

OVERVIEW OF ONSITE AND DECENTRALIZED WASTEWATER INADEQUACIES THROUGHOUT THE U.S.

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work conducted through consultancy with Global Communities



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U.S. WASTEWATER DATA

- ▶ U.S. Decennial Census
- ▶ American Community Survey
- ▶ American Housing Survey

U.S. DECENNIAL CENSUS

- ▶ removed wastewater question after 1990
- ▶ question phrasing and instruction issues
- ▶ proposed new wastewater question

1990 Decennial U.S. Census Questions on Sewage Disposal and Plumbing *(U.S. Census Bureau)*

Is this building connected to a public sewer?

- Yes, connected to public sewer
- No, connected to septic tank or cesspool
- No, use other means

Do you have COMPLETE plumbing facilities in this house, apartment, or mobile home; that is, 1) hot and cold piped water, 2) a flush toilet, and 3) a bathtub or shower?

- Yes, have all three facilities
- No

AMERICAN COMMUNITY SURVEY (ACS)

ACS Questions on Plumbing and Water Bills *(U.S. Census Bureau)*

Does this house, apartment, or mobile home have—		Yes	No
	a. hot and cold running water?		
	b. a bathtub or shower?		
	c. a sink with a faucet?		
	d. a stove or range?		
	e. a refrigerator?		
<p>IN THE PAST 12 MONTHS, what was the cost of water and sewer for this house, apartment, or mobile home? If you have lived here less than 12 months, estimate the cost. Past 12 months' cost – Dollars</p>	<p style="text-align: center;">\$ X,XXX.00</p> <p style="text-align: center;">Or</p> <ul style="list-style-type: none"> ○ Included in rent or condominium fee ○ No charge 		

AMERICAN HOUSING SURVEY (AHS)

Characteristics	Estimate
Total	124,135
Primary Source of Water	
Public or private system	110,171
Individual well	13,755
Other	209
Type of Sewage System	
Public sewer	103,565
Septic tank or cesspool	20,293
Standard septic tank and subsurface leach field	19,285
Pump used to distribute wastewater	596
Elevated above natural soil surface	284
Applied treated wastewater	74
Other	55
Other	136
None	70
Not reported	71
Number of Units Connected to Septic Tank or Cesspool	
1	19,635
2 to 5	486
6 or more	173

Bathrooms	
At least 1 complete bathroom	139,394
1	46,181
1 1/2	16,072
2	42,636
2 1/2	17,898
3	13,483
More than 3	3,125
No complete bathroom	291
Sink and tub present	.
Sink and toilet present	S
Tub and toilet present	S
Sink only present	.
Tub only present	S
Toilet only present	S
No sink, bathtub, shower, or toilet present	229

**2019 National - Plumbing, Water,
and Sewage Disposal
– All Occupied Units**
(U.S. Census Bureau, 2019)



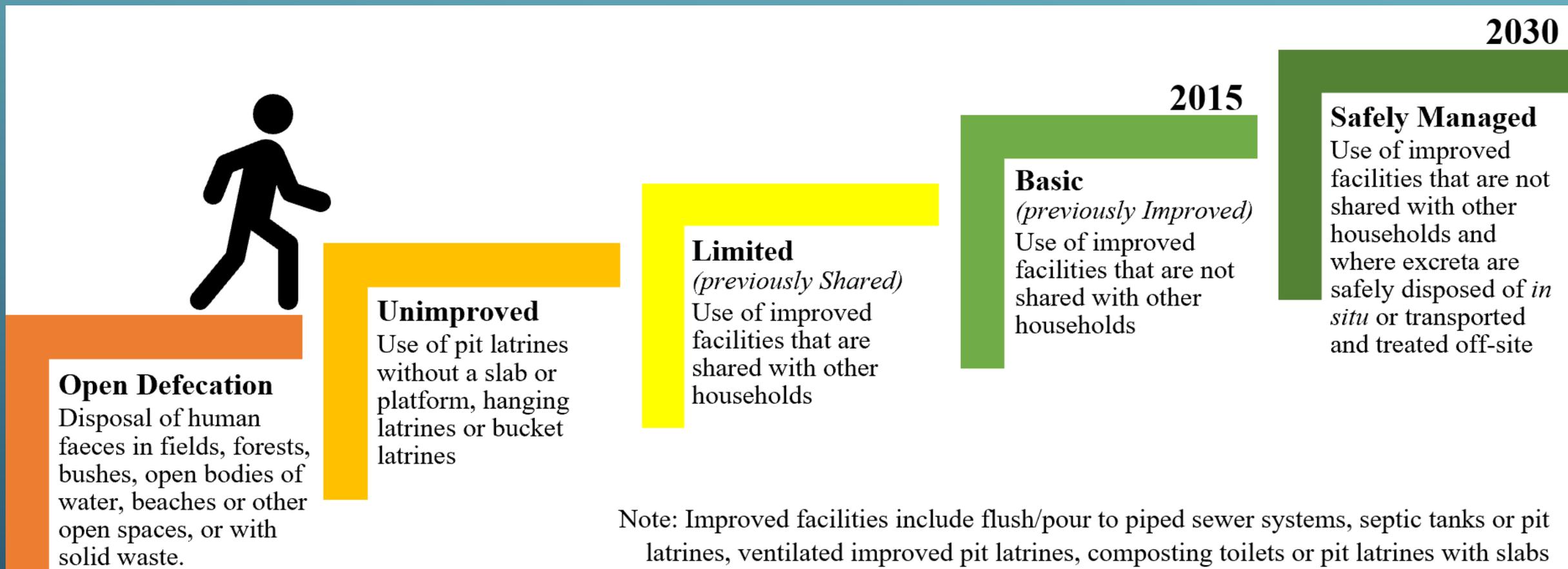
SUSTAINABLE DEVELOPMENT GOALS

1 NO POVERTY 	2 ZERO HUNGER 	3 GOOD HEALTH AND WELL-BEING 	4 QUALITY EDUCATION 	5 GENDER EQUALITY 	6 CLEAN WATER AND SANITATION
7 AFFORDABLE AND CLEAN ENERGY 	8 DECENT WORK AND ECONOMIC GROWTH 	9 INDUSTRY, INNOVATION AND INFRASTRUCTURE 	10 REDUCED INEQUALITIES 	11 SUSTAINABLE CITIES AND COMMUNITIES 	12 RESPONSIBLE CONSUMPTION AND PRODUCTION
13 CLIMATE ACTION 	14 LIFE BELOW WATER 	15 LIFE ON LAND 	16 PEACE, JUSTICE AND STRONG INSTITUTIONS 	17 PARTNERSHIPS FOR THE GOALS 	 SUSTAINABLE DEVELOPMENT GOALS

**UNITED
NATIONS
SUSTAINABLE
DEVELOPMENT
GOAL (SDG) 6.2**

By 2030, “achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations”

Joint Monitoring Programme (JMP) Service Ladder for Global Monitoring of Sanitation in Households



JMP U.S. 2020 DATA

Service Level	Urban	Rural	Total
Safely Managed	97.28 %	-	98.26%
Basic	2.55 %	-	1.42%
At Least Basic	-	98.94 %	-
Limited	0.00 %	0.00 %	0.00 %
Unimproved	0.16 %	1.06 %	0.32 %
Open Defecation	0.00 %	0.00%	0.00 %

TYPES OF GAPS IN SAFELY MANAGED SANITATION IN THE U.S.

- ▶ Incomplete Indoor Plumbing
- ▶ Failing Septic Systems
- ▶ Straight Pipes
- ▶ Cesspools
- ▶ Failing Outhouses
- ▶ Bucket Latrines
- ▶ Open Defecation

INCOMPLETE INDOOR PLUMBING

- ▶ *lack of hot and cold running water, a sink, a shower or bath, and/or toilet*
- ▶ at least 1.4 million people
- ▶ AHS estimates 291,000 housing units without complete plumbing



FAILING SEPTIC SYSTEMS

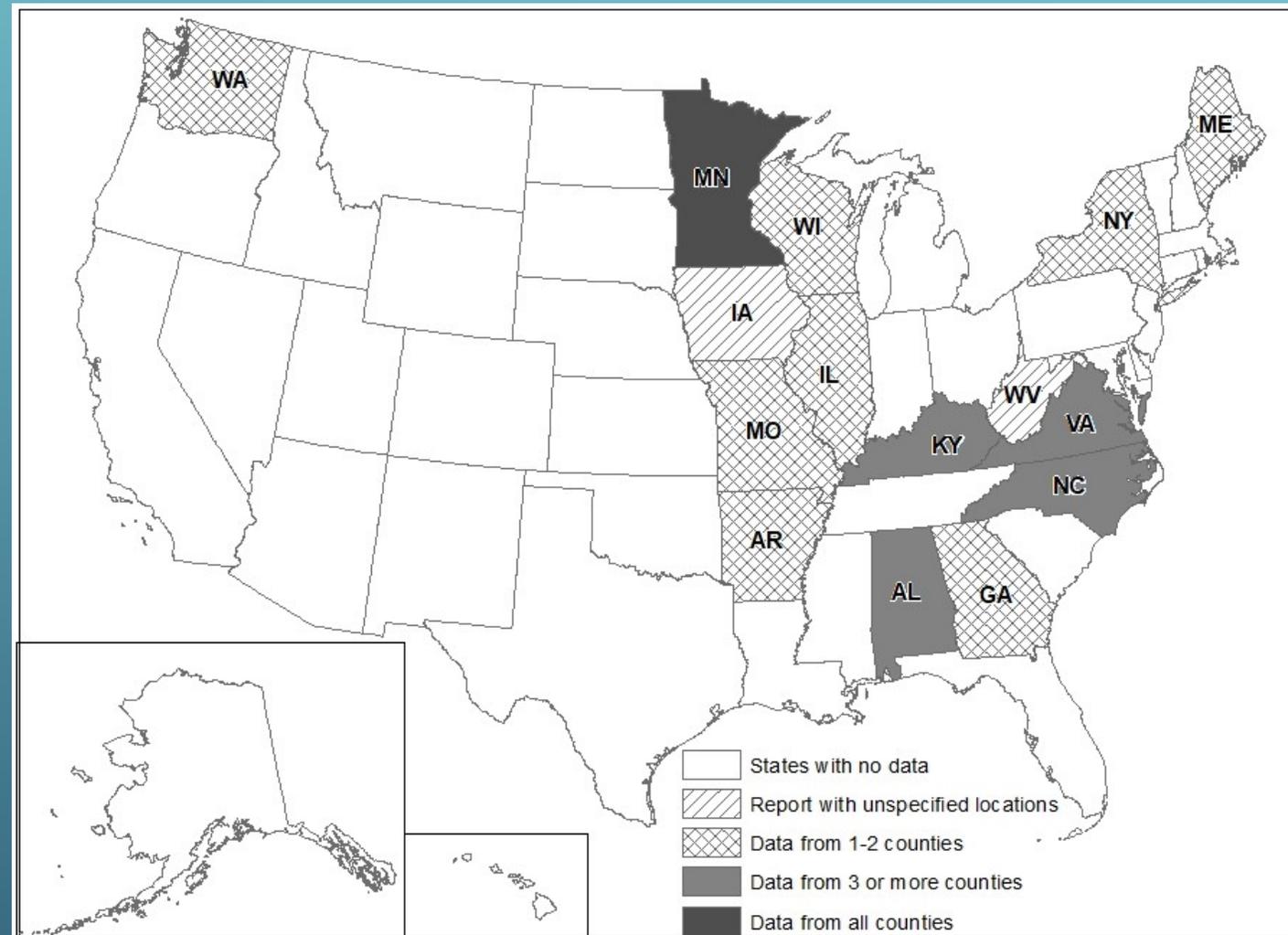
- ▶ *septic tank and drainfield with hydraulic or environmental failure*
- ▶ AHS estimated that 20 million households use septic systems
- ▶ at least 65 percent of land in the U.S. has conditions that are not suitable for conventional septic systems

Common Onsite Wastewater Treatment System Failures (EPA, 2002)

Type of failure	Evidence of failure
Hydraulic failure	Untreated or partially treated sewage pooling on ground surfaces, sewage backup in plumbing fixtures, sewage breakouts on hill slopes
Pollutant contamination of ground water	High nitrate levels in drinking water wells; taste or odor problems (e.g., sulfur, household cleaners) in well water caused by untreated, poorly treated, or partially treated wastewater; presence of toxics (e.g., solvents, cleaners) in well water
Microbial contamination of ground and surface water	Shellfish bed bacterial contamination, recreational beach closures due high bacterial levels, contamination of drinking water wells with fecal bacteria or other fecal indicators
Nutrient contamination of surface water	Algae blooms, high aquatic plant productivity, low dissolved oxygen concentrations

STRAIGHT PIPES

- ▶ *pipes that discharge raw sewage from homes into yards, trenches or other nearby surfaces*
- ▶ documentation of straight pipes in 15 states

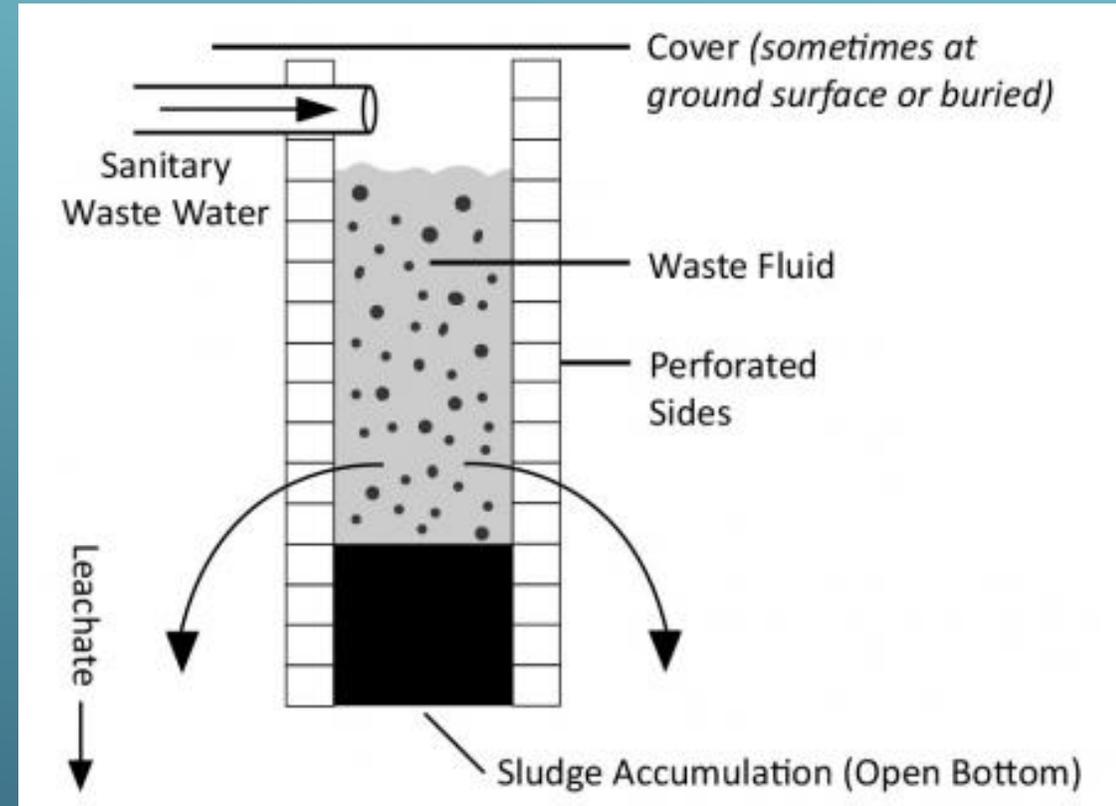


Documented Straight Pipes in the U.S.

(Maxcy-Brown et al., 2021)

CESSPOOLS

- ▶ disposal of wastewater into underground holes with or without a structure, such as a concrete cylinder, that allows wastewater to flow out an open bottom and/or perforated sides
- ▶ known to be in AL, HI, MS, NY, and OR
- ▶ roughly 88,000 cesspools in Hawaii with 43,000 posing a direct threat to water resources



Cesspool Using Concrete Cylinder
(EPA, 2021)

FAILING OUTHOUSES

- ▶ *an outdoor building with a toilet and typically without plumbing that is not safely managed*
- ▶ a common sight in Navajo Nation, Texas Colonias, and parts of Alaska



Outhouse- Navajo Nation
(Otomotif, 2014)

BUCKET LATRINES

- ▶ *also known as honeybuckets*
- ▶ *a large bucket with a seat attached used for toilet*
- ▶ in unpipied communities in parts of Alaska where environmental conditions prevent use of outhouses
- ▶ some households primarily use outhouse pit latrines with honey buckets as secondary toilets



Honey Bucket
(Eichelberger et al., 2021) 17

OPEN DEFECATION

- ▶ Unsheltered: open defecation or limited public bathrooms
- ▶ Sheltered: shared facilities with limited upkeep
- ▶ 580,000 people experiencing homelessness on a single night in January 2020



Open Defecation

Disposal of human faeces in fields, forests, bushes, open bodies of water, beaches or other open spaces, or with solid waste.

-Homeless Populations

Unimproved

Use of pit latrines without a slab or platform, hanging latrines or bucket latrines

-Straight Pipes
-Failing Outhouses
-Bucket Latrines

Limited

(previously Shared)

Use of improved facilities that are shared with other households

-Failing Outhouses
-Homeless Populations

Basic

(previously Improved)

Use of improved facilities that are not shared with other households

-Incomplete Plumbing
-Failing Septic Systems
-Straight Pipes
-Cesspools
-Failing Outhouses

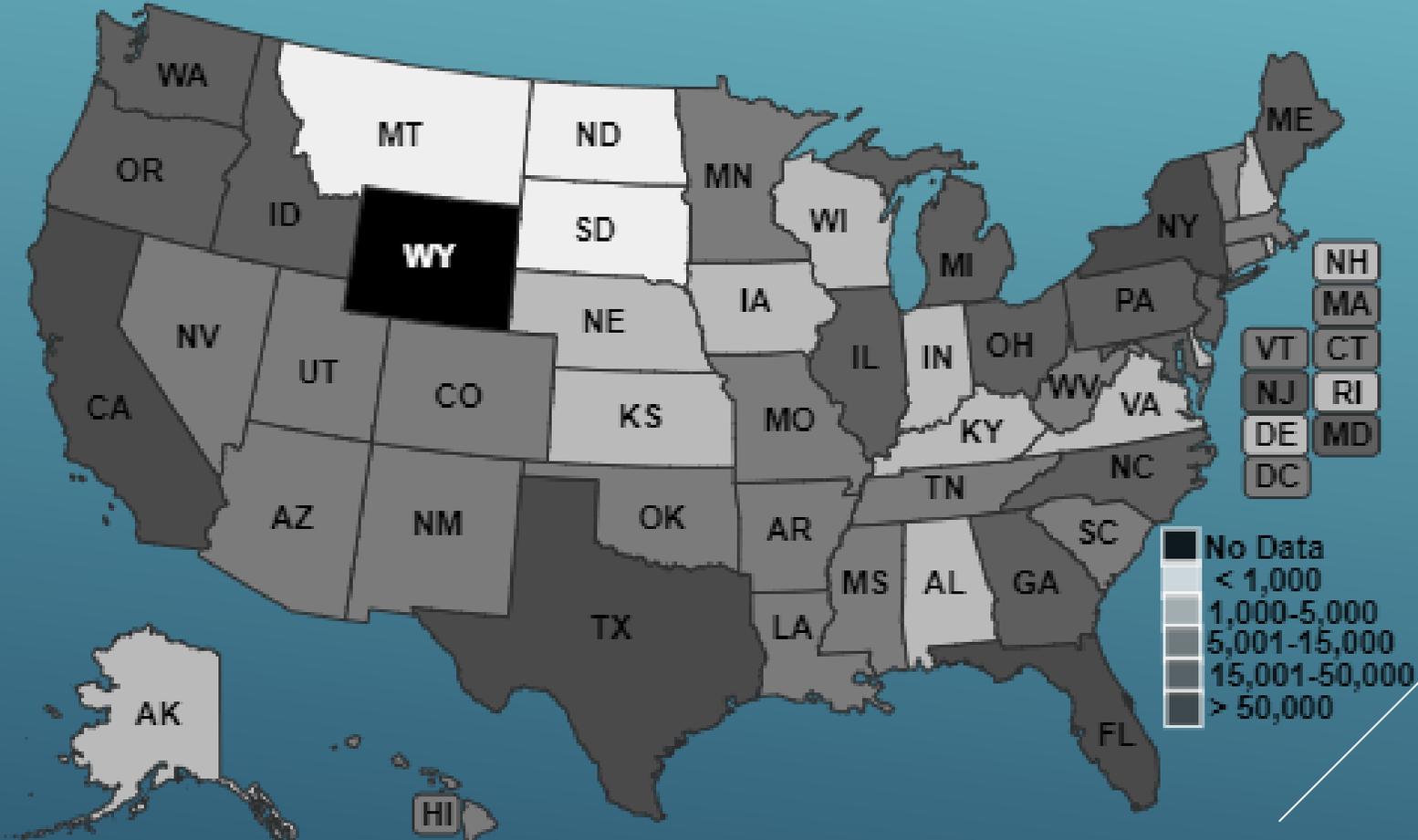
Safely Managed

Use of improved facilities that are not shared with other households and where excreta are safely disposed of *in situ* or transported and treated off-site

2030

2015

ESTIMATES OF POPULATION LACKING ACCESS TO BASIC SANITATION BY STATE: UNITED STATES, 2017-2019



BARRIERS TO PROVIDING SAFELY MANAGED SANITATION TO ALL IN THE U.S.

- ▶ Lack of Data
- ▶ Challenges for Households
- ▶ Challenges for Small Communities
- ▶ Lack of Funding
- ▶ Structural Racism

LACK OF DATA

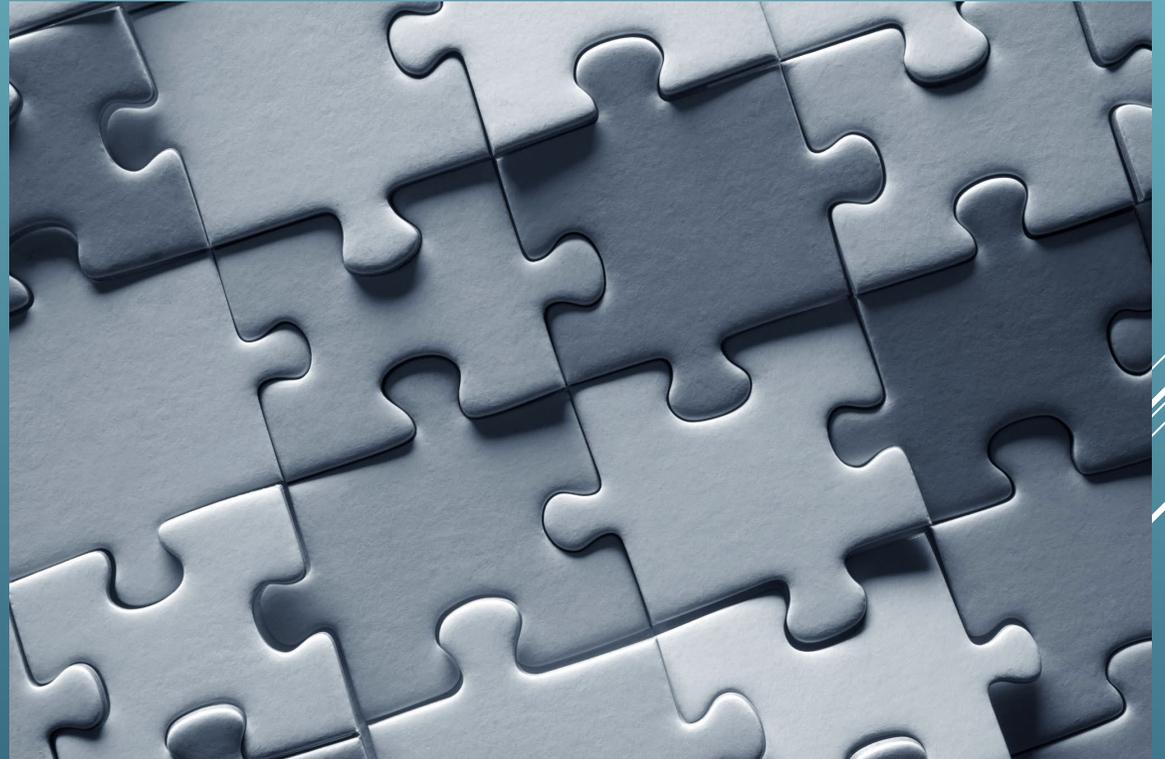
- ▶ survey data limitation
- ▶ no nationwide inventory of communities affected and their wastewater challenges
- ▶ few data classifications

Type of Sewage System	
Public sewer	103,565
Septic tank or cesspool	20,293
Standard septic tank and subsurface leach field	19,285
Pump used to distribute wastewater	596
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None	70
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AHS Data 2019
(U.S. Census Bureau, 2019)

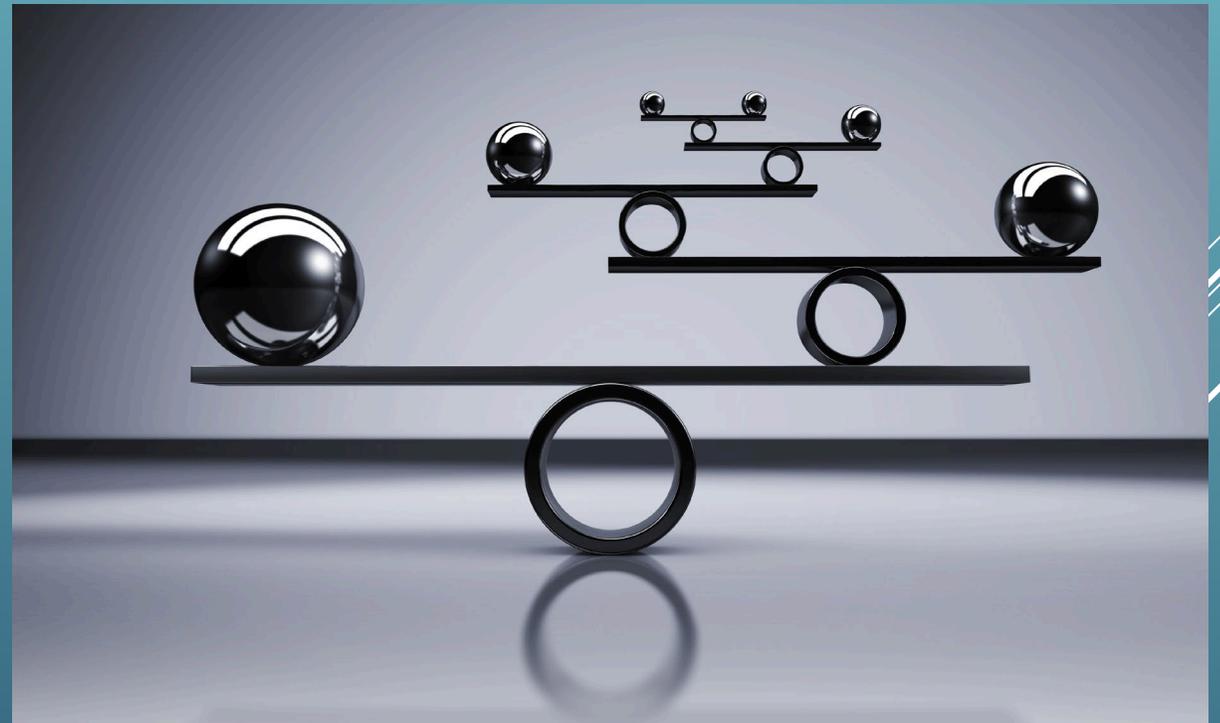
CHALLENGES FOR HOUSEHOLDS

- ▶ financial difficulties
 - ▶ the treatment system
 - ▶ fines
 - ▶ connection fees
- ▶ lack of knowledge
 - ▶ system O&M
 - ▶ funding opportunities
 - ▶ agency jurisdictions



CHALLENGES FOR SMALL COMMUNITIES

- ▶ limited financial resources
- ▶ low population density
- ▶ workforce issues
- ▶ geographical difficulties
- ▶ government limitations



LACK OF FUNDING

- ▶ large investments needed
- ▶ large systems prioritized
- ▶ stringent funding requirement
- ▶ limited funding scopes

STRUCTURAL RACISM

- ▶ exclusion of some communities from infrastructure investments
- ▶ effects of underbidding
- ▶ cost responsibility
- ▶ legal issues associated with “heir property”
- ▶ redlining
- ▶ exploitative practices of contractors

RECOMMENDATIONS FOR A PATH FORWARD

- ▶ help educate others on onsite and decentralized wastewater treatment
- ▶ target geographical areas that are likely to have equity challenges
- ▶ improvements to data
- ▶ continue to advocate for funding opportunities

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QUESTIONS?

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JMP U.S. 2020 DATA

Service Level	Urban	Rural	Total
Safely Managed	97.28 %	-	98.26%
	<i>266,185,704</i>	-	<i>325,255,283</i>
Basic	2.55 %	-	1.42%
	<i>6,983,088</i>	-	<i>4,686,904.77</i>
At Least Basic	-	98.94 %	-
	-	<i>56,773,394</i>	-
Limited	0.00 %	0.00 %	0.00 %
Unimproved	0.16 %	1.06 %	0.32 %
	<i>451,240</i>	<i>609,220</i>	<i>1,060,469</i>
Open Defecation	0.00 %	0.00%	0.00 %
Total	273,620,032	57,382,614	331,002,657