What works in preventing water-related diseases: Infrastructure solutions?

Duncan Mara, University of Leeds, UK

From our programme:

"Infrastructure solutions have a mixed record.

What have we learned?

How can it be improved?"

What do we KNOW?

- Waterborne diseases
- Water-washed diseases
- Water-based diseases
- Water-related insect vector diseases

But we also know:

Water, Sanitation, and Hygiene

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But, really to improve health, it's

Hygiene, Sanitation and Water

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But, really to improve health, it's

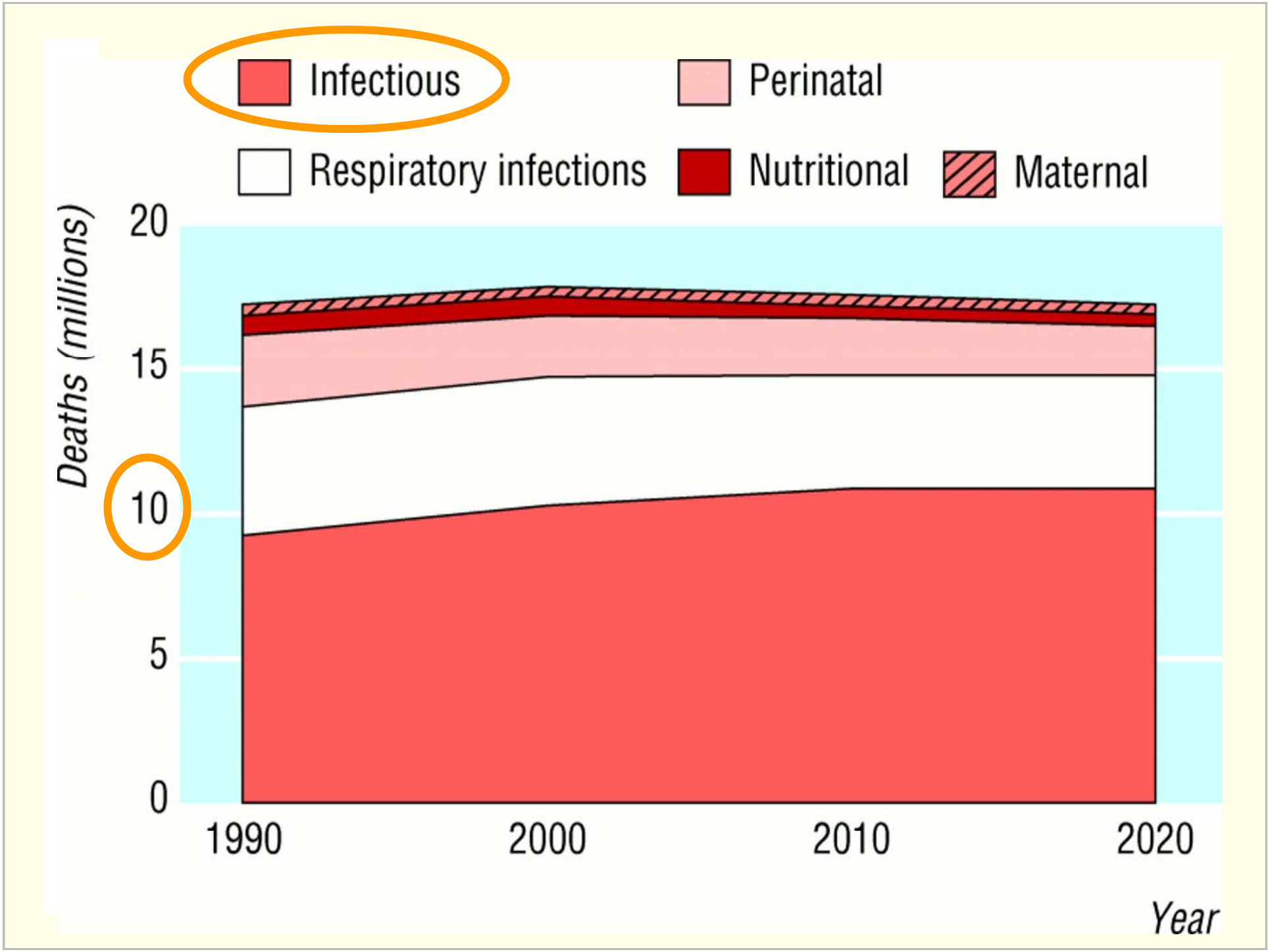
Hygiene, Sanitation and Water

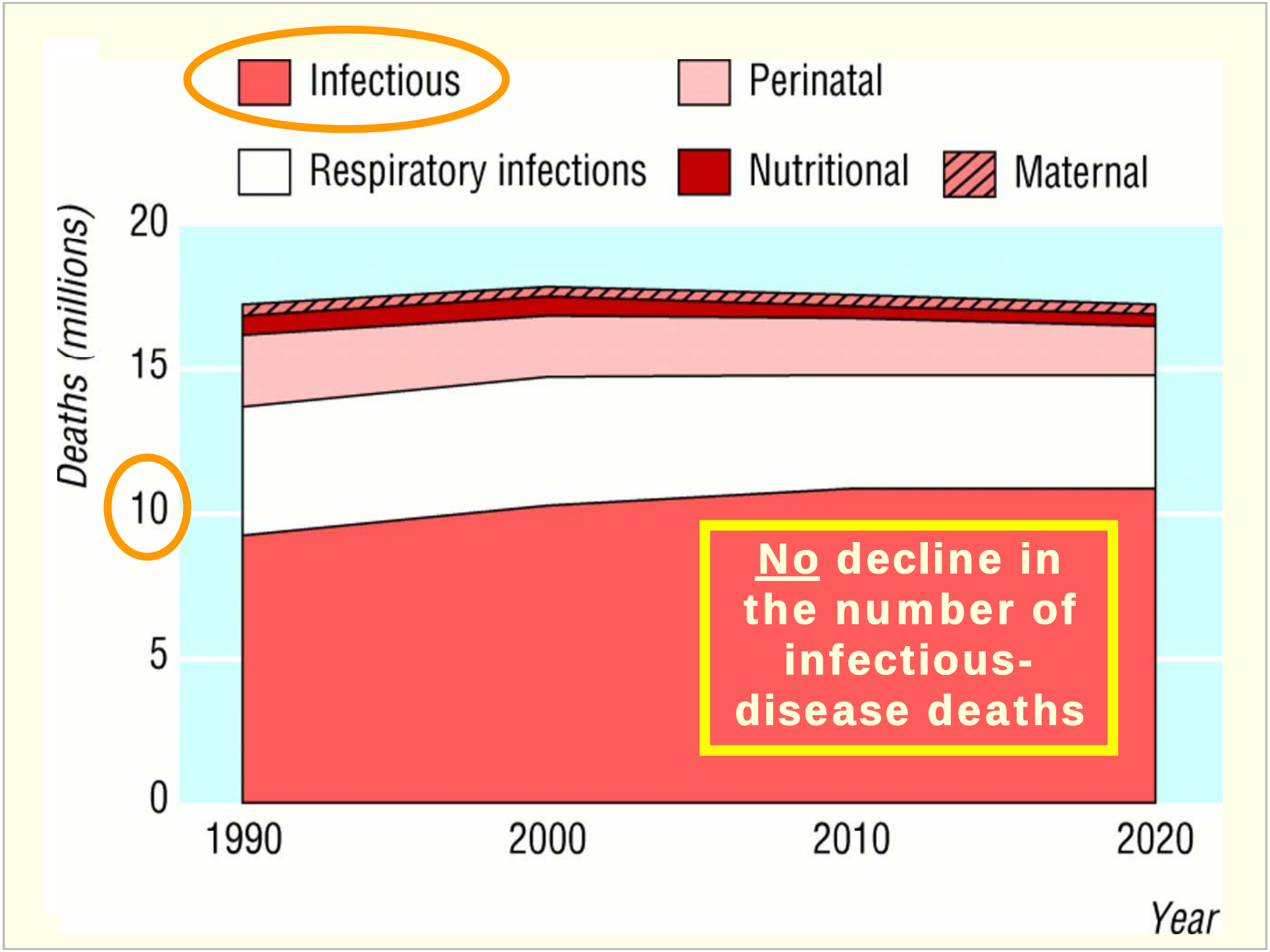
Water supply improvements on their own (i.e., no sanitation, no hygiene education) do NOT improve health

Diarrhoeal disease (DD) incidence per person per year by region and age in 2000

Region	DD incidence in all ages	DD incidence in 0–4 year olds	DD incidence in 5–80+ year olds
Industrialized countries	0.2	0.2–1.7	0.1–0.2
Developing countries	0.8–1.3	2.4–5.2	0.4–0.6
Global average	0.7	3.7	0.4

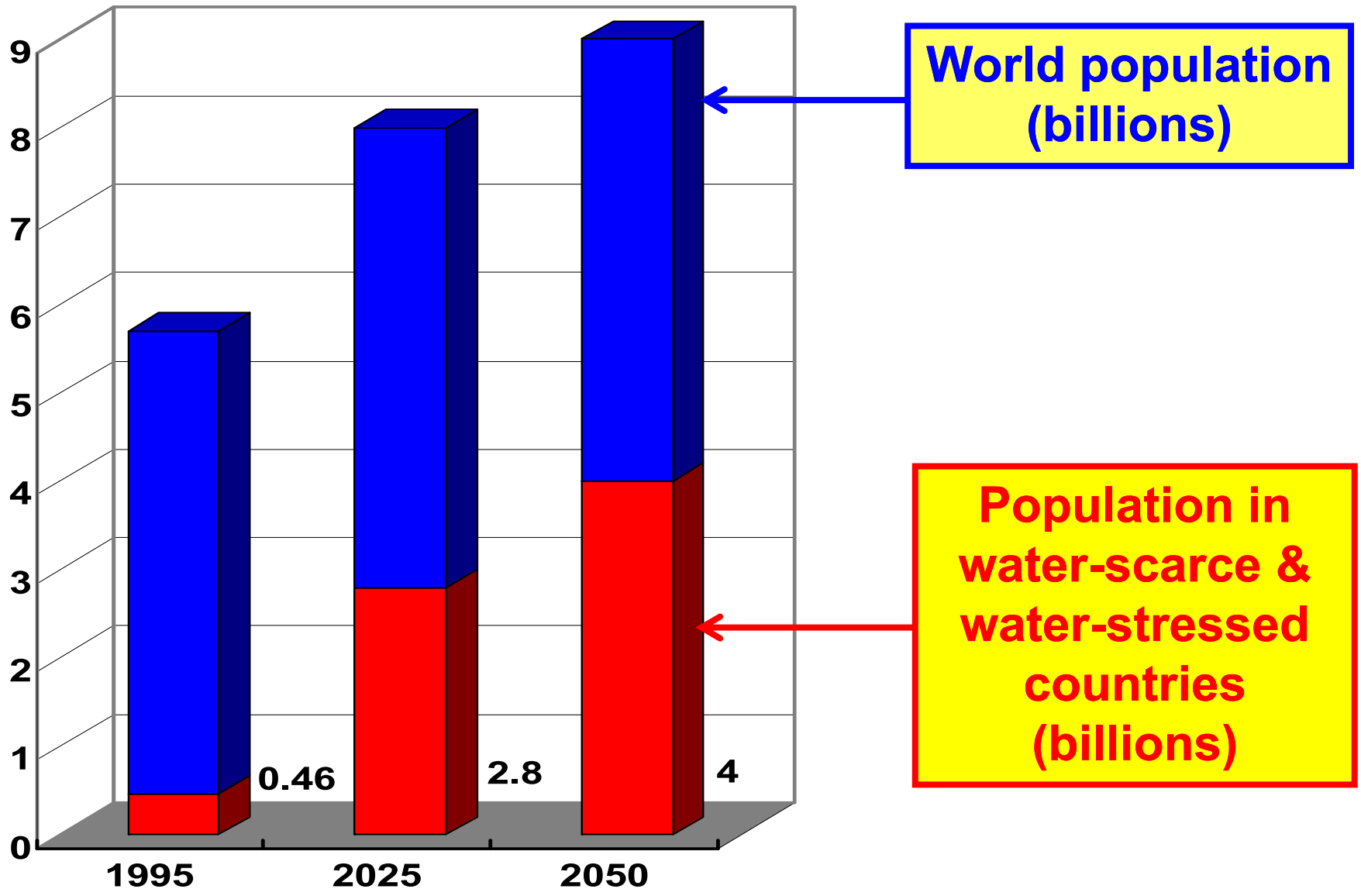
Source: WHO


Infectious
Perinatal
Respiratory infections
Nutritional
Maternal
Deaths (millions)
20
15
10
5
0
1990
2000
2010
2020
Year


Infectious
Perinatal
Respiratory infections
Nutritional
Maternal
Deaths (millions)
20
15
10
5
0
1990
2000
2010
2020
Year
No decline in the number of infectious-disease deaths

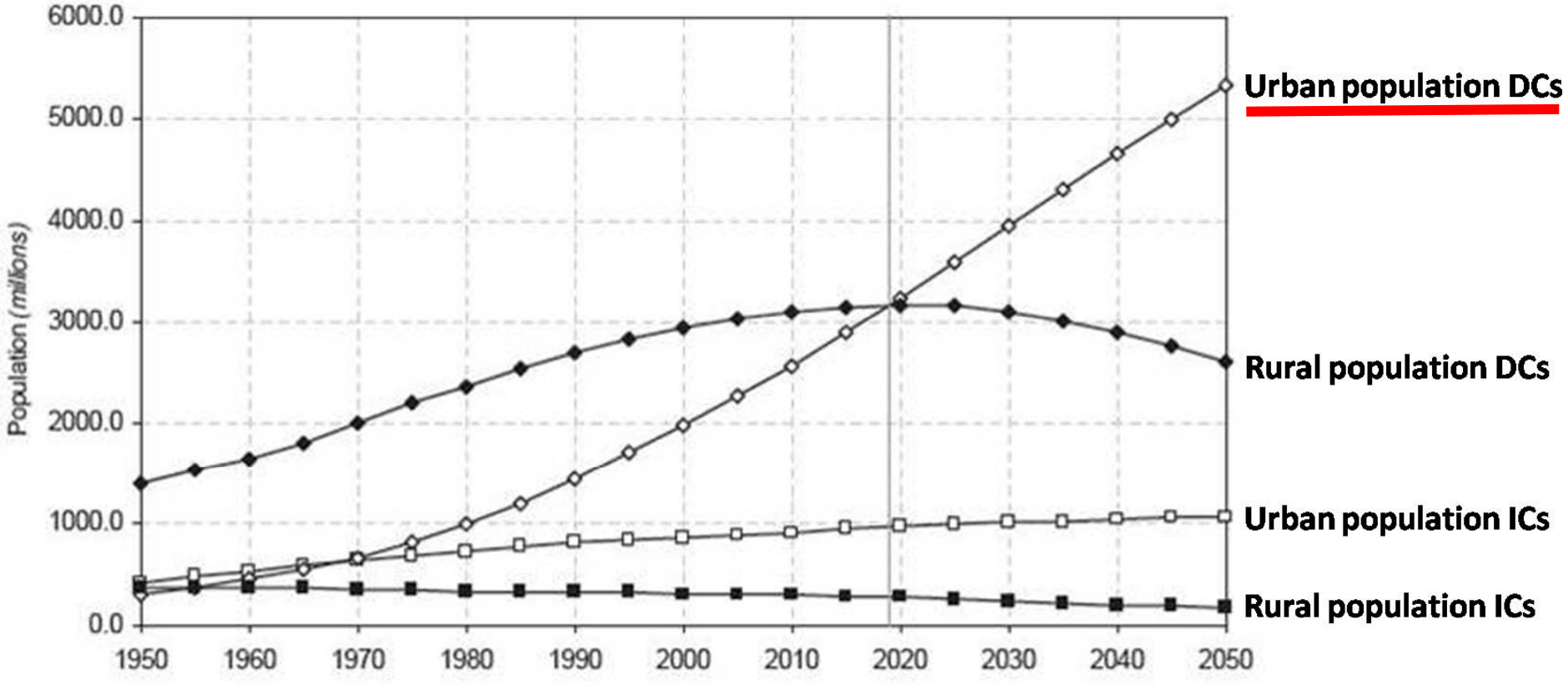
What's our World becoming?

A water-short world

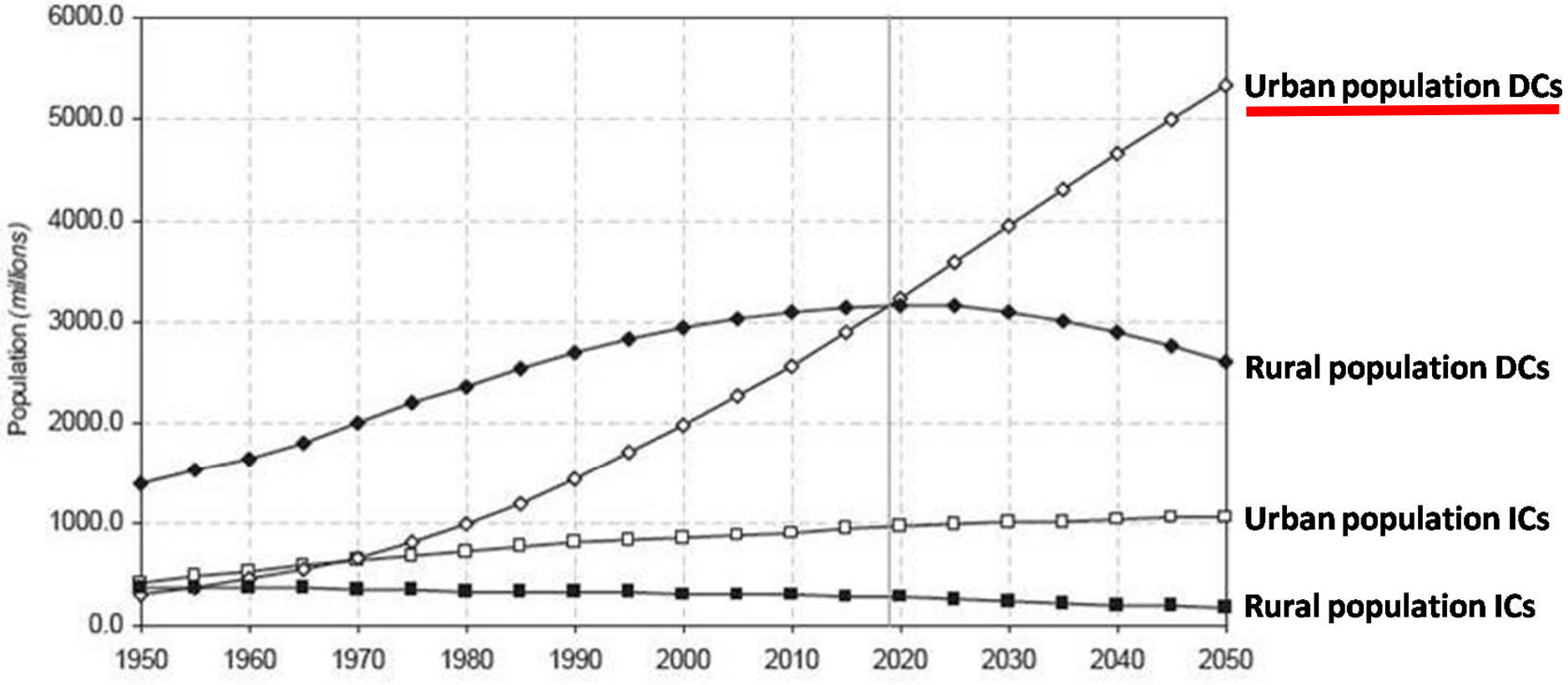

9
8
7
6
5
4
3
2
1
0
0.46
2.8
4
1995
2025
2050
World population (billions)
Population in water-scarce & water-stressed countries (billions)

and also ...

an
urban
world

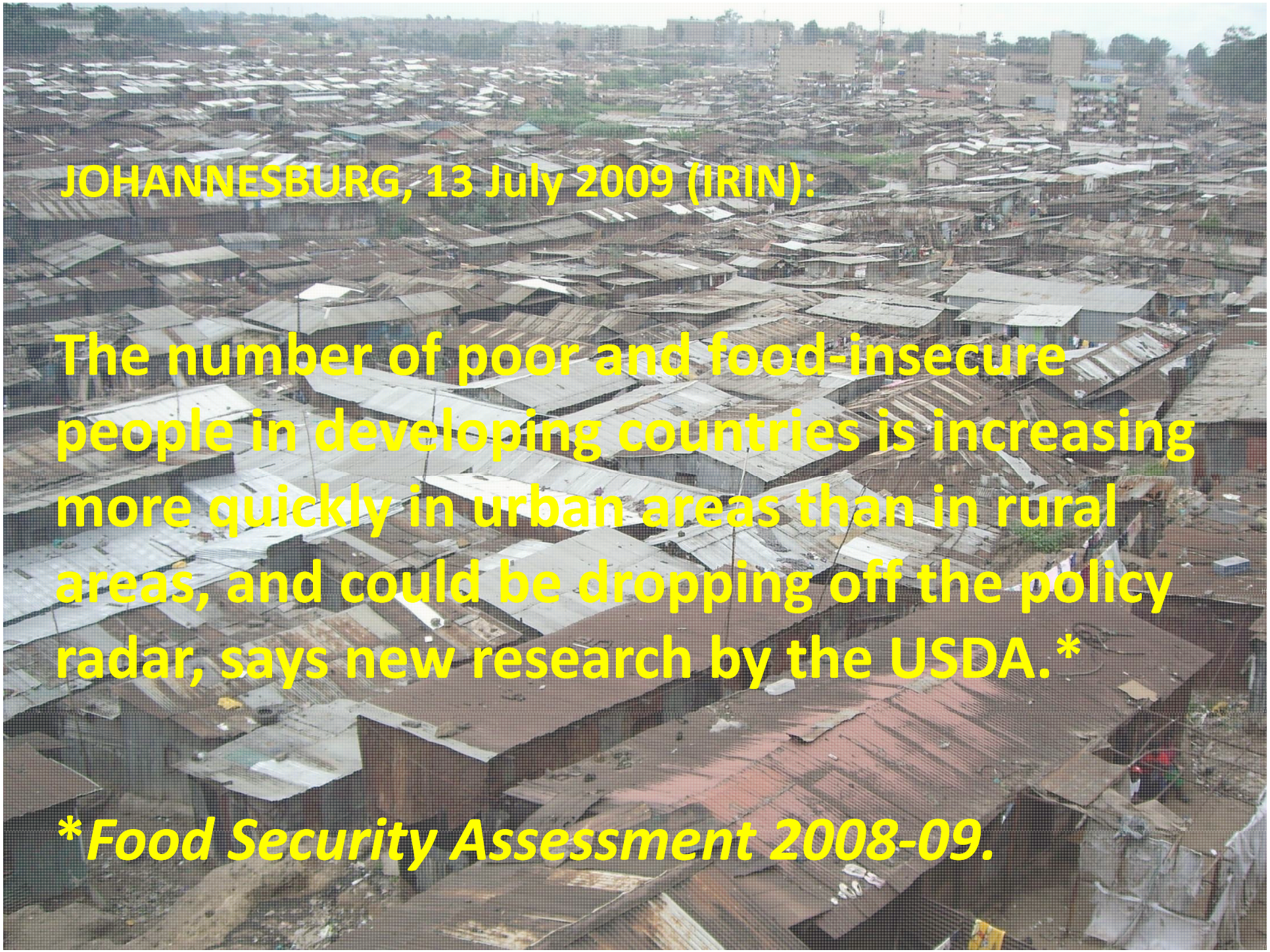


Source: ***World Urbanization Prospects: The 2007 Revision***



Source: *World Urbanization Prospects: The 2007 Revision*

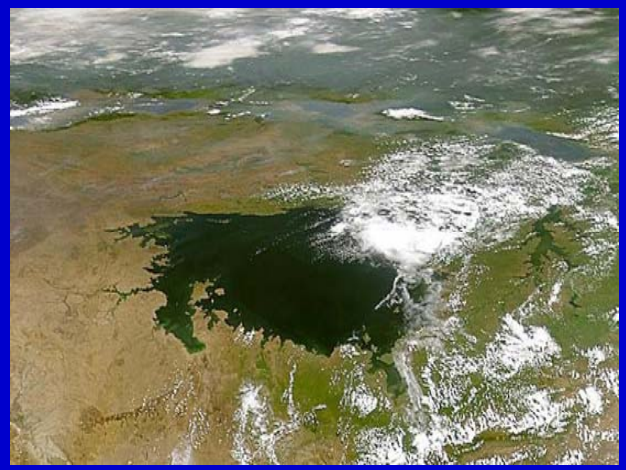
Actually a poor urban world


JOHANNESBURG, 13 July 2009 (IRIN):
The number of poor and food-insecure people in developing countries is increasing more quickly in urban areas than in rural areas, and could be dropping off the policy radar, says new research by the USDA.*
*Food Security Assessment 2008-09.

But we need ...

a world with better inform-ation

The UN-HABITAT Lake Victoria Water and Sanitation Initiative



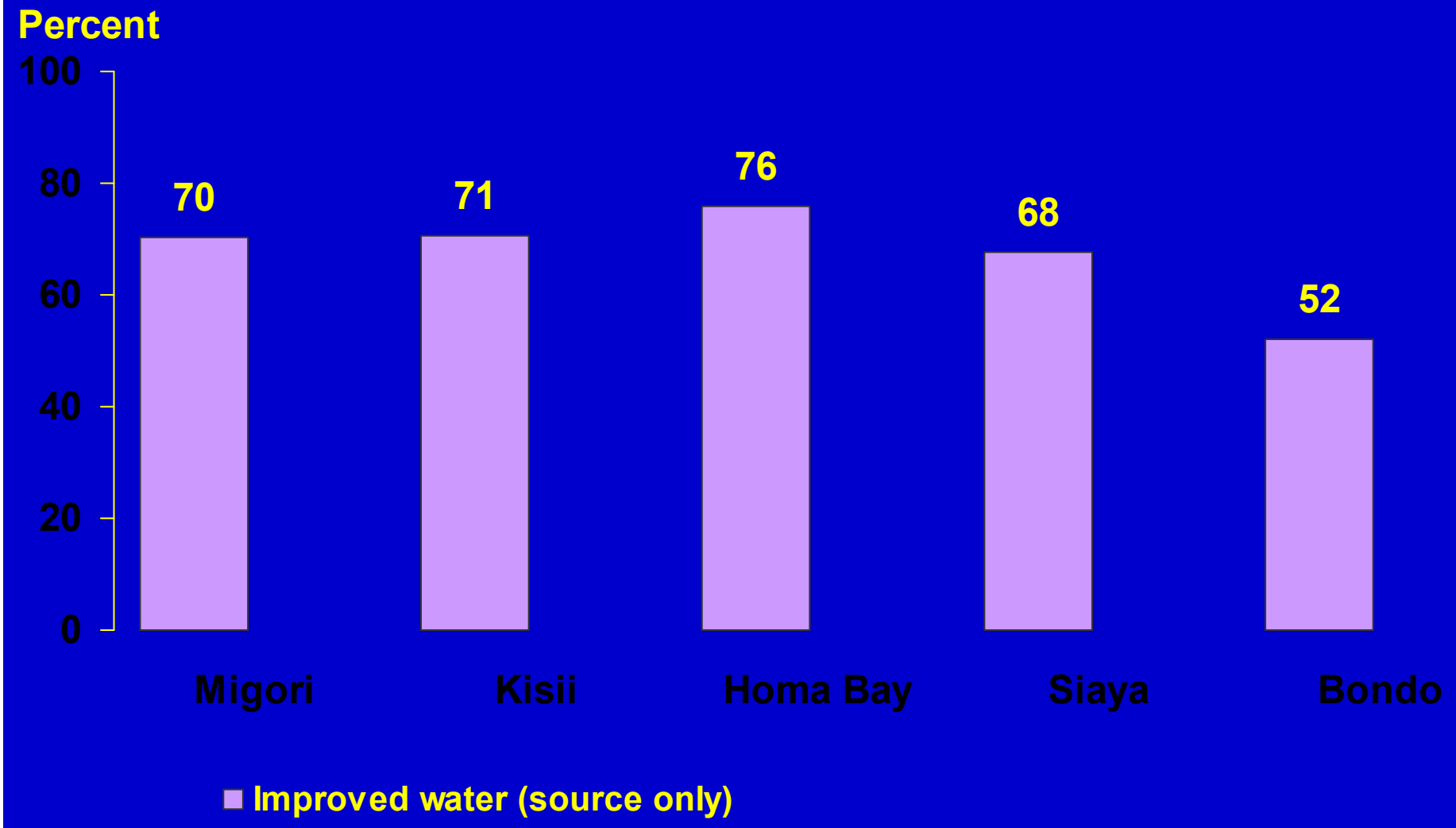
‘Adequate’ vs. ‘Improved’ Water Supplies

Case study:

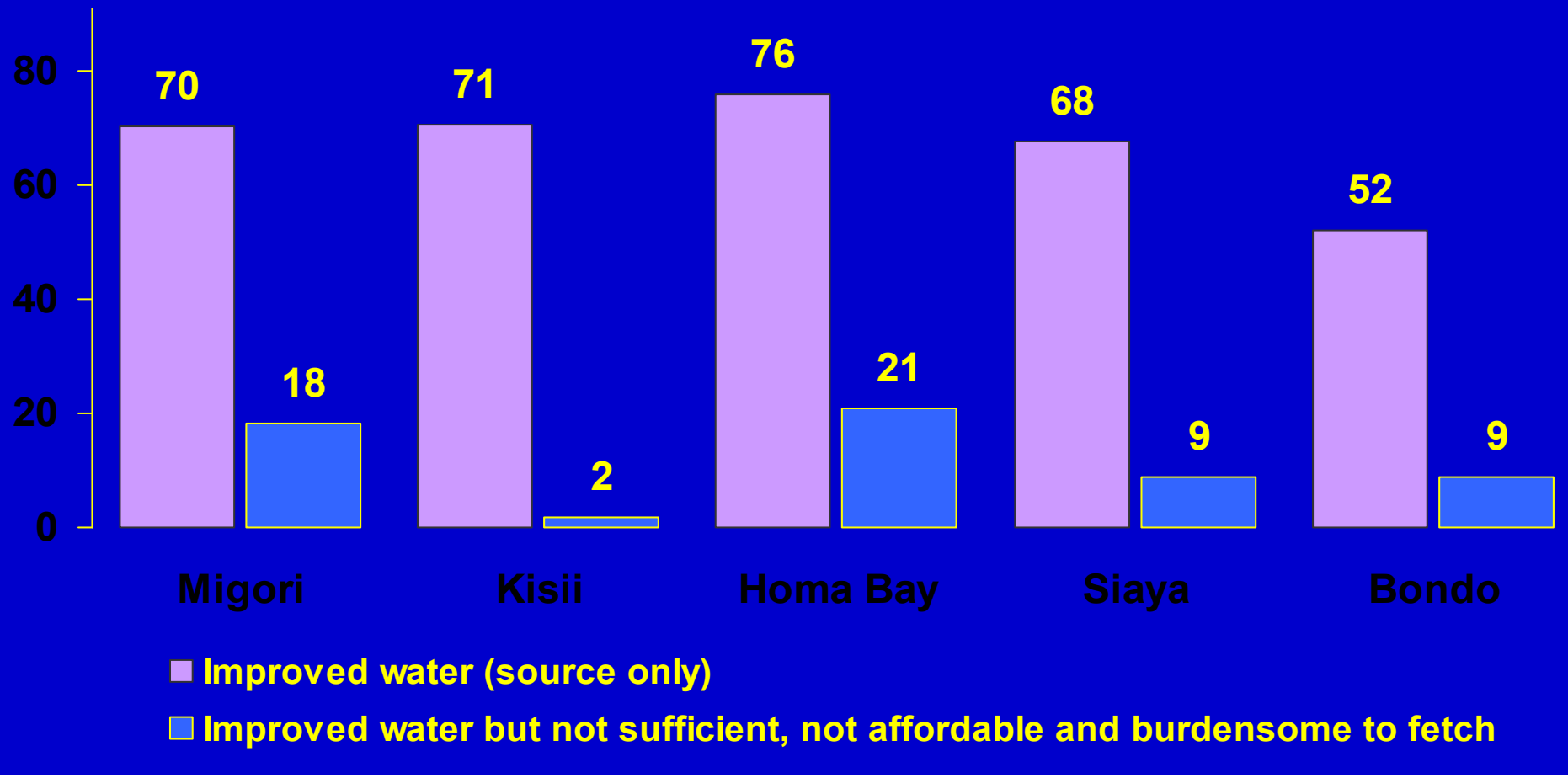
Five secondary urban centres in Western Kenya

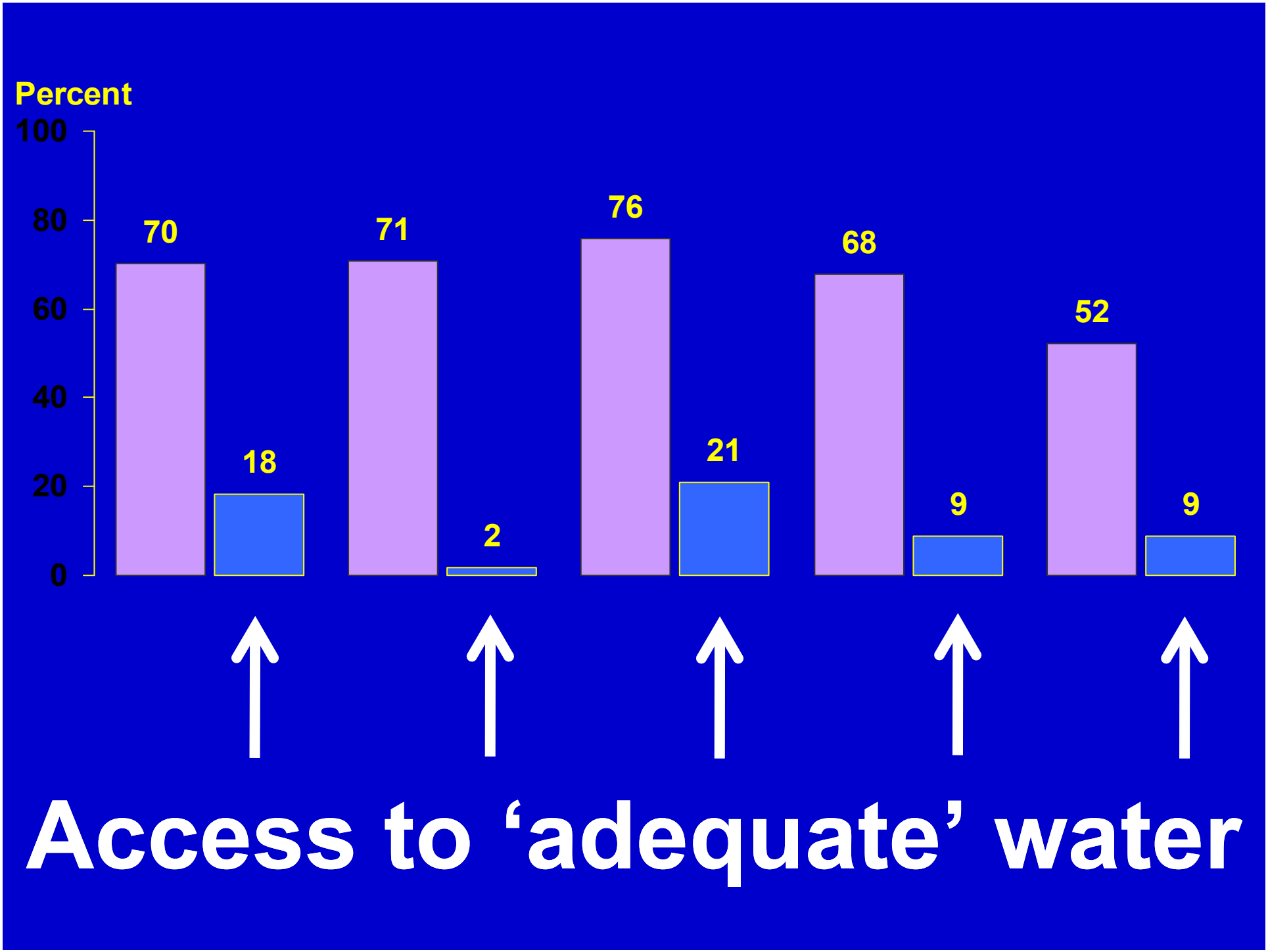
Access to ‘improved’ water

(JMP definition)



Access to ‘improved’ water decreases dramatically when quantity (<20 lcd), cost (>10% of income), and the burden of fetching water (>1 hour/day), are considered:




Percent
100
80
60
40
20
0
70
18
71
2
76
21
68
9
52
9
Access to ‘adequate’ water

Rural areas

On-site water

→ handpumps (inc. new “maintenance-free” pumps), boreholes

“Ownership”

Operation & maintenance (VLOMM, local women)

At least 20 liters/person day, preferably more, and conveniently located.

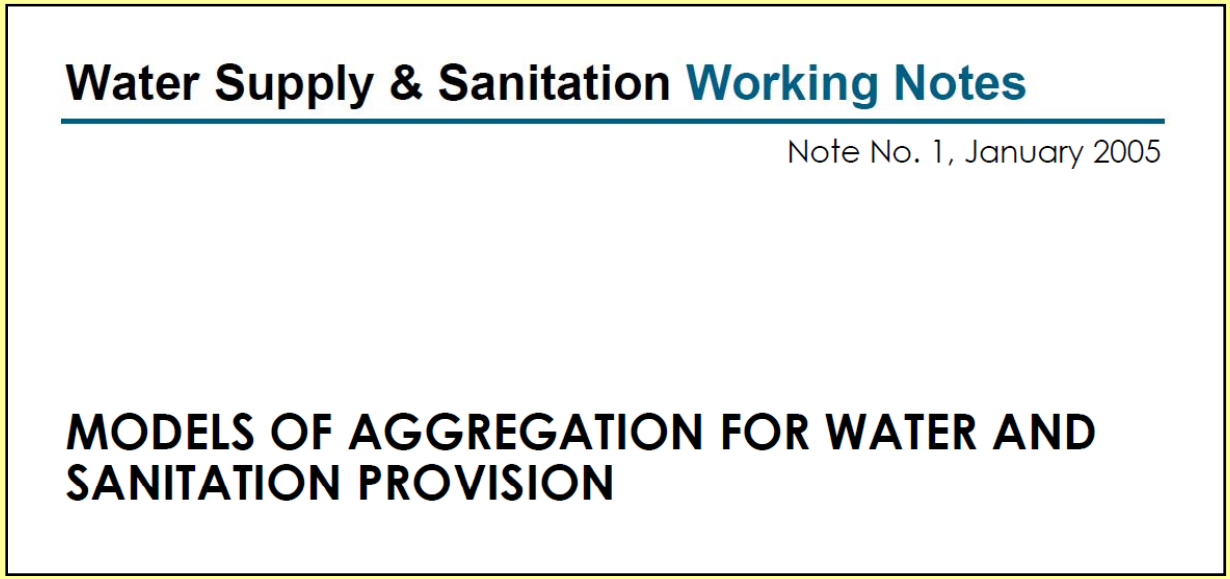
Rural areas

Off-site water

→ gravity schemes

Small towns & Large villages

- Often “quite urban”, but poor technical capacity, so:
- Aggregation (to achieve some economy of scale)



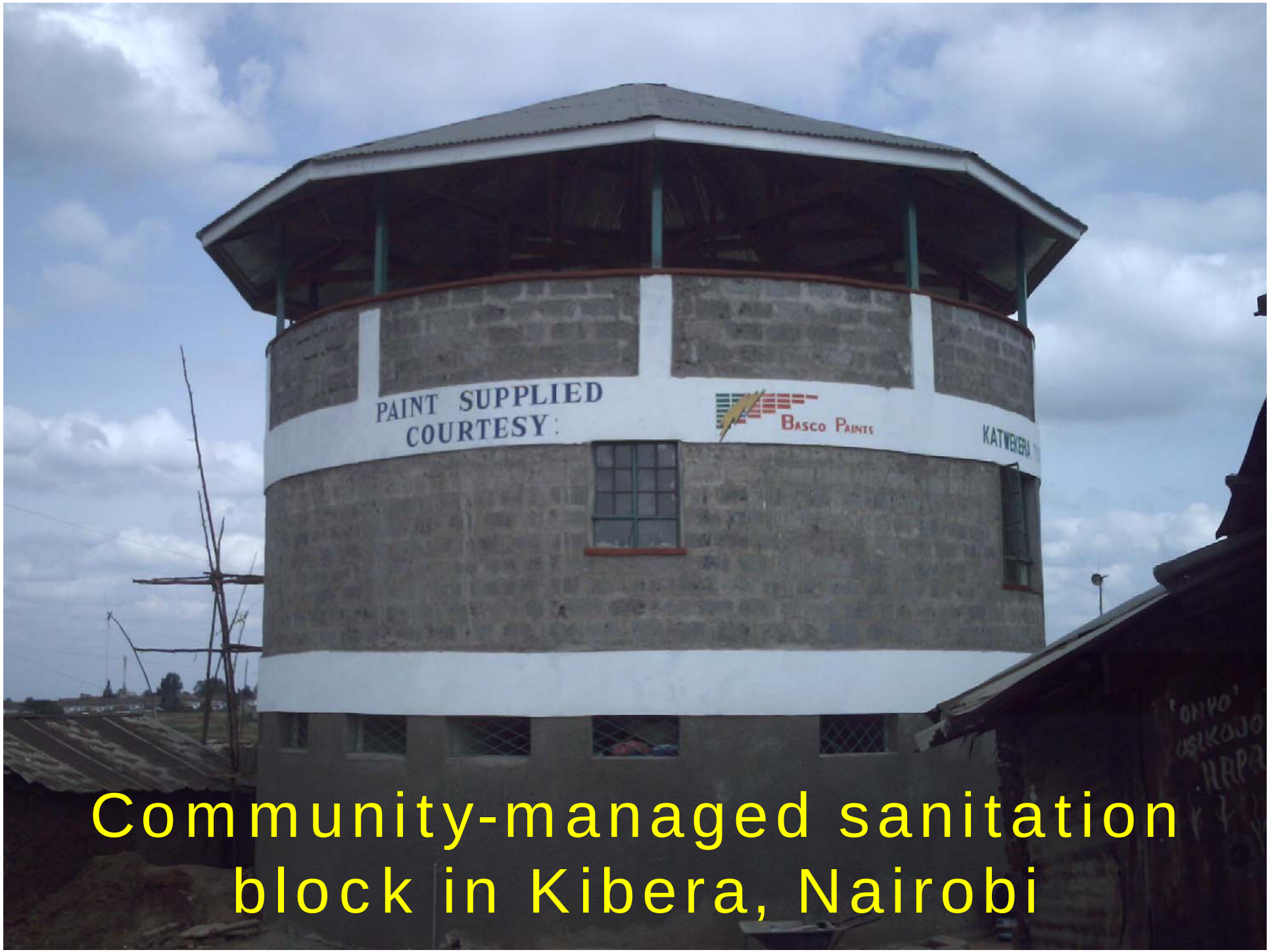
High-density low-income urban areas

- Well known that the poor pay far more per m^3 of water than the non-poor connected to urban reticulation system, so:
- NO CONNECTION FEES!
- Water supply (and sanitation) cooperatives
- For the poor & the very poor "standpipe cooperatives" with each member household paying something like 1% of minimum wage

A lesson from sanitation

In high-density low-income urban areas (inc. slums), if individual household systems unaffordable, then use

'SPARC-style' community-managed sanitation blocks



Community-managed sanitation block in Kibera, Nairobi

Biogas generator

Top floor: community meeting room and kitchen (biogas used for cooking)

If communities in high-density low-income urban slum areas can manage their own sanitation, then surely they can also manage their own water supply?

If communities in high-density low-income urban slum areas can manage their own sanitation, then surely they can also manage their own water supply?

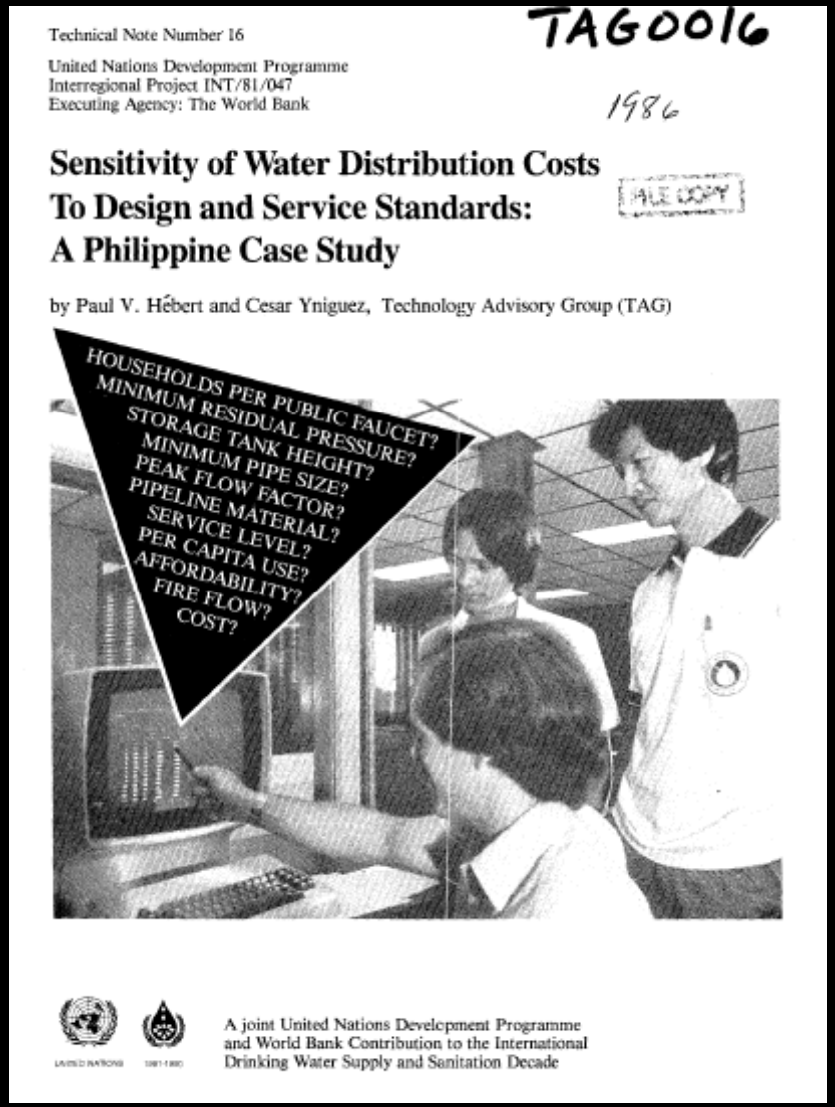
In fact they're already doing so as there's a water supply to each community-managed sanitation block.

We also need ...

a world with better informed profess-ionals

- We have to get knowledge of **all** appropriate water supply technologies to those in Government, but also ***and more importantly*** to those in local government
- This is a **MAJOR** challenge!

No substitute for knowledge!



1986

An example of ‘forgotten’ knowledge

Does *everyone* know about?

- Waterborne diseases
- Water-washed diseases
- Water-based diseases
- Water-related insect vector diseases

Does *everyone* know about?

- Waterborne diseases
- W[illegible]er-[illegible]as[illegible]ed di[illegible]eases
- W[illegible]ate[illegible]as[illegible]d dise[illegible]ses
- Water-related insect vector diseases

NO

Another example of lost knowledge:

Esrey *et al*. (1991)* said in fact:

"In the studies reporting a health benefit, the water supply was piped into or near the home, whereas in those studies reporting no benefit, the improved water supplies were protected wells, tubewells, and standpipes."

Bulletin of the World Health Organization* **69(5):609−621.

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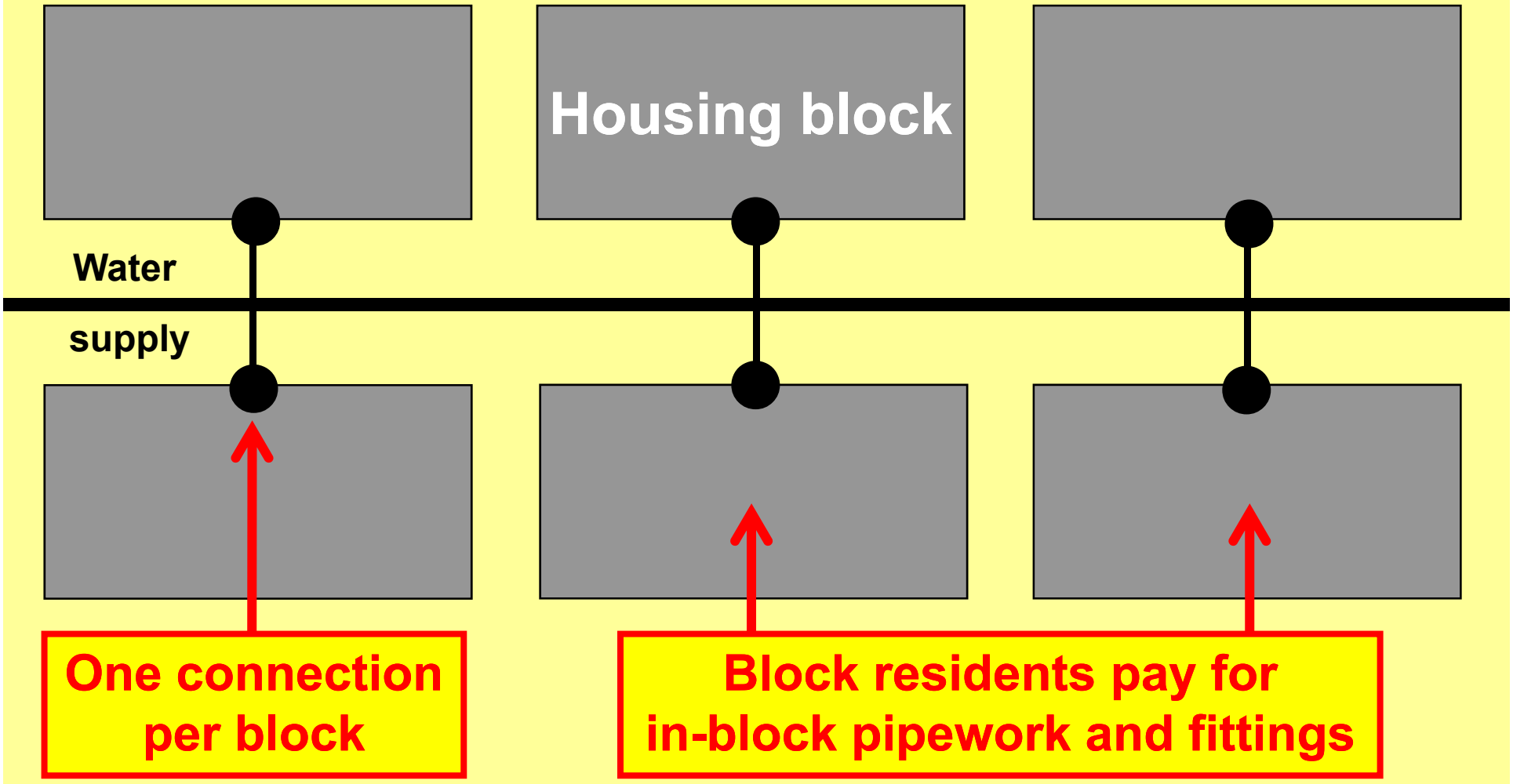
►49% median reduction in diarrheal disease from 12 studies; 63% from the two better studies – *much more than the usually quoted reductions of ~15–20%*

"Found" by Cairncross & Valdmanis (DCPP WP #28, 2004)

Bulletin of the World Health Organization* **69(5):609–621.

Condominial water supplies



Comparative costs (1997 US$) of conventional and condominial water supplies in Parauapebas, Pará, north Brazil

Item	Conventional supply*		Condominial supply*	
	Total cost	Cost per connection[a]	Total cost	Cost per connection[b]
Excavation	454,000	88	101,000	19
Pipes	407,000	79	129,000	25
Total	861,000	167	230,000	45

*Multiple-tap in-house supplies, 250 litres per person per day, 90% connection rate
[a] individual household connections; [b] individual condominium connections.
Source: Melo (2005).

Change outdated water supply design codes and local regulations/ bye-laws to permit use of pro-poor systems

From our programme:

"Infrastructure solutions have a mixed record.

What have we learned?

How can it be improved?"

CONCLUSIONS

- Infrastructure works if you do it right!
- Key is to choose the right infra-structure, design it properly, install it correctly, then do regular preventive O&M.

Conclusions, continued

BUT we need to do more on hygiene education ("mass hygiene education")

to

help maximize health benefits from improved water supplies.

Conclusions, continued

BUT we need to do more on hygiene education ("mass hygiene education") and promote/install sanitation to help maximize health benefits from improved water supplies.

Thank you
Grazie