

Research brief: Nitrate in Danish drinking water – a historical assessment



dNmark
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Summary

Nitrate levels in drinking water at public supplies have decreased since the 1980s, primarily owed to technical changes. This decrease is not seen at private wells. 17% of private well users are exposed to nitrate levels violating the legal limit of 50 mg/l. Increased and consistent monitoring of private wells is recommendable to get more knowledge and focus on this group of neglected drinking water users.

Conclusions

- Less Danes are exposed to high levels of nitrate in drinking water today
- Private well users did not benefit from this progress
- Data quality, monitoring, and registration of private wells varies considerably in the 98 municipalities

Backgrounds & Methods

Generally, regulation of Danish agriculture since the 1980s has resulted in significant lower nitrate concentrations in oxic groundwater. This tendency is not directly reflected in the Danish drinking water quality due to local variation in nitrate leaching, groundwater infiltration time, vulnerability of the aquifers etc. Historical nitrate levels in drinking water are of interest, e.g. for the use in epidemiological studies. Annual nitrate levels were assigned to each household, both publicly and privately supplied ones (see boxes)

Public Water Supply Areas

We connected nitrate levels from the water-works to the approx. 2,700 water supply areas

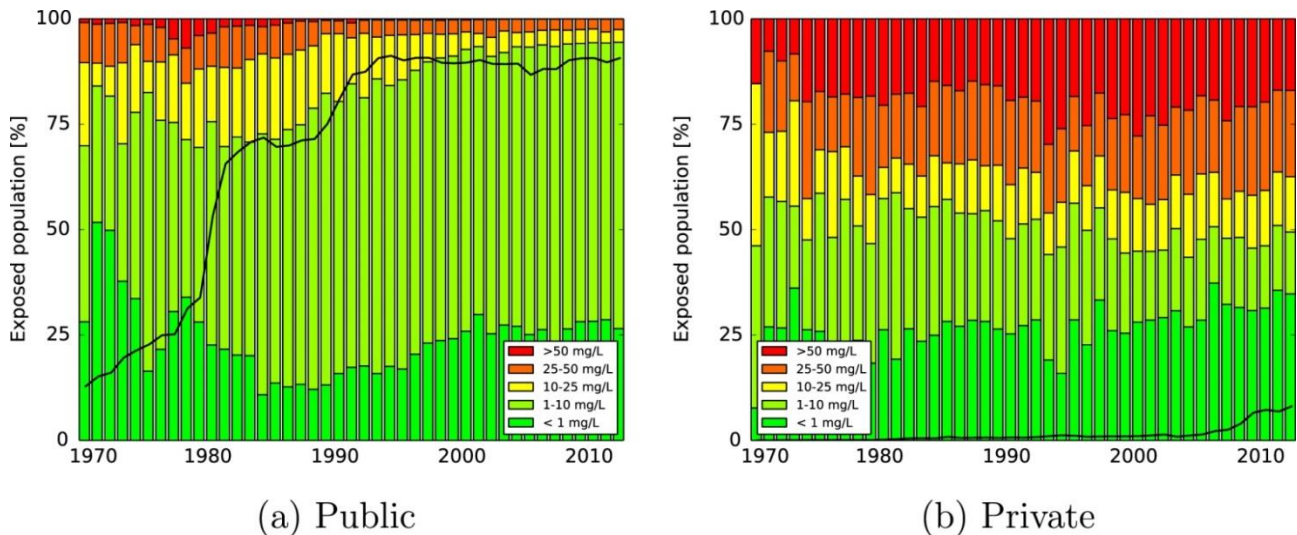


What is a PRIVATE WELL?

The WHO defines private wells as *point sources* [...] which typically serve a single family or a small number of households (for example, farms, hamlets). In Denmark, we define “enkeltindvendere”, serving up to 9 households, as private wells. We have identified approx. 55,000 private wells, but not all municipalities register and monitor their private wells to the same extent. Households next to a private well were assigned the nitrate levels of this well.

Results

The figure shows the percentage of Danes exposed to different nitrate levels over time for publicly and privately supplied users. The black line indicates the percentage of waterworks/private wells sampled for nitrate each year.



Approx. 188,000 Danes receive drinking water from private wells, 17 % of which violated the drinking water standard of 50 mg/l in 2012. Of the approx. 280,000 Danes exposed to elevated levels above 25 mg/l, half were public supply users and half private well users. The quality of data on private well users is much lower than that of public supplies.

Recommendations & Perspectives

- From a monitoring perspective, there is a need for more focus on private well users, as this group is exposed to highest nitrate levels while having the poorest data quality. Authorities are advised to engage in more consistent monitoring.
- From a methodological perspective, each resident of Denmark can now be assigned the drinking water quality they are exposed to. Therefore, we can now study the health effects of drinking water quality on humans regarding different chemical substances in drinking water and health outcomes.

More information

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