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The Road to Healthy Eating:

a new method based on graph theory

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Background:

- healthy diets are defined, which could lower the burden of disease and provide targets for populations.
- these target diets are far removed from current diets, so at best, the population is expected to move slowly along a trajectory.

Objective: characterize the different possible trajectories toward a target diet and identify the most efficient one for health.

Methods:

- A new method developed using graph theory
- A graph with all stepwise change trajectories toward a target healthy diet
- Trajectories all avoiding the risk of nutrient deficiency
- Identified and characterized the trajectory with the highest value for long-term health
- The best trajectories were found using the Dijkstra algorithm with the Health risk criteria based on epidemiological data.

Results:

- Trajectories that were rather similar for males and females regarding the most efficient changes in the first phase of the pathways
- We found that a one-step increase in the consumption of whole/semi-refined bread (60 g) was the first step in all healthiest trajectories.
- For males, the subsequent decrease in red meat was immediately preceded by increases in legumes.

Conclusions:

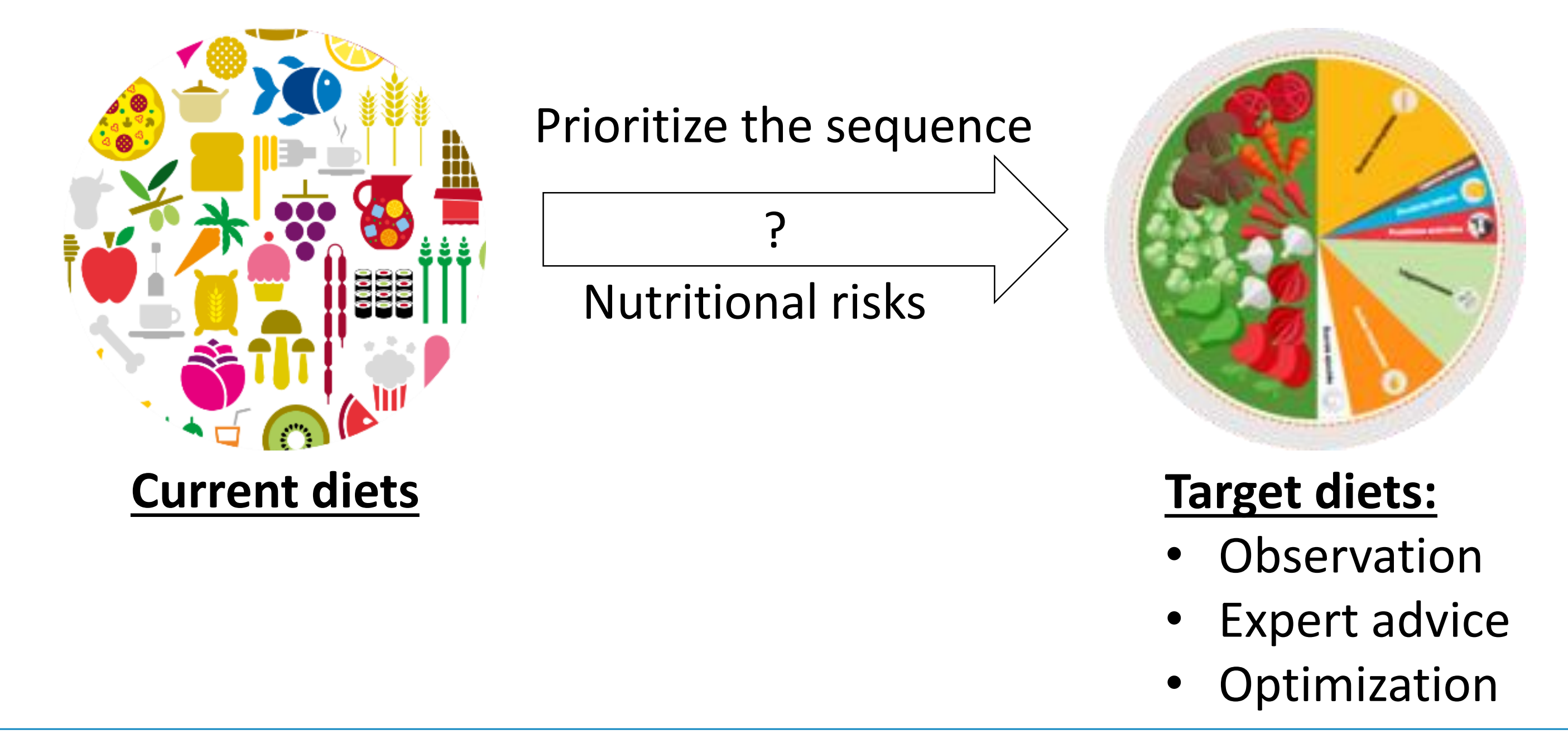
- We show simple practical dietary changes that can be prioritized along an integral pathway that is the most efficient overall for health when transiting toward a distant healthy diet.
- We put forward a new method to analyze dietary strategy for public health transition and highlight the first critical steps to prioritize.

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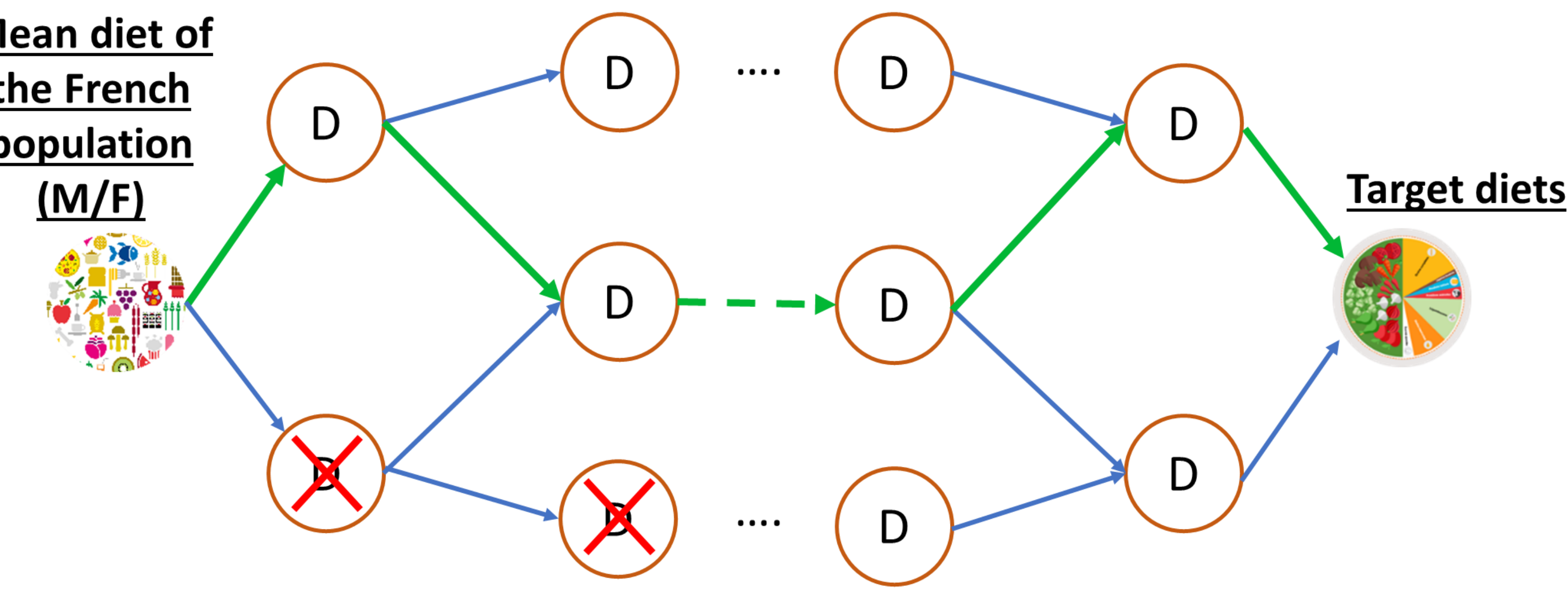
Introduction

- ➔ Diets have a strong impact on health and the environment
- ➔ Target diets have been identified.



Methods

Mean diet of the French population (M/F)

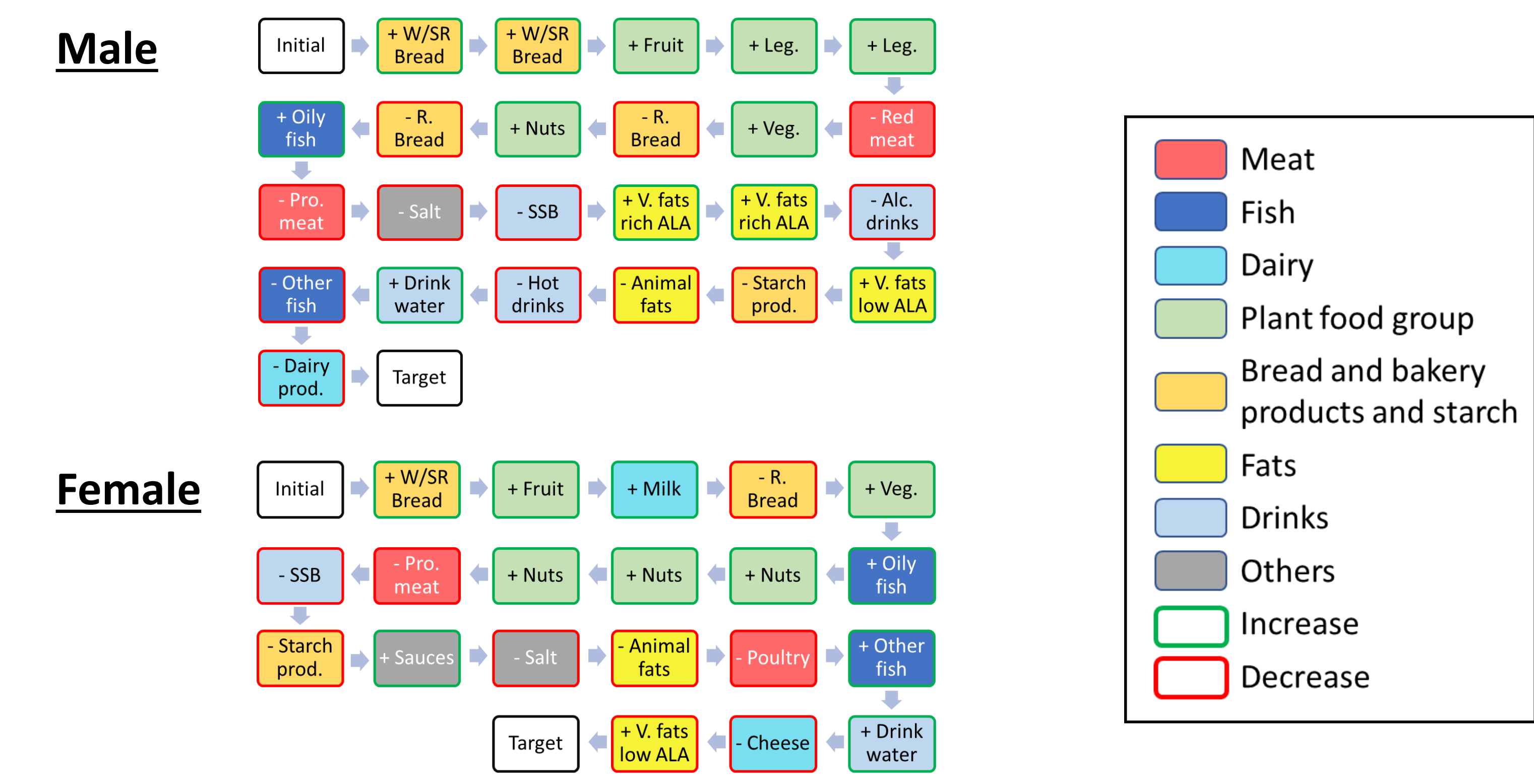


Optimization criteria:
Health score: TMREL, DALYs

Graph theory
 (D) Diet: vector of 33 food groups
 Dietary change: 1 portion step

➔ Optimal trajectory
 ✗ Constraint application

Results



Best trajectory identified based on the Health Risk Criterion, which uses estimates from the Global Burden of Disease.

Conclusion

- ➔ Trajectories are similar for males and females
- ➔ Importance of the consumption of whole/semi-refined bread
- ➔ Simple practical dietary changes that can be prioritized
- ➔ A new method to analyze dietary transitions

The study:



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