14195150 0.5938084 *
3) PopDen..Urban.Pop >= 0.49985 44 0.33788000 0.8086414
6) Roof.type.NOT.Thatch.and.Bamboo.roofing.. < 0.91065 14 0.07159457 0.7076667 *
7) Roof.type.NOT.Thatch.and.Bamboo.roofing.. >= 0.91065 30 0.05692950 0.8557630 *

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