Optimization of individual fish intake in Denmark

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Only 15% of the Danes meet the fish intakes recommended by the official Danish dietary guidelines. This study therefore proposes a method to find fish intakes that fulfill several dietary criteria, while simultaneously deviating as little as possible from the current intakes. For an individual consumer this is more realistic and achievable than a general recommendation.

A mathematical optimization model was developed, using quadratic programming. Individual recommended fish intakes were identified, meeting recommendations on fatty acids and vitamin D, without violating tolerable intake levels on methyl mercury and dioxins. Individual intakes for eight fish species were proposed for 3016 Danes, whose intakes were known from a Dietary survey. For women, the average change in fish intake was + 14.2 g of lean fish and + 62.6 g of fatty fish per week and for men the respective numbers were + 12.2 and + 55.1.

This study shows how mathematical optimization models can be used to advise individual consumers on the optimization of their diet, based on their current intake. The model can be modified to address other foods, food component and contaminants and the method can also address sustainability (e.g. by using constraints on greenhouse gas emission) or costs.