

water far exceeds the human health gain from consuming bottled water in Barcelona. Our findings are likely to have relevance for comparable cities in Europe; however, further research is needed to understand how results vary across settings. Our analysis highlights several important data gaps including: 1) relative routes of exposure to THMs; 2) the effect of different domestic filters on THM removal; and 3) levels of contamination in bottled drinking water as well as target areas for further development in LCA modelling.

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### Appendix A

**Table A1**

Summary of the inventory (input and output data) for the drinking water treatment plants and bottled water per functional unit (1 L of water).

	Units	Drinking water treatment plants				Bottled water
		Abrera	Sant Joan Despí	Cardedeu	Desalination plant	
<b>Input</b>						
Electricity	kWh L <sup>-1</sup>	1.90E-07	1.54E-03	9.43E-09	3.43E-03	2.18E-02
Chemicals	kg L <sup>-1</sup>	6.28E-05	2.09E-04	2.38E-05	2.81E-05	2.15E-05
Plastics for packaging	kg L <sup>-1</sup>	–	–	–	–	3.48E-02
<b>Outputs</b>						
Waste and wastewater	kg L <sup>-1</sup>	3.75E-05	3.86E-03	2.86E-05	5.71E-06	3.88E-02

**Table A2**

Global health impacts (disability-adjusted life years, DALYs) from the life cycle assessment, associated with drinking water production in Barcelona at different scales: treatment plant, bottled water production, water supply area, and drinking water scenario.

	DALYs
<b>Per 1 L of drinking water produced in:</b>	
Drinking water treatment plants	
Sant Joan Despí	1.08E-09
Abrera	1.95E-10
Desalination plant	3.17E-09
Cardedeu	9.10E-11
Bottled water	6.34E-07
<b>Per 1 L of drinking water in supply areas:</b>	
Llobregat area	1.20E-09
Llobregat + Ter area	4.87E-10
Ter area	9.10E-11
<b>In the drinking water consumption scenarios:</b>	
S1: Current	372
S2: All tap water	0.498
S3: All bottled water	625
S4: All filtered tap	0.498

### References

- ACA, 2019. Drinking water treatment plants. Estacions de potabilització d'aigua. Available: [http://aca.gencat.cat/ca/laigua/infraestructures/estacions-de-potabilitzacio-daigua/index.html#googtrans\(ca|en\)](http://aca.gencat.cat/ca/laigua/infraestructures/estacions-de-potabilitzacio-daigua/index.html#googtrans(ca|en)).
- Ashley, D.L., Blount, B.C., Singer, P.C., Depaz, E., Wilkes, C., Gordon, S., et al., 2005. Changes in blood trihalomethane concentrations resulting from differences in water quality and water use activities. *Arch. Environ. Occup. Health* 60, 7–15.
- ASPB, 2012. Quality of Drinking Water in Barcelona (In Catalan, “La qualitat sanitària de l'aigua de consum huma a Barcelona”). C.S. de B. CSB and ASPB, eds. Available: [http://www.aspb.cat/wp-content/uploads/2016/05/Aigua\\_consum\\_huma.pdf](http://www.aspb.cat/wp-content/uploads/2016/05/Aigua_consum_huma.pdf).
- ASPB, 2019. Barcelona Health Survey 2016. Enquesta de salut de Barcelona 2016/2017. Resultats principals. Available: [https://www.aspb.cat/wp-content/uploads/2018/12/ASPB\\_Enquesta-Salut-Barcelona-2016.pdf](https://www.aspb.cat/wp-content/uploads/2018/12/ASPB_Enquesta-Salut-Barcelona-2016.pdf).
- Barnes, D.K.A., Galgani, F., Thompson, R.C., Barlaz, M., 2009. Accumulation and fragmentation of plastic debris in global environments. *Philos. Trans. R. Soc. B-Biol. Sci.* 364, 1985–1998. <https://doi.org/10.1098/rstb.2008.0205>.
- Bartoll, X., Baranda, L., González, J., Perez, K., Pasarin, M., Rodríguez-Sanz, M., et al., 2018. Manual metodològic de l'Enquesta de Salut de Barcelona 2016/17. Agència Salut Pública Barcelona.
- Brandon, J.A., Jones, W., Ohman, M.D., 2019. Multidecadal increase in plastic particles in coastal ocean sediments. *Sci. Adv.* 5, eaax0587. <https://doi.org/10.1126/sciadv.aax0587>.