



Changing Sources of Drinking Water in Myanmar (2014 - 2019)



Methodology guide - February 2021






Contents

Introduction	2
I. Differences between the 2019 Intercensus Survey and global methodologies	3
II. Different types of drinking water sources	3
III. Equivalences in the census/surveys	4
IV. Different types of drinking water services	5
IV.A. Drinking water from improved sources	5
IV.B. Drinking water from unimproved sources	5
IV.C. Drinking water from safely managed services (safe drinking water)	5
IV.D. Drinking water from basic services	6
IV.E. Drinking water from limited services	7
IV.F. Drinking water from unimproved sources (unprotected wells/springs)	7
IV.G. Drinking water from surface water	8
V. Calculation of drinking water services by survey/census	8
V.A. 2014 Population and Housing Census	8
V.B. 2015-16 Myanmar Demographic and Health Survey	8
V.C. 2017 Myanmar Living Conditions Survey	9
V.D. 2019 Intercensus Survey	9
VI. Data Limitations	10
VI.A. Differences in sampling methodologies and sizes	10
VI.B. Limitations in availability of levels	10
VI.C. Limitations in availability of indicators	10
VI.D. Specific limitations in the 2017 Myanmar Living Conditions Survey	11
VII. Calculation of <i>Estimated number of households</i> and <i>Estimated population</i>	12
VII.A. Calculation of <i>Estimated number of households' use of drinking water sources/services</i>	12
VII.B. Calculation of <i>Estimated population' use of drinking water sources/services</i>	12

Introduction

Measurement of Myanmar households' access to safe drinking water has been undertaken on a large scale for the first time in the 2019 Intercensal Survey. Prior to this 2019 survey, access to safe drinking water was measured only through small-scale studies. Drinking water services are defined according to accessibility, availability and quality of households' main drinking water source. The resulting scale describes a range of household-level drinking water services – services which are safe, basic or limited refer to the use of improved water sources, whereas services with unimproved and surface sources are the least safe options. The focus is on the *Households' use of drinking water by drinking water service*.

The scale of different drinking water services is shown below:¹

Improved Low contamination risk	 Safely Managed	Drinking water from an improved source which is located inside the user's dwelling, plot or yard, available when needed and free of faecal & priority chemical contamination, such as arsenic & fluoride. Only faecal coliforms test was conducted in the Intercensal Survey 2019
	 Basic	Drinking water from an improved source and collection time is not more than 30 minutes for a roundtrip including queuing
	 Limited	Drinking water from an improved source and collection time is over 30 minutes for a roundtrip including queuing
Unimproved High contamination risk	 Unimproved	Drinking water from unprotected dug wells or unprotected springs or any other source where water is not protected from the outside
	 Surface	Drinking water from a river, dam, lake, pond, stream, canal or irrigation channel/ditches

This MIMU Analytical Brief provides a unique perspective by comparing, for the first time, households' use of drinking water services between 2014 and 2019. The four census/surveys used are:

- 2014 Population and Housing Census,
- 2015-16 Myanmar Demographic and Health Survey,
- 2017 Myanmar Living Conditions Survey and
- 2019 Intercensus Survey.

All results presented are from the four national level surveys/census exercises conducted between 2014 and 2019 which used different calculation methodologies. MIMU has adjusted these using the

¹ Myanmar's 2019 Intercensal Survey indicators are similar to those used globally by the WHO/UNICEF Joint Monitoring Programme: <https://washdata.org/>

calculation methodology of the 2019 Intercensal Survey to enable the measurements to be compared. The software used for this Analytical Brief are:

- Excel for the Data Analysis and
- Tableau for the Data Visualisations.

Note: All values presented are based on the enumerated population and may not fully reflect non-enumerated groups or certain areas, particularly Rakhine State.

I. Differences between the 2019 Intercensus Survey and global methodologies

MIMU has chosen to use the methodology of the 2019 Intercensus Survey instead of the global standard – the WHO/UNICEF Joint Monitoring Program (JMP).² One reason is that the 2019 Intercensus Survey’s methodology is better adapted to the Myanmar context.

The main differences are:

- **The indicator of *Households’ use of safe drinking water* in the 2019 Intercensus Survey does not test chemical contaminants.** It only tests for faecal contaminant.
- **Delivered water from "tanker truck" and "small cart with drum" are considered *drinking water from unimproved sources* and particularly *drinking water from unimproved sources (wells/springs)* in the 2019 Intercensus Survey while they would be considered *drinking water from improved sources* in the JMP’s methodology.** In Myanmar, delivered water from "tanker truck" and "small cart with drum" is taken from a variety of water sources including river and rainfed ponds (especially in the delta region) and a small percentage from boreholes (in dry zones).
- **The JMP’s methodology does not clearly define “other” whereas the 2019 Intercensus Survey includes “other” in the *Households’ use of drinking water from improved sources (wells/springs)*.**

II. Different types of drinking water sources

Different types of drinking water sources are used to determine drinking water services. The different types of drinking water sources that households use:

² More information on the JMP can be found here: <https://washdata.org/>

Drinking Water Source	Description
Piped	Piped into dwelling; piped into compound, yard or plot; piped to neighbour; public tap/standpipe
Tubewell /borehole	Tubewell; borehole
Protected dug well/spring	Protected well; protected spring
Rain	Rainwater collection, waterfall
Bottled	Bottled water/water from vending machine; home water purifier/filter
Unprotected well/spring	Unprotected well; unprotected spring
Tanker/small cart	Tanker/truck; cart with small tank/drum
Surface	Lake; pond; dam; river; stream; irrigation channel

III. Equivalences in the census/surveys

The Census and surveys each have their own set of questionnaires. A harmonisation exercise was performed between them in order to make the drinking water sources comparable as shown below:

Drinking Water Source	CS 2014 Items	MDHS 2015-16 Items	MLCS 2017 Items	ICS 2019 Items
Piped	Tap water/Piped	Piped into dwelling	Water pipe into dwelling	Piped into dwelling
		Piped to yard/plot	Water pipe inside compound	Piped into compound, yard or plot
		N/A	Water pipe outside compound	Piped to neighbour
		Public tap/standpipe	N/A	Public tap / standpipe
Tubewell/borehole	Tube well, borehole	Tube well or borehole	Tube well, borehole	Borehole or tubewell
Protected well/spring	Protected well/Spring	Protected well	Protected well/spring	Protected well
		Protected spring		Protected spring
Rain	Waterfall/Rain water	Rainwater	Rainwater collection/tank	Rainwater collection
Bottled	Bottled water/water from vending machine	Bottled water	Bottled water	Home water purifier/filter/Bottled water
Unprotected well/spring	Unprotected well/Spring	Unprotected well	Unprotected well/spring	Unprotected well
		Unprotected spring		Unprotected spring
Tanker/small cart	Tanker/Truck	Tanker truck	Tanker/Truck	Tanker-truck
	N/A	Cart with small tank/drum	N/A	Cart with small tank / drum
Surface	Pool/Pond/Lake	Surface water (river/dam/lake/pond/stream/canal/irrigation channel)	Pool/pond/lake/dam/stagnant water	Surface water (river, stream, dam, lake, pond, canal, irrigation channel)
	River/Stream/Canal		River/stream/canal	
Other	Other	Other	Other	Other

Note: The terms:

- “CS 2014” means “2014 Population and Housing Census”.
- “2015-16 MDHS” means “2015-16 Myanmar Demographic and Health Survey”.
- “2017 MLCS” means “2017 Myanmar Living Conditions Survey” and
- “2019 ICS” means “2019 Intercensus Survey”.

IV. Different types of drinking water services

IV.A. Drinking water from improved sources

Improved drinking water sources are those that have the potential to deliver safe water as a consequence of their design and construction, and include:

- Piped,
- Tubewell /borehole,
- Protected dug well/spring,
- Rain, and
- Bottled.

Census/surveys harmonisation for the drinking water from improved sources:

Drinking Water Service	Drinking Water Source	CS 2014 Items	MDHS 2015-16 Items	MLCS 2017 Items	ICS 2019 Items
Improved Low contamination risk	Piped	Tap water/Piped	Piped into dwelling	Water pipe into dwelling	Piped into dwelling
			Piped to yard/plot	Water pipe inside compound	Piped into compound, yard or plot
			N/A	Water pipe outside compound	Piped to neighbour
			Public tap/standpipe	N/A	Public tap / standpipe
	Tubewell/borehole	Tube well, borehole	Tube well or borehole	Tube well, borehole	Borehole or tubewell
	Protected well/spring	Protected well/Spring	Protected well	Protected well/spring	Protected well
		Protected spring		Protected spring	
Rain	Waterfall/Rain water	Rainwater	Rainwater collection/tank	Rainwater collection	
Bottled	Bottled water/water from vending machine	Bottled water	Bottled water	Home water purifier/filter/Bottled water	

IV.B. Drinking water from unimproved sources

Unimproved drinking water sources are those that do not have the potential to deliver safe water as a consequence of their design and construction, and include:

- Unprotected well/spring,
- Tanker/small cart,
- Surface, and
- Other.

Census/surveys harmonisation for the drinking water from unimproved sources:


Drinking Water Service	Drinking Water Source	CS 2014 Items	MDHS 2015-16 Items	MLCS 2017 Items	ICS 2019 Items
Unimproved High contamination risk	Unprotected well/spring	Unprotected well/Spring	Unprotected well	Unprotected well/spring	Unprotected well
	Tanker/small cart	Tanker/Truck	Tanker truck	Tanker/Truck	Tanker-truck
		N/A	Cart with small tank/drum	N/A	Cart with small tank / drum
	Surface	Pool/Pond/Lake	Surface water (river/dam/lake/pond/stream/canal/irrigation channel)	Pool/pond/lake/dam/stagnant water	Surface water (river, stream, dam, lake, pond, canal, irrigation channel)
		River/Stream/Canal		River/stream/canal	
Other	Other	Other	Other	Other	

IV.C. Drinking water from safely managed services (safe drinking water)

Safe drinking water is drinking water from an improved source which is located inside the user's dwelling, plot or yard, available when needed and free of faecal and priority chemical contaminants (such as arsenic and fluoride). It includes:

- Piped,
 - Tubewell /borehole,
 - Protected dug well/spring,
 - Rain,
 - Bottled,
 - Located on premises,
 - Available when needed, and
 - Free from faecal and priority chemical contaminants.
- } Drinking water from improved sources

Census/surveys harmonisation for the drinking water from safely managed services:

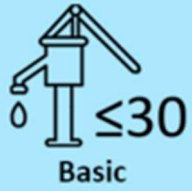
Drinking Water Service	Drinking Water Source	CS 2014 Items	MDHS 2015-16 Items	MLCS 2017 Items	ICS 2019 Items
	Piped	Tap water/Piped	Piped into dwelling	Water pipe into dwelling	Piped into dwelling
			Piped to yard/plot	Water pipe inside compound	Piped into compound, yard or plot
			N/A	Water pipe outside compound	Piped to neighbour
			Public tap/standpipe	N/A	Public tap / standpipe
	Tubewell/borehole	Tube well, borehole	Tube well or borehole	Tube well, borehole	Borehole or tubewell
	Protected well/spring	Protected well/Spring	Protected well	Protected well/spring	Protected well
			Protected spring		Protected spring
	Rain	Waterfall/Rain water	Rainwater	Rainwater collection/tank	Rainwater collection
	Bottled	Bottled water/water from vending machine	Bottled water	Bottled water	Home water purifier/filter/Bottled water
	Located on premises	N/A	N/A	N/A	Located on premises
Available when needed	N/A	N/A	N/A	Available when needed	
Free from faecal and priority chemical contamination	N/A	N/A	N/A	Free from faecal and priority chemical contamination	

IV.D. Drinking water from basic services

Drinking water from basic services is drinking water from an improved source and where collection time is not more than 30 minutes for a roundtrip including queuing. It includes:

- Piped,
 - Tubewell /borehole,
 - Protected dug well/spring,
 - Rain,
 - Bottled, and
 - Not more than 30 minutes for a roundtrip including queuing.
- } Drinking water from improved sources

Census/surveys harmonisation for the drinking water from basic services:

Drinking Water Service	Drinking Water Source	CS 2014 Items	MDHS 2015-16 Items	MLCS 2017 Items	ICS 2019 Items
	Piped	Tap water/Piped	Piped into dwelling	Water pipe into dwelling	Piped into dwelling
			Piped to yard/plot	Water pipe inside compound	Piped into compound, yard or plot
			N/A	Water pipe outside compound	Piped to neighbour
			Public tap/standpipe	N/A	Public tap / standpipe
	Tubewell/borehole	Tube well, borehole	Tube well or borehole	Tube well, borehole	Borehole or tubewell
	Protected well/spring	Protected well/Spring	Protected well	Protected well/spring	Protected well
			Protected spring		Protected spring
Rain	Waterfall/Rain water	Rainwater	Rainwater collection/tank	Rainwater collection	
Bottled	Bottled water/water from vending machine	Bottled water	Bottled water	Home water purifier/filter/Bottled water	
Not more than 30 minutes for a roundtrip including queuing	N/A	Not more than 30 minutes for a roundtrip including queuing	Not more than 30 minutes for a roundtrip including queuing	Not more than 30 minutes for a roundtrip including queuing	

IV.E. Drinking water from limited services

Drinking water from limited services is drinking water from an improved source and where collection time is over 30 minutes for a roundtrip including queuing. It includes:

- Piped,
 - Tubewell /borehole,
 - Protected dug well/spring,
 - Rain,
 - Bottled, and
 - Exceeds 30 minutes for a roundtrip including queuing.
- } Drinking water from improved sources

Census/surveys harmonisation for the drinking water from limited services:


Drinking Water Service	Drinking Water Source	CS 2014 Items	MDHS 2015-16 Items	MLCS 2017 Items	ICS 2019 Items
Limited	Piped	Tap water/Piped	Piped into dwelling	Water pipe into dwelling	Piped into dwelling
			Piped to yard/plot	Water pipe inside compound	Piped into compound, yard or plot
			N/A	Water pipe outside compound	Piped to neighbour
			Public tap/standpipe	N/A	Public tap / standpipe
	Tubewell/borehole	Tube well, borehole	Tube well or borehole	Tube well, borehole	Borehole or tubewell
	Protected well/spring	Protected well/Spring	Protected well	Protected well/spring	Protected well
			Protected spring		Protected spring
	Rain	Waterfall/Rain water	Rainwater	Rainwater collection/tank	Rainwater collection
Bottled	Bottled water/water from vending machine	Bottled water	Bottled water	Home water purifier/filter/Bottled water	
Exceeds 30 minutes for a roundtrip including queuing	N/A	Exceeds 30 minutes for a roundtrip including queuing	Exceeds 30 minutes for a roundtrip including queuing	Exceeds 30 minutes for a roundtrip including queuing	

IV.F. Drinking water from unimproved sources (unprotected wells/springs)

Drinking water from unimproved sources (wells/springs) is drinking water from unprotected dug wells or unprotected springs or any other source where water is not protected from contamination. It includes:

- Unprotected well/spring,
- Tanker/small cart, and
- Other.

Census/surveys harmonisation for the drinking water from unimproved sources (wells/springs):

Drinking Water Service	Drinking Water Source	CS 2014 Items	MDHS 2015-16 Items	MLCS 2017 Items	ICS 2019 Items
 Unimproved	(spring)				
	Unprotected well/spring	Unprotected well/Spring	Unprotected well Unprotected spring	Unprotected well/spring	Unprotected well Unprotected spring
	Tanker/small cart	Tanker truck N/A	Tanker truck Cart with small tank/drum	Tanker/Truck N/A	Tanker-truck Cart with small tank / drum
	Other	Other	Other	Other	Other


Note: This indicator is different from drinking water from unimproved sources. This latter contains both:

- Drinking water from unimproved sources (well/spring) and
- Surface.

IV.G. Drinking water from surface water

Surface water is drinking water from a river, dam, lake, pond, stream, canal or irrigation, channel/ditches.

Census/surveys harmonisation for the drinking water from surface water:

Drinking Water Service	Drinking Water Source	CS 2014 Items	MDHS 2015-16 Items	MLCS 2017 Items	ICS 2019 Items
 Surface	Surface	Pool/Pond/Lake	Surface water (river/dam/lake/pond/stream/canal/irrigation channel)	Pool/pond/lake/dam/stagnant water	Surface water (river, stream, dam, lake, pond, canal, irrigation channel)
		River/Stream/Canal	River/stream/canal	River/stream/canal	irrigation channel)

V. Calculation of drinking water services by survey/census

V.A. 2014 Population and Housing Census

Source used: Redatam website: <http://www.dopredatam.gov.mm>.

Calculation methodology used: built the indicators using the different types of drinking water sources indicators (bottled, piped, rain, etc.).

Available levels:

- Countrywide, State/Region, District and Township levels and
- Union, Urban and Rural levels.

Calculated indicators:

- Households' use of drinking water from improved sources,
- Households' use of drinking water from unimproved sources,
- Households' use of drinking water from unimproved sources (well/spring) and
- Households' use of surface water.

V.B. 2015-16 Myanmar Demographic and Health Survey

Source used: UNICEF's dataset.

Calculation methodology used: built the indicators using the different types of drinking water sources indicators (bottled, piped, rain, etc.).

Available levels:

- Countrywide and State/Region levels and
- Union, Urban and Rural levels.

Calculated indicators:

- *Households' use of drinking water from improved sources,*
- *Households' use of drinking water from unimproved sources,*
- *Households' use of drinking water from basic services,*
- *Households' use of drinking water from limited services,*
- *Households' use of drinking water from unimproved sources (well/spring) and*
- *Households' use of surface water.*

V.C. 2017 Myanmar Living Conditions Survey

Source used: Key Indicators Report of 2017 MLCS Report.

Calculation methodology used: built the indicators using the different drinking water services indicators publicly available in the report.

Available levels:

- Countrywide and State/Region levels and
- Union (Countrywide and State/Region levels), Urban and Rural level (only Countrywide level).

Calculated indicators:

- *Households' use of drinking water from improved sources,*
- *Households' use of drinking water from unimproved sources,*
- *Households' use of drinking water from basic services,*
- *Households' use of drinking water from limited services,*
- *Households' use of drinking water from unimproved sources (well/spring) and*
- *Households' use of surface water.*

V.D. 2019 Intercensus Survey

Source used: Department of Population: <https://dop.gov.mm/en/data-and-maps-category/main-report-1>.

Calculation methodology used: from the website.

Available levels:

- Countrywide, State/Region and District levels and
- Union, Urban and Rural level.

Calculated indicators:

- *Households' use of drinking water from improved sources,*
- *Households' use of drinking water from unimproved sources,*
- *Households' use of safe drinking water,*

- Households' use of drinking water from basic services,
- Households' use of drinking water from limited services,
- Households' use of drinking water from unimproved sources (well/spring) and
- Households' use of surface water.

VI. Data Limitations

VI.A. Differences in sampling methodologies and sizes

Using different census and surveys creates a risk of using different sampling methodologies and sizes (shown below).

	2014 CS	2015-16 MDHS	2017 MLCS	2019 ICS
EAs	81,750	441	1,145	3,960
HH that answered the questions	10,877,832	12,500	13,730	132,092
Pop. from HH that answered the questions	50,279,900	51,130	?	548,553
HH that got water tested	N/A	N/A	N/A	19,077

The values presented are based on the enumerated population of the relevant surveys and may not fully reflect non-enumerated groups or certain areas, particularly in Rakhine State. Due to differences in sampling techniques and sample sizes between surveys, presented values from certain surveys might differ significantly in comparison to other surveys.

VI.B. Limitations in availability of levels

It is not possible to have:

- State/Region (Urban & Rural only) level for:
 - 2017 Myanmar Living Conditions Survey.
- District level for:
 - 2015-16 Myanmar Demographic and Health Survey and
 - 2017 Myanmar Living Conditions Survey.
- Township level for:
 - 2017 Myanmar Living Conditions Survey,
 - 2015-16 Myanmar Demographic and Health Survey and
 - 2019 Intercensus Survey.

VI.C. Limitations in availability of indicators

It is not possible to calculate:

- The *Households' use of safe drinking water* indicator for:
 - 2014 Population and Housing Census,
 - 2015-16 Myanmar Demographic and Health Survey and
 - 2017 Myanmar Living Conditions Survey.

- The *Households' use of drinking water from basic services* indicator for:
 - 2014 Population and Housing Census.
- The *Households' use of drinking water from limited services* indicator for:
 - 2014 Population and Housing Census.

VI.D. Specific limitations in the 2017 Myanmar Living Conditions Survey

The 2017 Myanmar Living Conditions Survey (MLCS) presents specific limitations:

- **There were both dry and wet season indicators.** This prevents an accurate comparison between the other surveys/census.
- **The public report did not provide households' level indicators about drinking water sources (piped, bottled, rain, etc.).** Since the 2017 MLCS public report did not provide households' level indicators on drinking water source (piped, bottled, rain, etc.), the indicators of drinking water services could not be calculated using the indicators of drinking water sources.
- **The category “tanker truck” was counted as *drinking water from improved sources*.** This followed global (Joint Monitoring Program (JMP))’s methodology but contradicted the 2019 Intercensus Survey. Since the 2017 MLCS public report did not provide households' level indicators on drinking water source (piped, bottled, rain, etc.), the indicators of drinking water services could not be calculated using the indicators of drinking water sources. Therefore, the indicators of drinking water services that were already present in the report were used. The following indicators do not follow the 2019 Intercensus Survey’s methodology:
 - The *Households' use of drinking water from improved sources* contains the category “tanked truck”,
 - The *Households' use of drinking water from unimproved sources* and particularly the *Households' use of drinking water from unimproved sources (wells/springs)* do not contain the category “tanked truck” and
 - The *Households' use of drinking water from basic/limited/safely managed services* contain the category “tanked truck”.
- **The category “other” was counted as *surface water*.** The JMP’s methodology is unclear on where the category “other” should be placed in terms of drinking water services. However, the 2019 Intercensus Survey included it in the *drinking water from improved sources (wells/springs)*. The indicators of drinking water services that were already present in the report were used. The following indicators do not follow the 2019 Intercensus Survey’s methodology:
 - The *Households' use of surface water* contains the category “other” and
 - The *Households' use of drinking water from unimproved sources (wells/springs)* does not contain “other”.

VII. Calculation of *Estimated number of households and Estimated population*

Note: the following methodology works for any indicators on drinking water sources or drinking water services.

VII.A. Calculation of *Estimated number of households' use of drinking water sources/services*

The 2019 Intercensus provided the *Percentage of households' use of drinking water sources/services*. The *Estimated number of households* was calculated by multiplying the *Number of households in the geographical area* with *Percentage of households' use of the water source/services*.

<i>Estimated number of households' use of drinking water sources/services</i>	=	<i>Number of households in the geographical area</i>	x	<i>Percentage of households' use of drinking water sources/services</i>
---	---	--	---	---

VII.B. Calculation of *Estimated population' use of drinking water sources/services*

First, it is important to calculate the *Number of people per Households*. To obtain it, for each geographical area (state/region, district and township levels), the *Population* was divided to the *Number of Households*.

$\text{Number of people per Households} = \frac{\text{Population}}{\text{Number of Household}}$

MIMU used:

- 2014 Population and Housing Census for the years 2014, 2015-16 and 2017,
- 2019 Intercensus Survey for the year 2019.

Finally, the *Estimated population's use of drinking water sources/services* was calculated by multiplying the *Estimated number of households' use of drinking water sources/services* with *Number of people per Households*.

<i>Estimated population's use of drinking water sources/services</i>	=	<i>Estimated number of households' use of drinking water sources/services</i>	x	<i>Number of people per Households</i>
--	---	---	---	--