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Towards climate resilience using public health and sustainable food systems

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The Vision

1.

Demonstrate the value of carbon credit farming towards achieving climate mitigation and adaptation benefits using a fork to farm plan

2.

Increase overall fruits and vegetables consumption towards healthy eating practices and promote public health practices for children, via a systems approach of a carbon credit farming scheme with a network of schools/families

Prior experience and built capacity

Building on the capacity and infrastructure built during the ORGANIKO LIFE+ project,
Demonstrated:

- i) better climate performance (N₂O emissions) in certain organic farming practices compared against conventional farming (Dr. Omirou team);
- ii) the benefits of organic food on children's health (2015-2019) on childhood obesity and biomarkers of oxidative damage

-Serving organic meals in families of primary school children of Cyprus (ORGANIKO LIFE+, Spring 2017)

-Serving organic salads and fruits in whole day school meals in Cyprus (PRISHEC CY RPF project, Fall 2020)



FARM TO FORK STRATEGY

Reduction by 50% of the use and risk of pesticides.
Increase by 25% of the agricultural land under organic farming.

Need for systemic innovative solutions

(European Commission, 2020)

EU STOA REVIEW

The latest authoritative analysis on the human health implications of organic food.

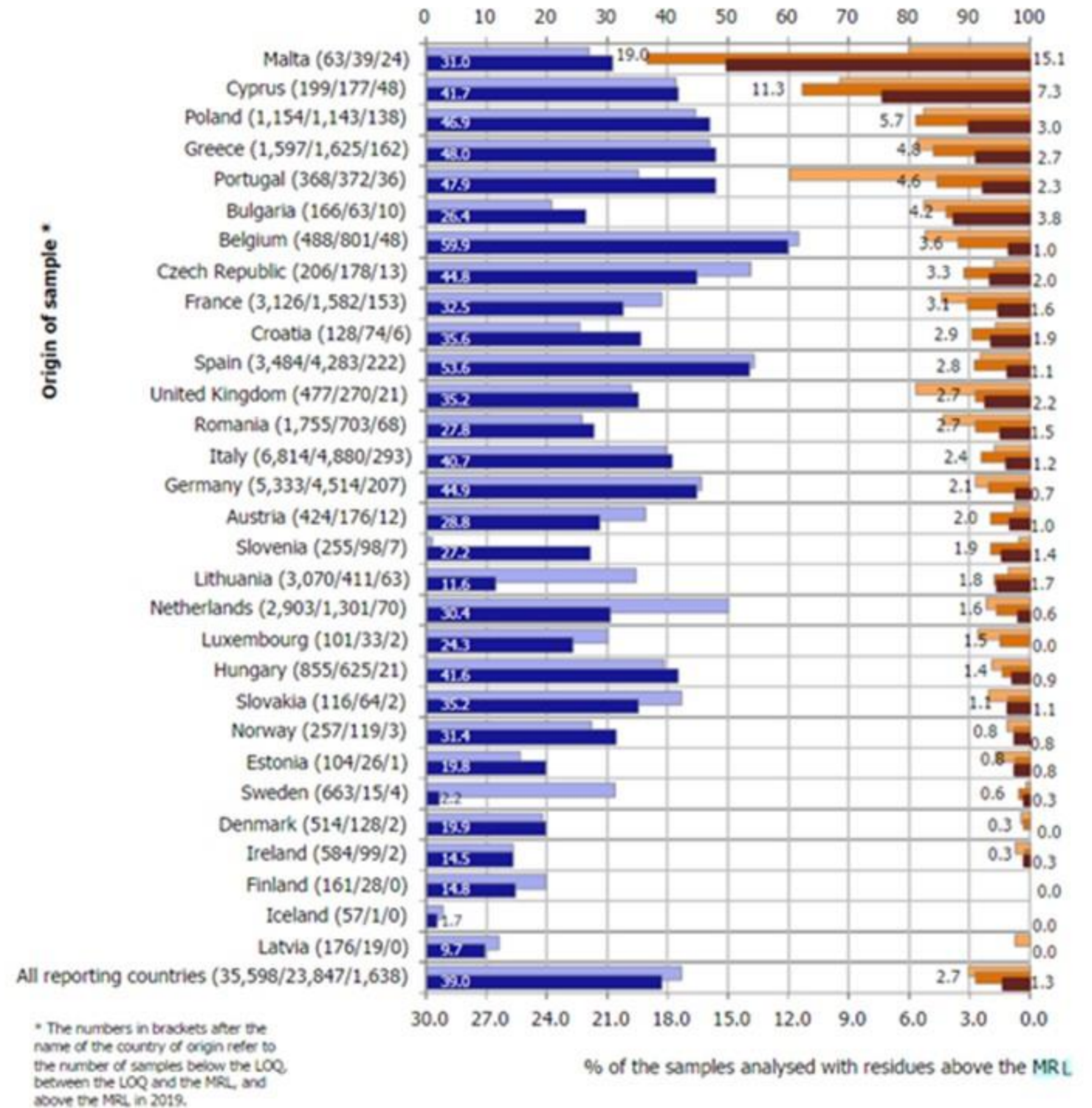
(EuroParl, 2016)

MAXIMUM RESIDUE LEVEL (MRL)

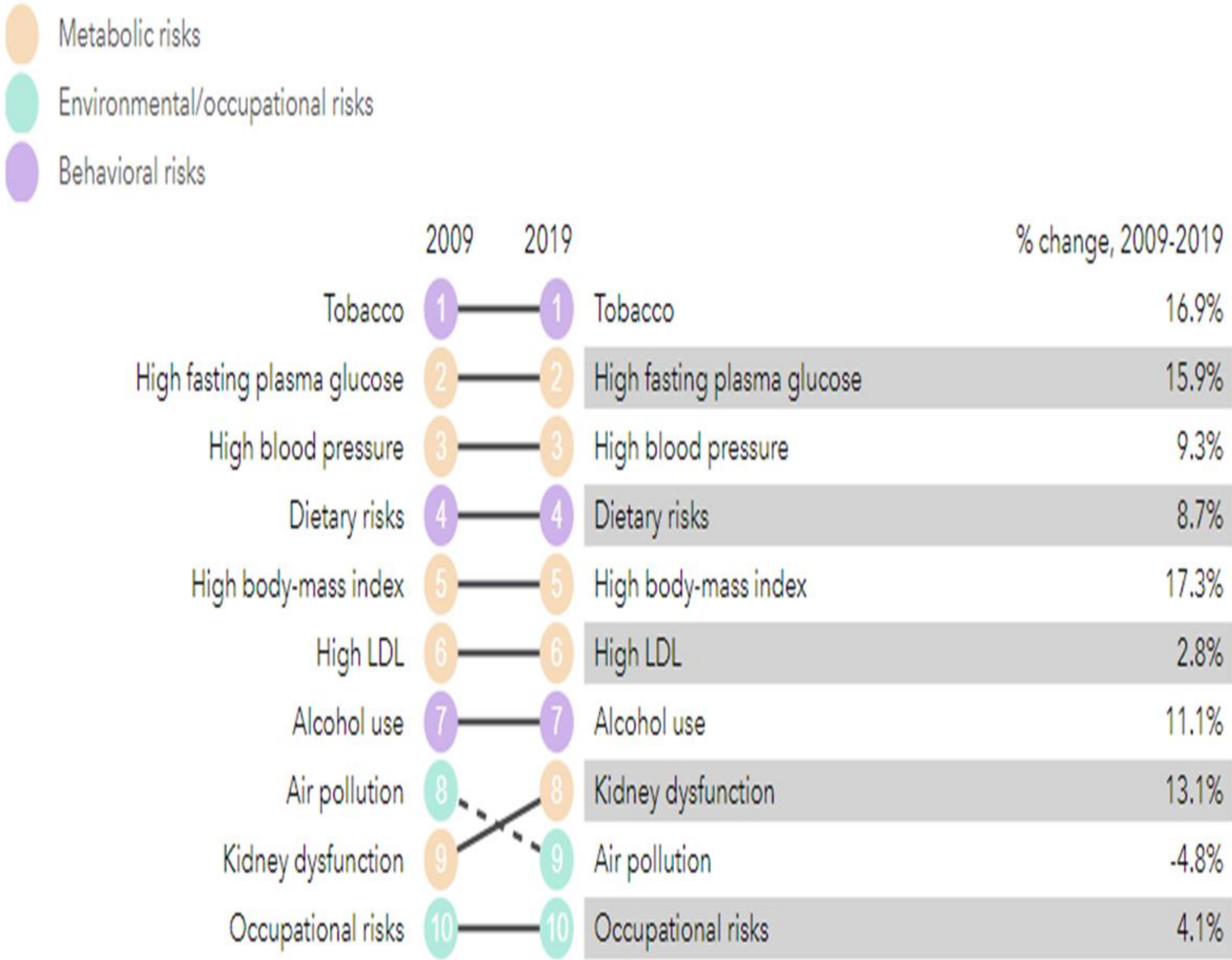
In 2018, the overall quantification rates of pesticides <MRL for 91,015 samples were 13.8%
in organic food and 46% in conventional food.

(EFSA, 2020)

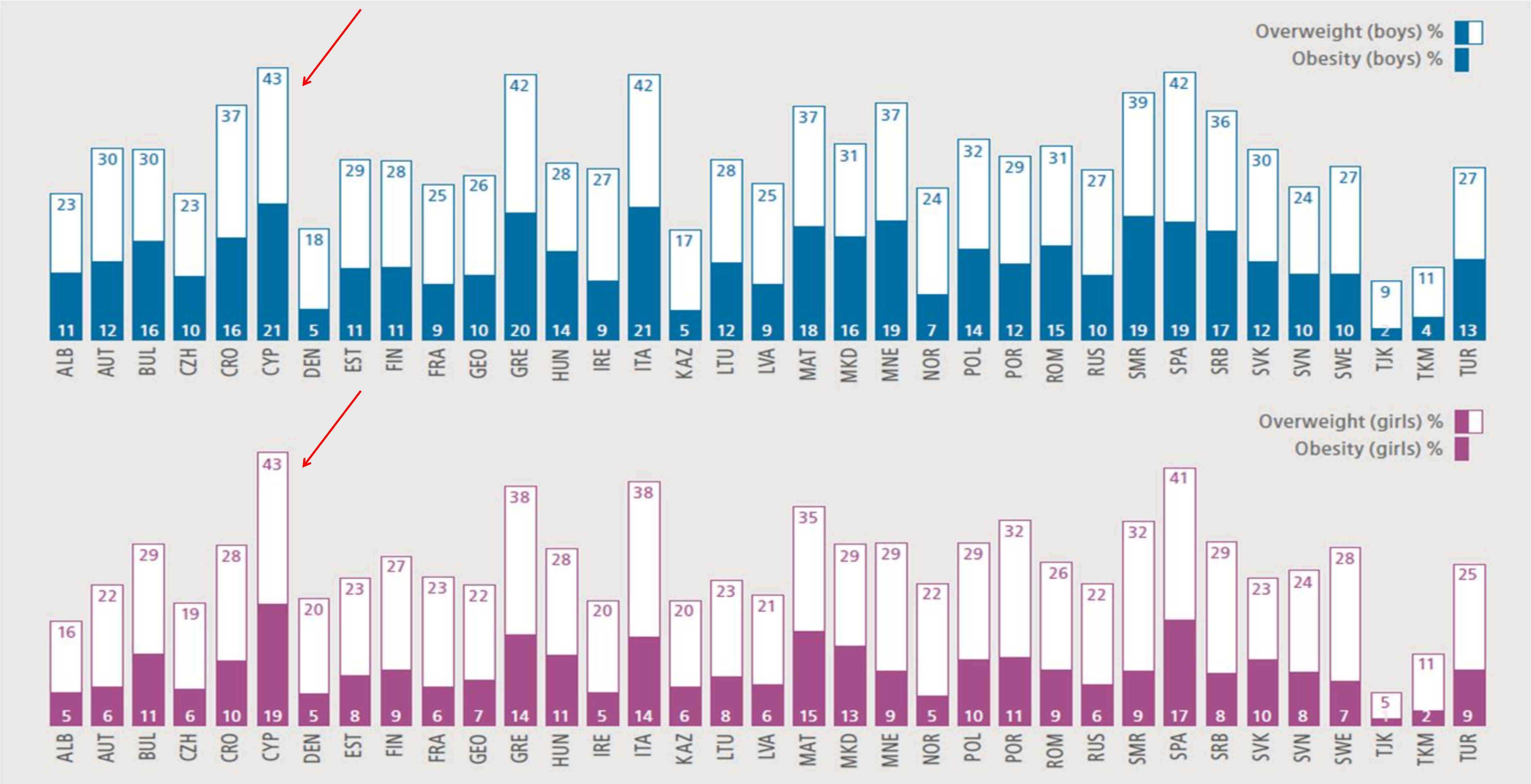
Cyprus quite high in the EU list of countries with highest % quantified pesticides residues >MRL



Unhealthy dietary choices and metabolic alterations remain unaltered for a decade or more in Cyprus and the region



Overweight and obesity prevalence values based on WHO definition^a (%) – COSI 2015-2017

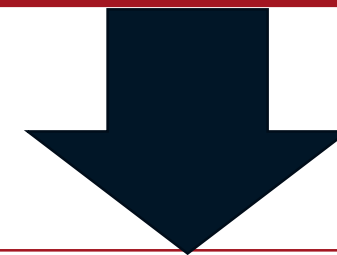
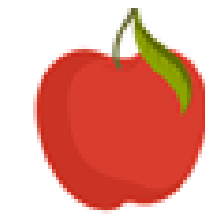


FOCUS ON CHILDREN

HEALTH CLAIM APPLICATION

Article 14 of Regulation (EC) No1924/2006

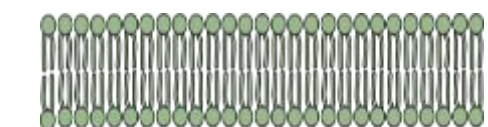
5-yrs work led to: Claim referring to children's development and health



The systematic consumption of organic food leads to **lower body burden of chemical pesticides.**

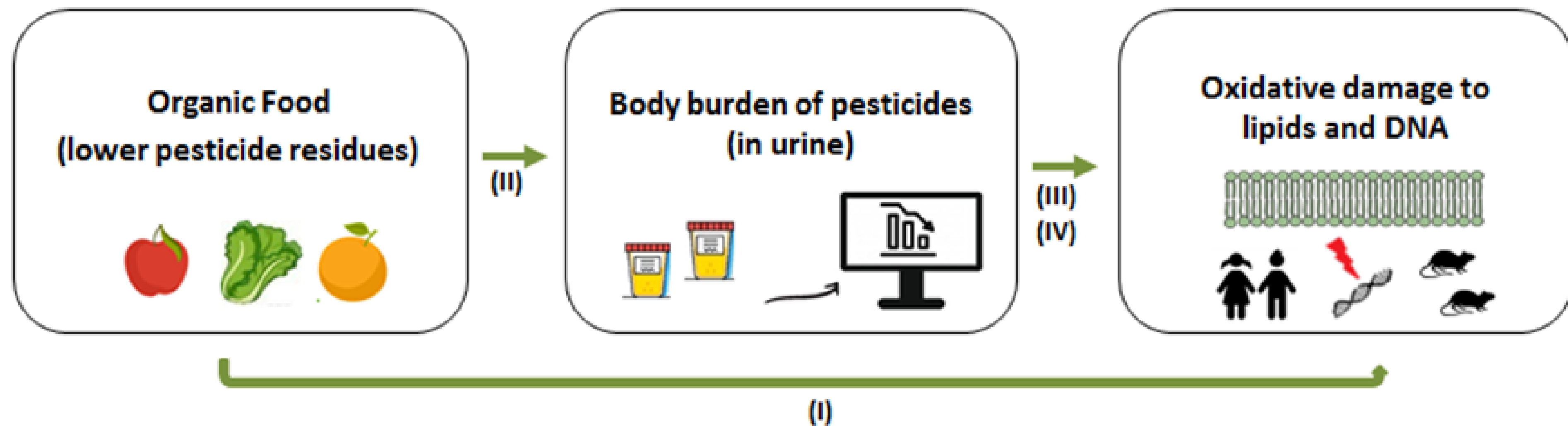


The body burden of chemical pesticides in children is considered as the main risk factor leading to **lipid-based and DNA oxidative damage.**



PROPOSED HEALTH CLAIM

Organic food (lower levels of pesticide residues than those in conventional food) contributes to the protection of body cells and molecules (lipids and DNA) from oxidative damage



Human trials:

(I) Makris et al., 2019

(II) Makris et al., 2019; [Fagan et al., 2020; Hyland et al., 2019]*; Bradman et al., 2015; [Lu et al., 2006a; Lu et al., 2006b; Lu et al., 2008; Lu et al., 2009]*

(III) Makris et al., 2019

Animal studies:

(IV) Abdel-Rahman Mohamed et al., 2017; Abu-Qare & Abou-Doni, 2000; López-Granero et al., 2013; De Felice et al., 2016

* [Series of publications that are linked with the same study population and intervention]

Scientific Weight of Evidence (based on official EFSA guidance documents, EFSA, 2016; EFSA, 2017; EC1924/2006)

Randomized controlled trials:

USA

- Bradman A, Quirós-Alcalá L, Castorina R, et al. Effect of organic diet intervention on pesticide exposures in young children living in low-income urban and agricultural communities. *Environ Health Perspect.* 2015;123(10):1086-1093. doi:10.1289/ehp.1408660
- Fagan J, Bohlen L, Patton S, Klein K. Organic diet intervention significantly reduces urinary glyphosate levels in U.S. children and adults [published online ahead of print, 2020 Jul 31]. *Environ Res.* 2020;109898. doi:10.1016/j.envres.2020.109898
- Hyland C, Bradman A, Gerona R, et al. Organic diet intervention significantly reduces urinary pesticide levels in U.S. children and adults. *Environ Res.* 2019;171:568-575. doi:10.1016/j.envres.2019.01.024
- Lu C, Toepel K, Irish R, Fenske RA, Barr DB, Bravo R. Organic diets significantly lower children's dietary exposure to organophosphorus pesticides. *Environ Health Perspect.* 2006a;114(2):260-263. doi:10.1289/ehp.8418
- Lu C, Barr DB, Pearson M, Bartell S, Bravo R. A longitudinal approach to assessing urban and suburban children's exposure to pyrethroid pesticides. *Environ Health Perspect.* 2006b;114(9):1419-1423. doi:10.1289/ehp.9043
- Lu C, Barr DB, Pearson MA, Waller LA. Dietary intake and its contribution to longitudinal organophosphorus pesticide exposure in urban/suburban children. *Environ Health Perspect.* 2008;116(4):537-542. doi:10.1289/ehp.10912
- Lu C, Barr DB, Pearson MA, Walker LA, Bravo R. The attribution of urban and suburban children's exposure to synthetic pyrethroid insecticides: a longitudinal assessment. *J Expo Sci Environ Epidemiol.* 2009;19(1):69-78. doi:10.1038/jes.2008.49

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- Makris KC, Konstantinou C, Andrianou XD, et al. A cluster-randomized crossover trial of organic diet impact on biomarkers of exposure to pesticides and biomarkers of oxidative stress/inflammation in primary school children. *PLoS One.* 2019; 14(9):e0219420. doi:10.1371/journal.pone.0219420.

Animal studies of pesticide health effects:

- De Felice A, Greco A, Calamandrei G, Minghetti L. Prenatal exposure to the organophosphate insecticide chlorpyrifos enhances brain oxidative stress and prostaglandin E2 synthesis in a mouse model of idiopathic autism. *J Neuroinflammation.* 2016;13(1):149. Published 2016 Jun 14. doi:10.1186/s12974-016-0617-4
- López-Granero C, Cañadas F, Cardona D, et al. Chlorpyrifos-, diisopropylphosphorofluoridate-, and parathion-induced behavioral and oxidative stress effects: are they mediated by analogous mechanisms of action?. *Toxicol Sci.* 2013;131(1):206-216. doi:10.1093/toxsci/kfs280.

Way Forward



Health risks well established



**Need for paradigm shift and practices
that reduce pesticide use**



**Consumer perceptions and
pesticides use in ag
commodities and home
(individual use) is well known**



**Incentives for farmers and
consumer health marketing**

Fork to farm carbon credit plan

Create a network of whole day lunch serving schools with regional groups of farmers, identifying specific fruits and vegetables (quantities, reliability etc.) for the scheme.

The EU school scheme could perhaps be used to demonstrate the carbon credit project

The Ministry authority will be managing carbon credit payments while a managing office will be overseeing the offer-demand chain and the logistics. We have their approval to participate.

This demonstration to run in Cyprus would need the proper financing via CAP or EU schools scheme

The plan could start immediately, depending when funds become available, as the schools can be easily identified by our consortium in Cyprus, because we have been engaging with these groups for other research projects in the last years.

PROPOSED Fork to farm carbon credit system



Opportunities to Engage with Private Sector



A & A Ετ. Αγρ. Αν. ΤΟ ΑΡΣΟΣ ΛΤΔ



Clearspring



McLLOYD'S



Αγροκτήματα Κρήτης

N.C Farm

Χ. Δρουσιώτης



Κ. Οικονομίδης



Π. Παπαντώνης

Λ. Πίγγουρας



Sana Investments GROUP OF COMPANIES



Melino



Progress Evaluation – Monitoring

1. At schools
2. At farms
3. At homes of participating children and their families

The project will require periodic evaluation and monitoring ensuring that the whole farm to fork chain of activities is synchronized and up to date.

The approach would entail:

Baseline characterization,
Climate impact assessment and reward,
Impact monitoring,
Reporting, verification,
Credit registration and handling,
Link with national GHG inventory compilers,
Digital network platform of participating schools – farms



Thank you!



Funding

EU Horizon2020, EU Structural Funds, EU BBMRI-LPC, ΙΔΕΚ-ΙΠΕ

International Collaborators

- The Nord-Trøndelag Health Study (The HUNT Study)
- The Lifelines Biobank initiative – University Medical School Groningen
- The French CONSTANCES cohort
- Emory University – Dept. of Epidemiology
- Institute of Occupational Medicine
- TNO



Research Team (few are missing from the photo shoot© Xanthi, Nadine and Elina)