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Date : 20-12-2018
Status : draft, to be agreed upon by Project Council

Annual Project Report

SHARP BASIC (15SD01)

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Table Document description

Report title	SHARP-BASIC
Report type	Annual Project Report
Theme	Food chain Sustainability & Dynamics
Project name	SHARP-BASIC - Sustainable and Healthy diets
Project code	15SD01
Year	2018
Authors	A Kuijsten, JM Geleijnse, P van 't Veer on behalf of SHARP BASIC Consortium
Project leader	P van ‘t Veer
Theme director	WJ Schouten
Issue date (day-month-year)	20-12-2018
Status	Final

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1 Project synopsis

Project title Scientific knowledge base and data platform for modelling SHARP diets (SHARP- BASIC)						**Project No.** 15SD01
Project status	❑ new	❑ OPP	❑ FPP	x running	❑ mid-term review	❑ completed

Key objectives

Sub-project 1: Identification of SHARP indicators
Based on existing literature, available knowledge from the different partners and/or existing databases, relevant data will be identified and evaluated for their scientific quality and comprehensiveness.

Sub-project 2: Theoretical mathematical model for defining SHARP diets.
As nutrient and food data are available on a much more detailed level than sustainability data on commodities in the food chain, the SHARP indicators must be tailored to the food level by means of transparent and feasible operational procedures.

The project is closely aligned with the SUSFANS project that runs in parallel to SHARP and that uses aggregate data of food commodities to model and foresight diets from the macroeconomic and agricultural perspective.

Main deliverables

Subproject 1: Data
D1: Database with SHARP indicators and their scientific robustness and suitability for use in models (first version to be extended throughout the course of the project)
1a – Indicators of environmental sustainability (S: Sustainable), M25, Dec 2017
1b – Indicators of a healthy diet (H: Healthy), M13, Dec 2016
1c – Indicators of the ARP-aspects of diets (Affordable, Reliable and Preferable), M37, Dec 2018

D2+D3: Two scientific papers on SHARP indicators (M24-40, Nov 2017-Mar 2019)

Subproject 2: Modelling
D4+D5: Two scientific papers on mathematical basis of the SHARP model illustrated with food survey data (M31, Jun 2018)

D6: Workshop on the SHARP model in the context of other models, and perspectives for future research and modelling (M38, Jan 2019)

Approach

Subproject 1

1a Sustainability indicators (environmental)
- A comprehensive database with high quality sustainability data for 944 food items has been compiled (**D1: SHARP indicators database** (SHARP-ID)). Food items were coded using the FoodEx2 classification (EFSA). These sustainability data are needed both for the paper that links sustainability metrics to national food intake data of the four countries (DK, CZ, IT, FR) and for SHARP modelling (subproject 2). This database (version 1.0) has been finalized in 2018, and dissemination will be guided by legal IPR-issues and recommendations from the Project Advisory Board (2019). The database will be further improved before publication as an open access resource, to maximize its impact in the public domain.

- A paper on diet-associated environmental impact across four European countries (DK, CZ, IT, FR) based on individual level food consumption data is in preparation (Mertens et al, *under TIFN clearance*), and expected to be submitted to a peer-reviewed scientific journal in January 2019. This paper contains an annex describing the LCA database on S-indicators of individual foods according FoodEx2 classification. Furthermore, GHGE and LU were described in population subgroups by age, gender, educational level and overweight status. (**D3: paper on sustainability of EU diets** including methods to estimate LCA of individual foods according FoodEx2 classification).

1b. Health indicators
- Data Transfer Agreements (DTA) for databases of nutrients and food intake using food classification system FoodEx2 of EFSA has been signed by the data providers (institutes in 4 countries) in Jan/Feb 2018. Legal inconsistencies between the SUSFANS and SHARP contract agreements slowed down the approval of the DTA.

- A scientific paper that describes the diversity and nutritional adequacy (food and nutrient intake data) of diets in 4 EU countries has been published (Mertens et al., 2018, Eur J Nutr). **(D2: paper on diversity of EU diets including description of health indicators).** See also annual report 2017.

1c ARP-indicators
- This activity started in August 2017, the deliverable was scheduled in Dec 2018. We have focussed on the A (Affordability) and P (Preferability); R (Reliability) is part of the concept of Food and Nutrition Security (SUSFANS project). Modelling 'A' and 'P' is a scientific challenge as simple direct indicators are not available. Exploration of the ARP indicators have been addressed by several MSc-projects (see Annex 2).
For 'A' consumer prices from CZ are available. These data are currently used in modelling (see subproject 2). With regard to affordability, two MSc-students (HN) explored socio-economic status and price elasticities as related to the intake of meat and pulses.
As simple indicators for modelling 'P' are not readily available and ORL is exploring existing databases in the public and private domain to enrich this aspect of the model. To incorporate the ARP-consumer aspects into the SHARP model, the DEA model was developed (Data Envelopment Analysis). This model bypasses the need for a specific (and necessarily limited) set of A- and P-indicators as it incorporates actually observed dietary habits to set boundaries ('envelope') on potential changes in dietary habits (see subproject 2).

Summary deliverables subproject 1:
As agreed by the Project Council in Nov 2017 the S- and H-indicators in the 4 countries have been described in two separate papers.

D1: SHARP indicators database (v1, 2018); dissemination will be guided by legal IPR-issues and recommendations from the Project Advisory Board (2019).
D2: paper on diversity of EU diets including description of health indicators (Mertens et al, 2018)
D3: paper on environmental sustainability of EU diets including methods to estimate LCA of individual foods according FoodEx2 classification (Mertens et al, *under TiFN clearance*)

Subproject 2
- A **basic SHARP model (D4)** has been developed based on a Data Envelopment Analysis (DEA) framework that can be used to benchmark current healthier diets and to provide guidelines for improving less healthy diets in a way that is acceptable by the studied population. In its present form the initial SHARP-model can be conceptualized as a linear combination of existing day-menus of subjects from the 4 countries; this keeps the resulting diet patterns within the range of current diets (preferability constraint). This model is developed based on nutrient-requirements (using nutrient densities, standardized to 2000 kcal) and is tested using the NQ-plus dataset (comprising a highly educated Dutch population).
Acceptability considerations are taken into account by identifying for each diet in our sample an alternative healthier diet which is as similar as possible, in terms of included food items, to the original current diet. Although not covering all SHARP dimensions, the initial model's flexibility allows for additional dimensions to be included, such as sustainability indicators and prices, which will be included in consequent iterations thereof. To demonstrate how DEA can be used to benchmark healthier and acceptable diets we used information from the NQplus dataset for the Netherlands, which helped inform the validation process for the approach. The model results on these data are satisfactory. A draft paper has been submitted to a peer-reviewed scientific journal (Kanellopoulos et al, submitted).

- An **extension of the SHARP model** is currently developed **(D5)**. The basic model's primary goal is to identify healthier and more sustainable diets within the context of a particular 'peer group', defined by age, gender, and type of population. The basic SHARP model is based on Data Envelop Analysis (DEA), using actual dietary intake data from different EU countries. It includes a consumer similarity metric ('peer resemblance'), which is an absolute loss function. The basic SHARP model proposes diets that are feasible and likely to be consumed. There may be, however, better alternatives for computing preferability. Instead of focusing on 'peer resemblance', one may consider 'food item resemblance'. This approach is based on the hypothesis that similar food items are bought by similar consumers, which would automatically take into account various aspects of human preferences (determined by consumers' culture, socio-economic status, lifestyle, etc.). Selecting similar (but more healthy and sustainable) foods may be more intuitive and robust from a modelling perspective than finding similar peers. That may also allow the use of other types of datasets with less information on population diversity characteristics. Furthermore, this alternative approach allows for consumers' diets to be enriched with food items that they have not reported in their dietary surveys.

- Application of the model to 4 EU countries. The initial on DEA model, using S and H indicators, is currently applied to intake data of the four EU countries *(Mertens, Kannelopoulos et al, in preparation). Not a deliverable for SHARP-BASIC.*

- Since September 2018, an MSc-student (ORL/HN) is designing SHARP diets using a linear programming (LP) model at the individual level; results of the optimized diet will be aggregated in population subgroups by age and sex. Moreover, she aims to explore the trade-offs between health, environment and diet cost using the Czech data. Result of LP modelling will be compared to the results of the DEA modelling.

- Workshop on modelling SHARP diets (D6)
Workshop on modelling SHARP diets in the context of other models, and perspectives for future research and modelling. This workshop is scheduled in Jan 2019.

Summary deliverables subproject 2:
D4: A draft paper has been submitted to a peer-reviewed scientific journal (*Kanellopoulos et al, submitted).*
D5: Develop alternative modelling approach for computing preferability, based on food item similarities *(Ivancic et al, in progress)*.
D6: Workshop on SHARP modelling *(scheduled in Jan 2019)*

Indication of total project costs	**Start date**	**Estimated end date**
1245 k	1-12-2015	2020
Main location(s):		
Name Project leader	**Name Theme director**	**Date**
P. van ‘t Veer	W.J. Schouten	20-12-2018

2 Milestones 2018

	Milestone	Status
	Objective is (1) to collate reliable data on SHARP-indicators and EU-diets and (2) to develop the SHARP model, and (3) make the former available for application in SUSFANS.	
1	***Subproject 1:*** *Identification of SHARP indicators, collection of data, linkage of data, (HN, ORL, APS)*	*Running/delayed/realized*
	• Initiate formulation and iterative discussion of scope and vision on consumer-diets and SHARP model, jointly with project team and food industries. (van ‘t Veer). • Data Transfer Agreement Diet Data signed (HN) • Initiate discussion on data sharing (van ‘t Veer) • Obtain Food composition DBs and dietary intake data for use in model (HN, ORL)	Realized Realized Realized Realized Realized

	• Construction of SHARP- indicator database, including report (HN, advised by APS, collaboration SUSFANS partners) • Food intake and S-indicators linked • GHGe and LU of diets computed • Paper on sustainability of EU diets including methods to estimate LCA of individual foods according FoodEx2 classification. • Obtain and link ARP-data for use in model (ORL, HN)	Realized Realized Expected *(Jan 2019)* Modified (DEA modelling)
	Additional information (attachments of presentations, posters, publications, manuscript etc.)	See Annex 2
2	***Subproject 2:*** *Develop a theoretical mathematical model for defining SHARP diets (ORL)*	*Running/delayed/realized*
	• Initial model to design SHARP-diets using preliminary data H-indicators (ORL). • Describe initial model in peer-reviewed paper (ORL). • Expert meeting on model development and initial results of four countries. • Extent BASIC SHARP model with advanced methods for inferring consumer preferences. Providing the basic model with the ability to search for potentially preferable food items outside of consumers' purchase history (ORL). • Developing a food item graph based on food item similarities (ORL). • Apply SHARP model (S&H indicators) on data of 4 countries (HN&ORL) • Consumer aspects (ARP) will be incorporated by means of e.g., model constraints (e.g. on meals or food products, or availability of indicators (e.g. price). This process will be guided by interaction with the SHARP Expert Group (and/or experts in the SUSFANS project). • Determine the goals of the full model, what will it be used for, agreement in team (ORL, HN, APS)	Realized Running Realized (June 2018) Running Running Modified (Incorporated using DEA model) ORL/HN agreed on scope& vision document
3.	*Make results available to SUSFANS project*	
	Relations SHARP-SUSFANS: (1) S and H indicators will be linked to food intake data within the SUSFANS project; (2) A close link between the SHARP-model and the SUSFANS case studies on livestock and fruits & vegetables is essential. • Based on current dietary intake, performance metrics for balanced and sufficient diets (SUSFANS) could be calculated for the four countries • Dietary intake data have been standardized for demographic variables, so these data can be used to calculated performance metrics of future projections	Realized Realized Realized Realized, Running

	(based on scenario's). Food based metrics are realized, nutrient based metrics, is running. • Explore options to incorporate case studies and radical system changes (lead APS, collaborative with ORL and HN). • Diet scenario's as input for macro models (SUSFANS) have been constructed based SHARP-data/model outputs (health indicators). • Use results SHARP to refine SUSFANS case studies on livestock and fruits & vegetables (APS) • Final SHARP model, applied 4 EU countries (HN, ORL, SUSFANS deliverable)	Realized Running Realized Running
	Additional information (attachments of presentations, posters, publications, manuscript etc.)	See Annex 2

3 Conclusions

The overall aim of the SHARP-BASIC project is to provide a scientifically underpinned knowledge and data platform that can be used to build models for deriving SHARP diets for European citizens, i.e., a diet that is SHARP: Sustainable, Healthy, Affordable, Reliable and Preferable. The project develops according to plan, e.g., based on existing literature, available knowledge from the different partners and/or existing databases, relevant data have been identified and evaluated for their scientific quality and comprehensiveness. The SHARP indicator database (v1, 2018) has been finalized and has been linked to the dietary intake data of four European countries. The 'S' and 'H' indicators have been well described (subproject 1a and 1b) and are currently applied in modelling SHARP diets (subproject 2).

With regard to the ARP-indicators (subproject 1c), we partially deviate from the original plan. The initial idea to use ARP indicators and linear programming for the SHARP model has been replaced by the Data Envelop Analysis model, which builds on actual diets (subproject 2a). Acceptability considerations are now taken into account by identifying for each diet in our sample an alternative healthier diet which is as similar as possible, in terms of included food items, to the original current diet. This approach has the advantage that it keeps the resulting diet patterns within the range of current diets (preferability constraint). Furthermore, an extension of the SHARP model is currently developed (subproject 2b). Instead of focusing on 'peer resemblance', 'food item resemblance' is being explored.

The SHARP-BASIC project uses food based dietary guidelines, nutrient requirements and sustainability indicators (GHGE, LU) to describe healthy and sustainable dietary habits. The national dietary survey data of four countries have been standardized and harmonized (demographic variables, food classification system) to enable linkage to macro-models of the SUSFANS project (MAGNET, CAPRI). These models of EU food demand, which use food availability data on a high aggregate level, can now be translated into more detailed dietary patterns, allowing for a more precise estimation of diet quality in different population subgroups. Trade-offs and synergies between and within the various scenarios can now be extended to the public health domain. This is a substantial improvement of the current food system models.

Annex 1 Activity planning 2019

Time	Description of activities	Milestones	Deliverables
Jan	Organize workshop on modelling SHARP – diets for 4 EU countries and other project partners (HN/ORL)	Workshop	D6
Jan	Paper on Top-N food item recommendation system based on mutual information and entropy weighting (Ivancic)		Scientific paper
Jan/Feb	Translated output of macro models (SUSFANS) to diet performance metrics on population subgroup levels. (dietary intake data 4 countries/SHARP) (HN)	Operationalized link with MAGNET models (SUSFANS)	
Feb	Discuss steps in final year of the project with all project partners (dissemination)	R2S meeting	tbd
Feb	Paper on Maximum entropy estimation of nutrient importance (Ivancic)		Scientific paper
March	Paper on environmental sustainability of European diets using benchmark approach (Mertens)		Scientific paper
May	Paper on theoretical food replacement study in Dutch cardiac patients (Mertens)		Scientific paper
June	Contribution to masterclass VLAG ‘Healthy and Sustainable diets: synergies and trade-offs’ (van ‘t Veer)		Lecture
Sep	PhD-thesis (Mertens)		PhD-thesis
	Conferences & meetings (FENS/ WEON/ etc.)		Lectures, abstracts

Annex 2 List of publications, patents and other outputs

Publications 2018

Scientific papers in peer-reviewed journals

- Mertens E, Kuijsten A, Dofkova M, Mistura L, D'Addezio L, Turrini A, et al. Geographic and socioeconomic diversity of food and nutrient intakes: a comparison of four European countries. European journal of nutrition. 2018.
- Mertens E, Kuijsten A, Geleijnse JM, Boshuizen H, Feskens EJM, van 't Veer P. FFQ versus repeated 24-hour recalls for estimating diet-related environmental impact. Nutrition Journal (accepted).
- Zurek M, Hebinck A, Leip A, Vervoort J, Kuiper M, Garrone M, Havlík P, Heckelei T, Hornborg S, Ingram J, Kuijsten A, Shutes L, Geleijnse JM , Terluin I, van 't Veer P, Wijnands J, Zimmermann A, Achterbosch T. Assessing sustainable food and nutrition security of the EU food system-an integrated approach. Sustainability. 2018

Submitted papers in peer-reviewed journals

- A. Kanellopoulos, A. Ivancic, J. C. Gerdessen, J. M. Geleijnse, J.M. Bloemhof-Ruwaard Benchmarking healthy and preferable diets using Data Envelopment Analysis. (*in preparation*).
- Mertens E, Kuijsten A, van Zanten HHE, Kaptijn G, Dofková M, Mistura L, D'Addezio L, Turrini A, Dubuisson C, Havard S, Trolle E, Geleijnse JM, van't Veer P. Dietary choices and environmental impact in four European countries (*under TiFN clearance*)

Other scientific papers

Invited lectures

- 18 Jun 2018. In Course 'Food systems for Healthy and Sustainable diets', Wageningen University & Research. Presentation: Sustainable Outcome of Food Systems (Kuijsten)
- 19 Jun 2018. "Nutriëntenzekerheid in een duurzame(re) vorm: wat zijn de belangrijkste aandachtspunten voor een gezond en duurzaam voedingspatroon?" Symposium "Een duurzaam voedingspatroon: hoe ziet dat eruit?", organised by Friesland Campina Instituut (van 't Veer).
- 5 Sep 2018. Nutrition Congress, Johannesburg, South Africa. Keynote opening lecture: SHARP diets: towards healthy, sustainable nutrition (Geleijnse)
- 28 Sep 2018. European Federation of the Associations of Dietitians [EFAD]. Presentation: Healthy and sustainable diets in Europe (Kuijsten)
- 22 Nov 2018. Alpro Foundation Student Symposium. Presentation: Healthy and sustainable diets in Europe (Kuijsten)

Scientific presentations (including posters)

- 7-8 Jun 2018. Dutch Epidemiology Conference (WEON). Poster: Variability in diet-related environmental impact (Mertens)
- 6 Sep 2018. FOOD2030. Oral presentation: Diets and its environmental impact (Mertens)
- 6 Sep 2018. FOOD2030. Poster: Sustainable Healthy Nutrition: a theoretical food replacements study in Dutch cardiac patients (Mertens)
- 11 Oct 2018. Dutch Nutritional Science Days (NSD). Oral presentation: Plant protein and cardiovascular mortality in cardiac patients (Mertens)

- 2 Feb 2018. System Dynamics and Innovation in Food Networks. Poster/Oral presentation: Probabilistic modelling of consumers' food item preferability (Ivancic)
- 10 July 2018. EURO 2018. Oral presentation: Maximum entropy estimation of nutrient importance (Ivancic)

Publication plan for the next period

- Ivancic, Kanellopoulos, Geleijnse. Top-N food item recommendation system based on mutual information and entropy weighting (*expected January 2019*)
- Ivancic, Kanellopoulus. Maximum entropy estimation of nutrient importance (*expected February 2019*)
- Mertens, Kanellopoulus, Kuijsten, Dofková, Mistura, D'Addezio, Turrini, Dubuisson, Havard, Trolle, Geleijnse, van 't Veer. Improving the environmental sustainability of European diets using benchmark approach (*expected in March 2019*)
- Mertens, Kuijsten, Geleijnse, van 't Veer. A theoretical food replacement study in Dutch cardiac patients (*expected in May 2019*)
- Mertens. PhD-thesis *(draft expected in September 2019)*

Patents

Other outputs

- MSc theses

- Developing a generic mathematical programming model for SHARP diet optimization: Identifying modelling requirements. (2016, Faramitha, ORL)
- Elicitation of the importance weights of nutrients to assess the healthiness of a diet.(2017, Ista Indriani, ORL)
- Designing preferable diets using mathematical modeling: A review of preference elicitation methods (2017, Nareswari, ORL)
- Acceptability constraints for sustainable diet models (2018, Simone Struijk, HN)
- Healthy and sustainable diets and their relation to sensory profiles (2018, Corinne Ouwehand, HN)
- Healthy and sustainable diets in four EU countries (2018, Rozemarijn van der Pol, HN)
- The comparison of Dutch and European LCA data bases (2018, Reina Vellinga, RIVM/HN)
- Healthy and sustainable catering at RIVM (2018, Josien Croezen, RIVM/HN)
- Identifying drivers of transitioning food patterns – a case-study on pulses (2018, Marjolein Lommen, HN)
- Meat and pulses intake and socio-economic status (2018, Cristina Alvarez, HN)
- Price Elasticities for Meat Products and Socio-Economic Status (2018, Michele Boulade, HN)

- Workshops

- None, or combined with progress meetings/expert meetings

- Partner visits

- None, or combined with progress meetings/expert meetings

- Stakeholder meetings

21 Jun 2018 4th Expert meeting (H-paper, S-paper, DEA model + extensions)

- *Visits to (inter)national meetings or conferences*

Feb 2018	System Dynamics and Innovation in Food Networks, Innsbruck *(Ivancic)*
Apr 2018	Start Up Delta Summit, Arnhem *(Kuijsten)*
Jun 2018	7th International fibre conference, Rotterdam *(Kuijsten)*
June 2018	Dutch Epidemiology Conference (WEON) *(Mertens)*
July 2018	European Conference on Operational Research, Valencia *(Ivancic, Kanellopoulos)*
Sep 2018	FOOD2030 'Towards sustainable agri-food systems', University of Hohenheim, Germany *(Mertens, Kuijsten)*
Sep 2018	Nutrition Congress, Johannesburg, South Africa. *(Geleijnse)*
Sep 2018	TIFN Retreat, Arnhem *(van 't Veer, Kuijsten)*
Sep 2018	Annual conference European Federation of the Associations of Dietitians, Rotterdam *(Kuijsten)*
Oct 2018	Nutritional Science days, Heeze *(Mertens, Geleijnse, Kuijsten)*
Nov 2018	Alpro Foundation Student Symposium, Wageningen *(Kuijsten)*

PPP annual report 2018
PPPs which have started under the direction of the top-sectors need to deliver an annual report regarding their research and financial progress. For reporting on research progress this format has to be applied. A separate format 'PPP final report' is available for PPPs that have finalized in 2018.
Annual reports are entirely published on the TKI/topsector website(s). Please prevent the incorporation of confidential matter in the report.
PPP annual reports have to be submitted - pooled for each research organisation - before 1 March 2019 to the TKIs at info@tkitu.nl, or at info@tki-agrifood.nl. For Wageningen Research the delivery of reports occurs centrally.

General data	
PPP number	AF-15505
Title	SHARP-BASIC - Sustainable and Healthy diets
Theme	Consument & Maatschappij
Executing research organisation(s)	Wageningen University, Division Human Nutrition, chair group Operations Research and Logistics, chair group Animal and Production Systems (als TiFN-onderzoekspartner)
Project leader research (name + email address)	Prof dr Pieter van 't Veer Pieter.vanvteer@wur.nl
Coordinator (on behalf of private parties)	Project Council voorzitter: Sheila Wiseman
Contact person of government	
Total project budget (k€)	1244 kEUR
Project website address	
Starting date	1 Dec 2015
Final date	30 Nov 2019

Approval coordinator/consortium The annual report has to be discussed with the coordinator/consortium. The TKI(s) like to be informed regarding potential comments on the annual report.	
The annual report is …… by the coordinator on behalf of the consortium	□ approved □ not approved
Potential comments regarding the final report	

Brief description content/aim PPP What is the matter and what does the project contribute? What does the project deliver and what are the effects of its delivery?
SHARP-BASIC ontwikkelt de wetenschappelijke onderbouwing voor beleidsadvies over duurzame(re) en gezonde voeding voor consumenten in Europa. SHARP refereert aan (ecologisch) duurzaam (Sustainable), (voedingskundig) gezond (Healthy), en voor consumenten Betaalbaar (Affordable), Betrouwbaar (Reliable) en Aantrekkelijk voor consumenten (Preferable). De twee hoekstenen van het project zijn:

• Betrouwbare gegevens over indicatoren van ecologische duurzaamheid en gezondheid van de voedingsgewoonten van EU-burgers, en
• de ontwikkeling van methoden voor het modelleren van synergiën en trade-offs tussen de SHARP-dimensies van het voedselpatroon.

Het vier jaar durende project resulteert in verschillende wetenschappelijke artikelen, één proefschrift en een database over duurzaamheidsindicatoren. Het project sluit nauw aan bij de kennis en expertise binnen het SUSFANS-project (H2020; http://www.susfans.eu/)

Results 2018
Give a brief description of the high-lights in 2018.

Wat is er aan de hand?
De transitie naar een duurzame(re) voedselproductie en tegelijkertijd gezonde consumptie heeft implicaties voor het voedselpakket van de consument. De meeste modellen inzake de voedseltransitie maken gebruik van geaggregeerde data van voedselaanbod en duurzaamheidsindicatoren per hoofd van de bevolking, gebaseerd op FAO-databases van een twintigtal voedselgroepen. Hierdoor is het niet goed mogelijk de implicaties van de transitie voor het veel uitgebreider dagelijks voedselpakket en de voedingskwaliteit van Europese burgers te evalueren; ook blijven hierbij de gevolgen voor verschillende subgroepen (naar leeftijd, geslacht, opleiding) buiten beschouwing.

Wat doet het project daaraan?
Het SHARP-project brengt de analyses van huidige en mogelijke toekomstige voedingspatronen in kaart op basis van hoogwaardige gegevens over voedselconsumptie van ruim 9000 personen uit 4 EU-landen met uiteenlopende voedingspatronen (Denemarken, Tsjechië, Italië, Frankrijk). De voedingspatronen worden vergeleken op basis van food-based dietary guidelines, nutriënt-inname en duurzaamheidsindicatoren. Toekomstige gezonder en duurzamer voedingspatronen worden geanalyseerd met geavanceerde datamodellen; hierbij wordt nadrukkelijk gestreefd naar een wijze van modelleren die nauw aansluit bij wat voor consumenten acceptabel is.

Wat levert het project op?
Het project laat de heterogeniteit zien van Europese voedselpatronen, voor 4 verschillende landen, naar leeftijd, geslacht en opleiding. Deze heterogeniteit wordt beschreven in termen van voedingsmiddelen, voedingskundige kwaliteit en duurzaamheid van de productie.
Vervolgens worden gezonder en duurzamer patronen samengesteld door modelleringstechnieken. Het realiteitsgehalte hiervan wordt bewaakt door aan te sluiten bij de huidige dag- en maaltijdpatronen van consumenten.
Om dit te realiseren is een database ontwikkeld met duurzaamheidsindicatoren van voedsel; deze sluit aan bij de EFSA-classificatie van voedingsmiddelen, waardoor deze op Europees niveau bruikbaar is. Het onderzoek zal resulteren in tenminste 4 wetenschappelijke artikelen en een proefschrift.

Wat is het effect hiervan?
Inzicht in een brede range van huidige en geoptimaliseerde voedingspatronen verdiepen het debat over de voedseltransitie van het niveau van 'per capita productie' naar 'individuele consumptie' in subgroepen van de bevolking. Hierdoor kan de wenselijke consumptie worden vertaald naar de benodigde productie, terwijl veranderingen in productie kunnen worden geëvalueerd op voedings-gezondheid. Samenloop en tegenstellingen tussen gezonde en duurzame voedingspatronen worden hierdoor inzichtelijk. De levensmiddelenindustrie kan hierop inspelen door kennis en keuzes in de productieketen, duurzame technologie en herformulering. Beleidsmakers kunnen dit vertalen naar maatregelen voor de levensmiddelenindustrie, de preventieve sector en consumentengedrag.

Number of delivered products in 2018 (give titles and/or description of products, or a link to the products on the project website, or other public websites).			
Scientific articles	Reports	Articles professional in journals	Lectures/workshops
- Operationalising the health aspects of sustainable diets: a review (link) - Geographic and socioeconomic diversity of food and nutrient intakes: a comparison of four European countries (link)	SUSFANS publications including SHARP diets and modelling (link)		
Titles/descriptions of prominent products in 2018 (max. 5) and their targets groups			

Annex: Titles of deliverables or a link to products on the project website or other public websites