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UNIVERSIDAD
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DE CHILE

The MAUCO Cohort

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on behalf of the MAUCO team

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Caen, France



THE MAULE COHORT



MOLINA-CHILE 2013-2023

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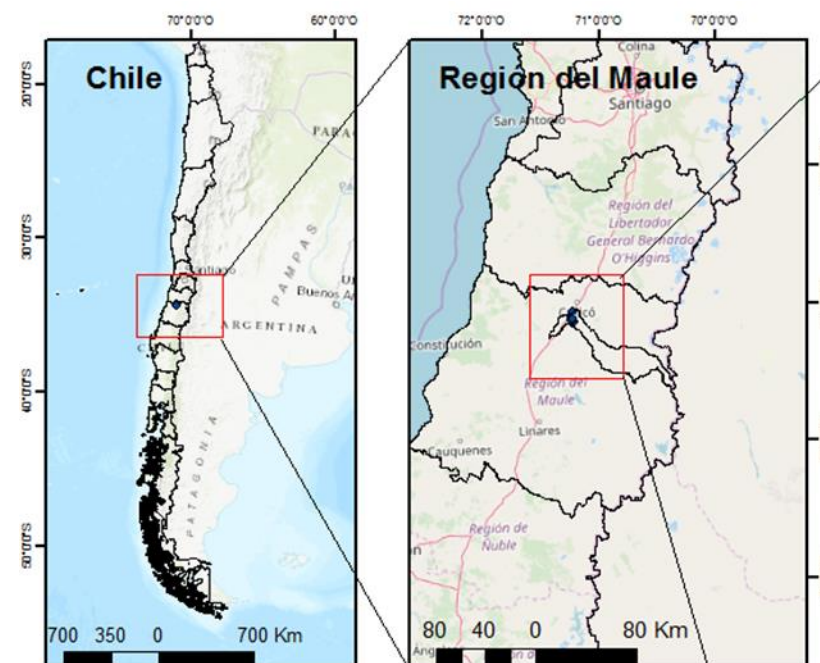
1. Molina, study site of MAUCO



30% vineyards
27% fruit trees
20% forestry
cereals, berries



•599 sq. mi
•45,000 inhabitants



Leyenda

- Límite urbano
- Zona agrícola

High prevalence of obesity (47%), active smoking (53.0%) and chronic diseases such as high blood pressure (59.0%), diabetes (22.0%) and cancer (5.6%), according to the ENS 2017

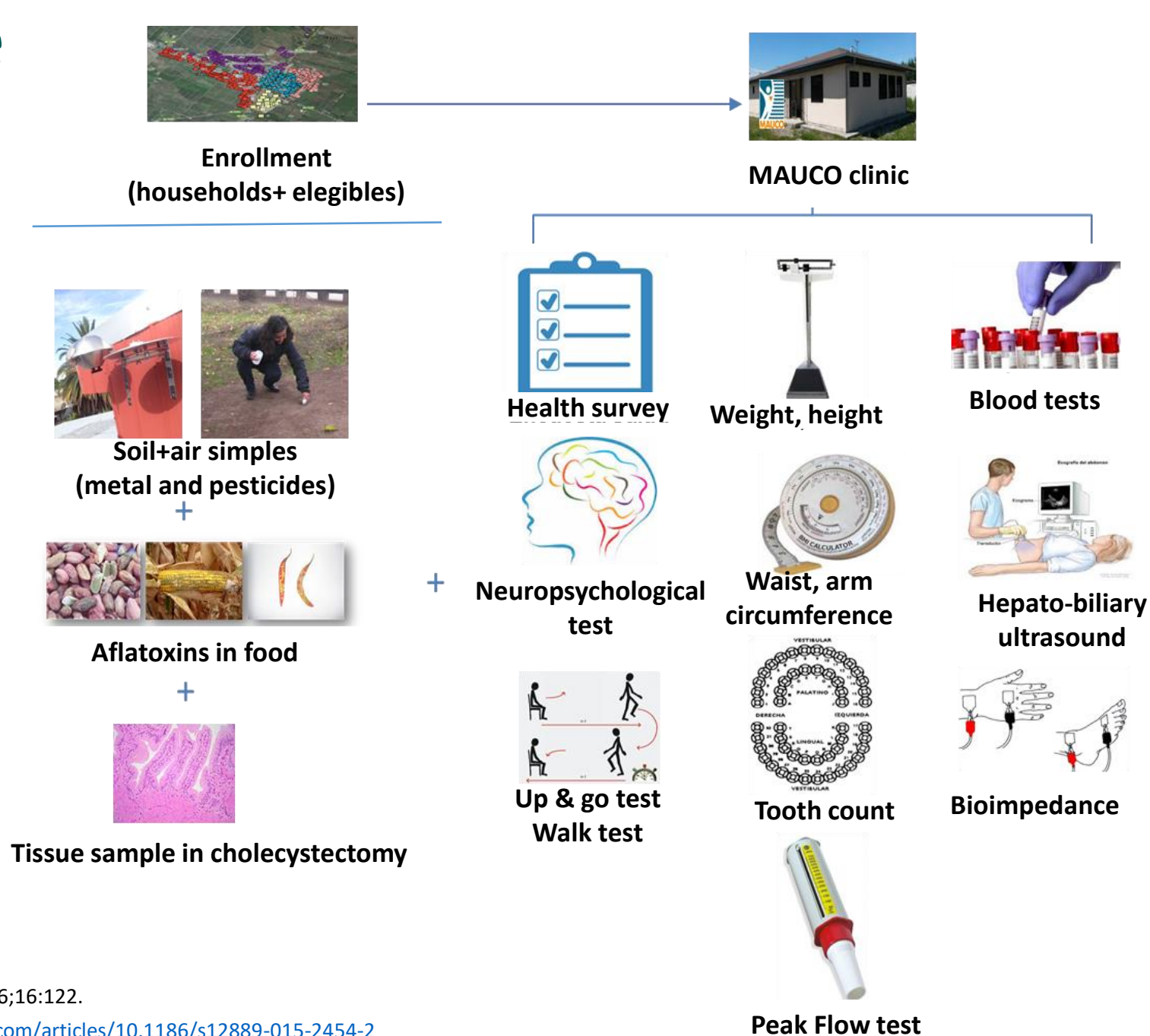


1. MAUCO objectives 2013

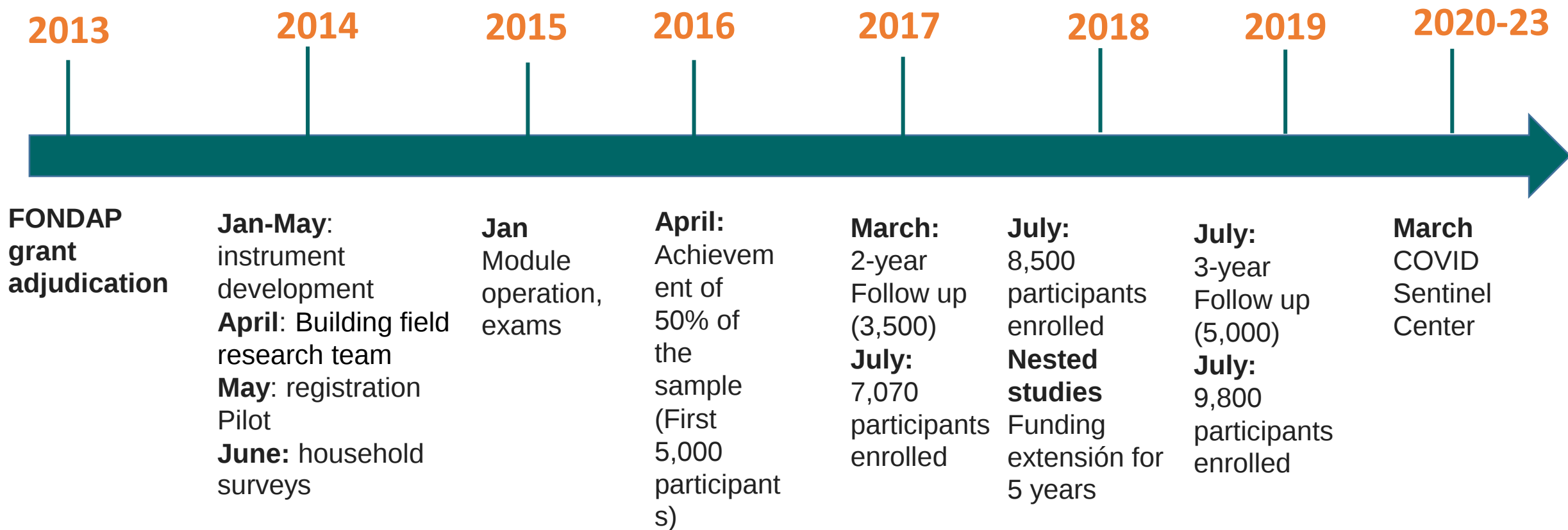
1. Assess physical and mental health at baseline; measure a wide range of **exposures associated with health and healthy aging**
2. Measure risk factors and collect samples for **future biomarkers assessments**
3. Evaluate **changes in exposures, health conditions and biomarkers**

Ongoing: Moving from descriptive to analytical study on causality, input prevention policies; omics technologies; joint analysis of data and samples.

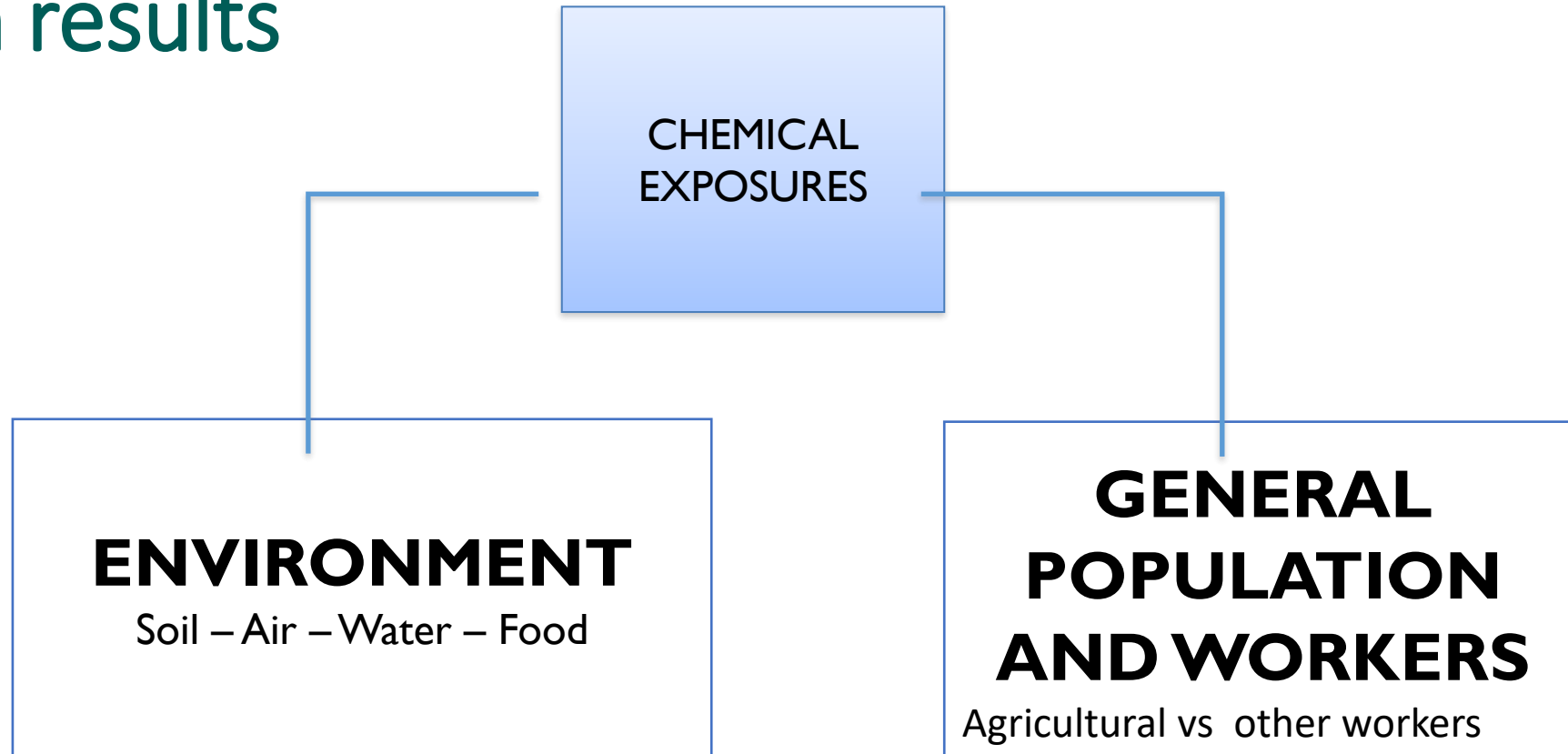
1. Baseline evaluation



Key features MAULE COHORT (MAUCO) - Chile



2. Main results



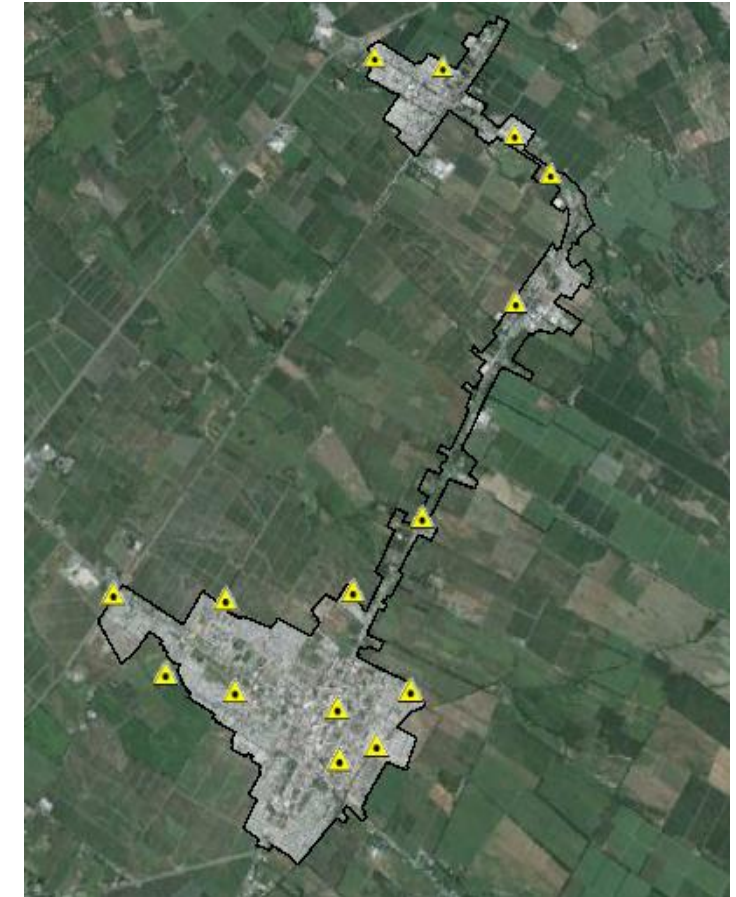
2. Pesticides exposure in MAUCO

2015 – 2017

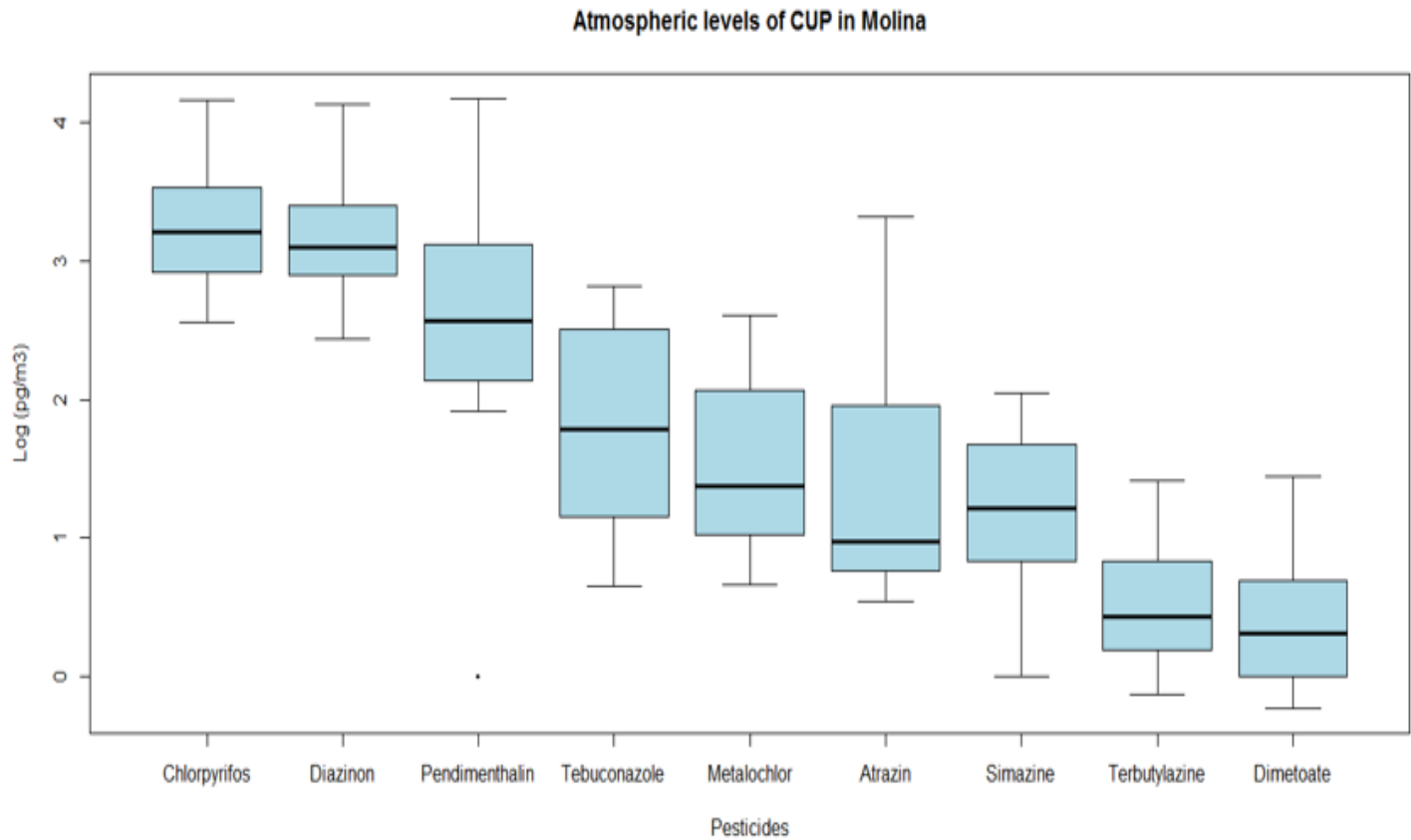
Air samples each 2-3 months

Analysis:

- Current organophosphorus pesticides, HAP, clorades (RECETOX, Czech Republic) (air)
- Metals (Chilean Atomic Energy Commission, Chile) (soil)



2. Currently used pesticides (CUP) in air



Cortes, S., et al. (2020).
doi:<https://doi.org/10.1016/j.apr.2019.12.023>

Detected	IARC
Atrazin	3 (1999)
Diazinon	2A (2017)
Dimetoate	
Chlorpyrifos	
Metolachlor	
Pendimethalin	
Metolachlor	
Simazine	3 (1999)
Tebuconazole	
Terbutylazine	
Alachlor	
Carbaryl	3 (1987)
Carbendazim	
Diuron	
Metazachlor	
Metribuzin	

Below LD	IARC
Acetochlor	
Azinfos-metyl	
Dimetachlor	
Disulfoton	
Fenitrothion	
Fenoxaprop ethyl	
Fenpropimorph	
Florasulam	
Fluroxypyr	
Fonofos	
Chlorsulfuron	
Chlortoluron	
Isoproturon	
Malathion	2A (2017)
Metamitron	
Methyl Parathion	3 (1987)
Phosmet	
Pirimicarb	
Prochloraz	
Propiconazole	
Pyrazon	
Temefos	
Terbufos	

<https://monographs.iarc.who.int/list-of-classifications>

2. Health conditions in MAUCO participants

Sociodemographic characteristic	All ^a <i>n</i> = 8970	Women <i>n</i> = 5052 (56.3%)	Men <i>n</i> = 3918 (43.7%)
Age, mean ± SD	53.5 ± 9.8	53.1 ± 9.7	53.9 ± 9.8
35–44	22.1	22.7	21.6
45–54	33.0	34.3	31.7
55–64	28.2	27.3	29.0
65–74	16.7	15.7	17.6
Self-identified ethnicity			
Chilean/Hispanic	96.9	97.3	96.6
Mapuche	2.5	2.1	2.8
Marital status			
Married	67.1	61.5	72.5
Separated/divorced	10.6	12.6	8.7
Widowed	5.9	9.4	2.6
Single	16.4	16.5	16.3
Schooling, mean ± SD	9.0 ± 4.1	8.8 ± 4.1	9.1 ± 4.1
≤8 years	49.2	49.4	49.0
9–12 years	38.7	39.1	38.4
≥13 years	12.1	11.6	12.6
Public health insurance	87.1	87.6	86.7
Currently employed	63.9	43.8	83.2
Agricultural worker (ever)	45.4	35.5	54.9

The high adherence to the public health system has allowed the implementation of a surveillance system based on health records

2. Health conditions in MAUCO participants

Health conditions		All ^a <i>n</i> = 8970 (100%)	Women <i>n</i> = 5052 (56.3%)	Men <i>n</i> = 3918 (43.7%)
Self-reported health status	Excellent, very good and good	44.7	37.9	51.2
	Fair	45.9	49.9	42.1
	Bad	9.1	12.2	6.2
Chronic conditions	Diabetes ^b	15.7	16.0	15.3
	Hypertension ^c	61.1	55.5	68.4
	Cardiovascular diseases ^d	7.3	7.0	7.5
	Myocardial infarction	2.5	2.2	2.8
	Heart failure	1.4	1.6	1.2
	Stroke	2.0	1.6	2.3
	Arrhythmia	1.1	1.2	1.1
	Cancer	3.5	5.2	1.8
	Non-infectious digestive diseases	31.3	42.3	20.7
	Digestive symptoms ^e	39.7	50.1	29.8
	Respiratory diseases	5.3	6.5	4.2
	Osteomuscular diseases ^f	5.2	8.1	2.5
Lifestyle factors	Alcohol intake (g) per week, ^g mean $\pm$ SD	57.5 $\pm$ 174.6	27.2 $\pm$ 113.7	86.6 $\pm$ 211.8
	Risky alcohol intake ^h	20.5	9.9	30.7
	Binge drinking ⁱ	20.8	11.0	30.3
	Sugary drinks consumption >2 times/day	14.4	9.1	19.5
	Processed meat consumption >4 times/week	7.9	6.8	8.9
	Vegetables consumption >1 time/day	66.4	73.6	59.5
	Fruits consumption >1 time/day	49.7	55.7	43.9
	Low physical activity ^j	92.7	92.6	92.7
	Smoking habit			
	Never smoker	41.5	48.6	34.6
	Current smoker	32.9	30.6	35.1
	Former smoker	25.6	20.7	30.3

2. Health conditions in MAUCO

Health conditions		All ^a <i>n</i> = 8970 (100%)	Women <i>n</i> = 5052 (56.3%)	Men <i>n</i> = 3918 (43.7%)
Mental health and cognitive examinations	Depressive symptoms (PHQ-2)	17.0	23.2	11.1
	ACE-R ^k , mean ± SD	73.2 ± 15.5	73.0 ± 15.5	73.3 ± 15.6
	MMSE ^l , mean ± SD	25.8 ± 4.1	25.9 ± 4.0	25.8 ± 4.2
Physical examinations	High blood pressure ^m	56.6	49.4	65.9
	Body mass index ≥ 30 kg/m ²	39.4	42.6	36.3
	High body fat percentage ⁿ	76.1	87.4	65.2
	Remaining teeth, mean ± SD	18.7 ± 9.2	18.0 ± 9.5	19.4 ± 8.8
	Peak expiratory flow < 80%	45.2	40.0	50.1
	Handgrip strength test (kg), ^o mean ± SD	30.0 ± 10.5	21.9 ± 5.5	36.9 ± 9.5
	Abnormal electrocardiogram (<i>n</i> = 6550)	5.4	4.4	6.3
Hepatobiliary ultrasound	Fatty liver (any degree)	47.5	47.3	47.7
	Cholecystectomized	18.3	28.4	8.6
	Gallstones	11.2	13.3	9.2
Laboratory examinations	Fasting blood glucose ≥ 100 mg/dL	30.0	26.1	33.7
	Fasting blood glucose ≥ 126 mg/dL	8.7	7.8	9.9
	LDL > 160 mg/dL	9.9	10.8	9.1
	Triglycerides ≥ 200 mg/dL	25.6	21.1	29.9
	HDL ≤ 50 mg/dL women, ≤ 40 mg/dL men	49.6	59.2	40.3
	AST (GOT) ≥ 35 U/L	16.4	12.7	20.0
	ALT (GPT) ≥ 35 U/L	32.3	22.7	41.6
	Metabolic syndrome ^p	47.6	50.8	44.6

3. Next steps MAUCO years 5 - 10

- Chile Biliary Longitudinal Study (Chile BiLS) – NCI-USA
- Biomonitoring of metals, mycotoxins, BPA and pesticides (n= 400 workers) – CCHEN – Ugranada – U.Lund
- Chronic kidney disease (www.cencam.net)
- Metabolomics (www.ihccglobal.org)

Publications

Ferreccio et al. *BMC Public Health* (2016) 16:122
DOI 10.1186/s12889-015-2454-2



STUDY PROTOCOL

Open Access



Study protocol for the Maule Cohort (MAUCO) of chronic diseases, Chile 2014–2024



Atmospheric Pollution Research

Volume 11, Issue 4, April 2020, Pages 776–784



First measurement of human exposure to current use pesticides (CUPs) in the atmosphere of central Chile: The case study of MaucO cohort

Sandra Cortes ^{a, b, c}  , Karla Pozo ^{d, e}, Yasna Llanos ^f, Natalia Martínez ^g, Claudia Foerster ^h, Cinthya Leiva ^c, Javier Ustáriz ^f, Petra Přibyllová ^e, Jana Klánová ^e, Héctor Jorquera ^{b, f}



Atmospheric Pollution Research

Volume 13, Issue 5, May 2022, 101411



Local and regional sources of organochlorine pesticides in a rural zone in central Chile

Yasna Llanos ^{a, b}, Sandra Cortés ^{b, c, d}, Andrés Martínez ^e, Karla Pozo ^{f, g}, Petra Přibyllová ^f, Jana Klánová ^f, Héctor Jorquera ^{a, b}  

Mycotoxin Research (2020) 36:63–72
<https://doi.org/10.1007/s12550-019-00369-5>



ORIGINAL ARTICLE



Occurrence of relevant mycotoxins in food commodities consumed in Chile

Claudia Foerster ¹  • Katherine Muñoz ² • Lorena Delgado-Rivera ³ • Andrea Rivera ⁴ • Sandra Cortés ^{5,6} • Andrea Müller ¹ • Gabriel Arriagada ¹ • Catterina Ferreccio ⁴ • Gisela Ríos ⁷



toxins

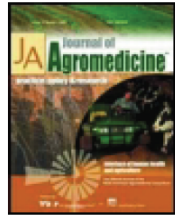


Article

Assessment of Mycotoxin Exposure in a Rural County of Chile by Urinary Biomarker Determination

Claudia Foerster ^{1,*} , Gisela Ríos-Gajardo ², Patricia Gómez ², Katherine Muñoz ³, Sandra Cortés ^{4,5} , Carlos Maldonado ¹ and Catterina Ferreccio ⁵

Publications



Journal of Agromedicine



ISSN: 1059-924X (Print) 1545-0813 (Online) Journal homepage: <https://www.tandfonline.com/loi/wagr20>

Gender differences in respiratory health outcomes among farming cohorts around the globe: findings from the AGRICOH consortium

Community Mental Health Journal (2020) 56:1284–1291
<https://doi.org/10.1007/s10597-020-00605-8>

ORIGINAL PAPER



Validity and Performance of the Patient Health Questionnaire (PHQ-2) for Screening of Depression in a Rural Chilean Cohort

Constanza Caneo¹ · Pablo Toro^{1,2} · Catterina Ferreccio³ on behalf of the Maucos Research Team

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Cohort Profile



Cohort Profile

Cohort Profile: The Maule Cohort (MAUCO)

Catterina Ferreccio,^{1,2*} Andrea Huidobro,^{1,3} Sandra Cortés,^{1,2,4}
Claudia Bambs,^{1,2} Pablo Toro,^{1,2} Vanessa Van De Wyngaert,^{1,2}
Johanna Acevedo,^{1,5} Fabio Paredes,^{1,2} Pía Venegas,^{1,2} Hugo Verdejo,^{1,2}
Ximena Oyarzún-González,^{1,6} Paz Cook,^{1,2} Pablo F Castro,^{1,2}
Claudia Foerster,^{1,7} Claudio Vargas,^{1,8} Jill Koshiol^{1,9}

Received: 6 August 2019 | Revised: 25 November 2019 | Accepted: 27 November 2019
DOI: 10.1002/pds.4941

ORIGINAL REPORT

WILEY

Polypharmacy in a semirural community in Chile: Results from Maule Cohort

Ximena Oyarzún-González^{1,2,3} | Catterina Ferreccio^{3,4} | Erin L. Abner^{1,2,5} |
Claudio Vargas^{3,6} | Andrea Huidobro^{3,7} | Pablo Toro^{3,4}

Thanks!

Merci beaucoup!

Muchas Gracias

