



**Progetto Pest Practice:
Final event**

The Economics of an Area Wide- Integrated Pest Management Plan for Tiger Mosquito

The case of Emilia-Romagna Region, Italy

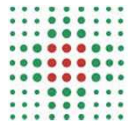
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(Servizio Sanitario Regionale Emilia-Romagna)



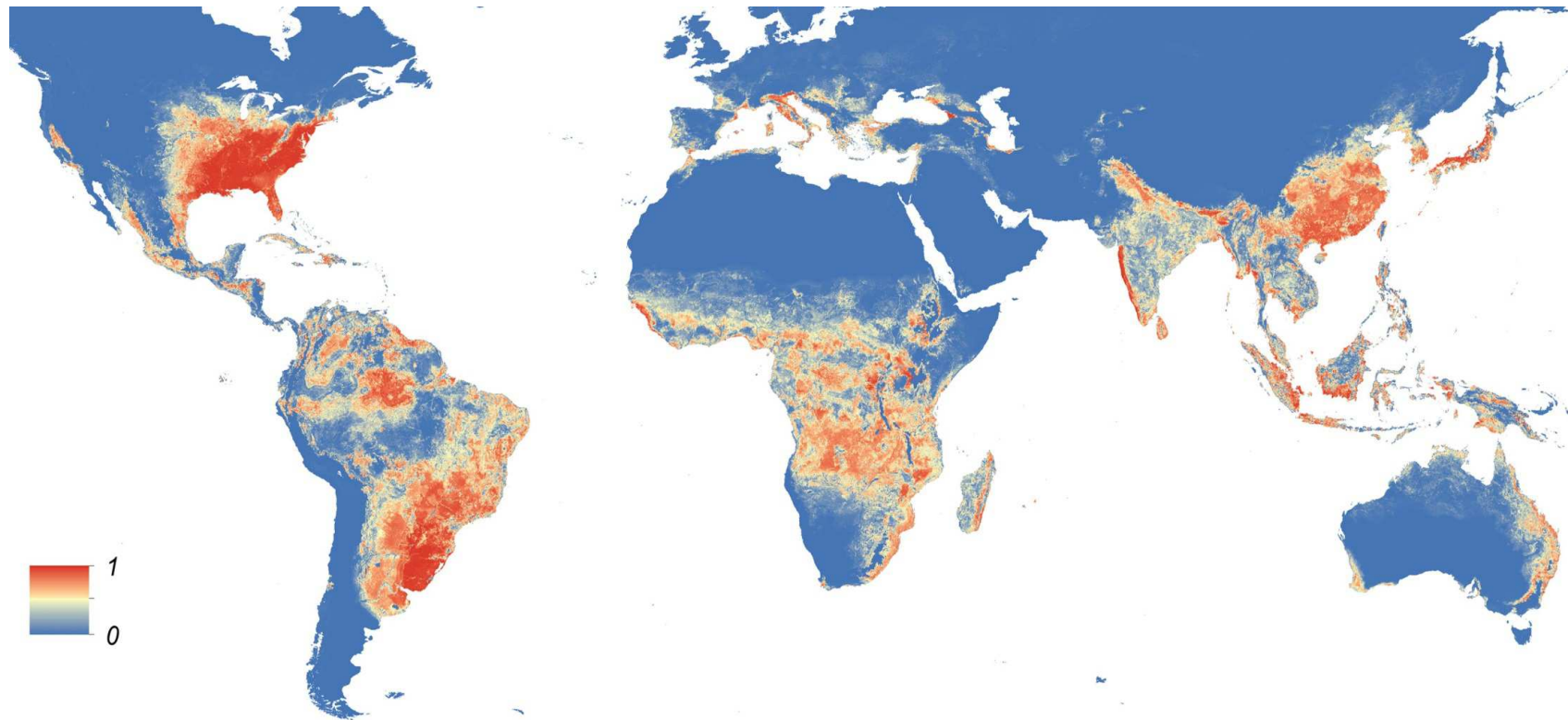
**SERVIZIO SANITARIO REGIONALE
EMILIA-ROMAGNA**



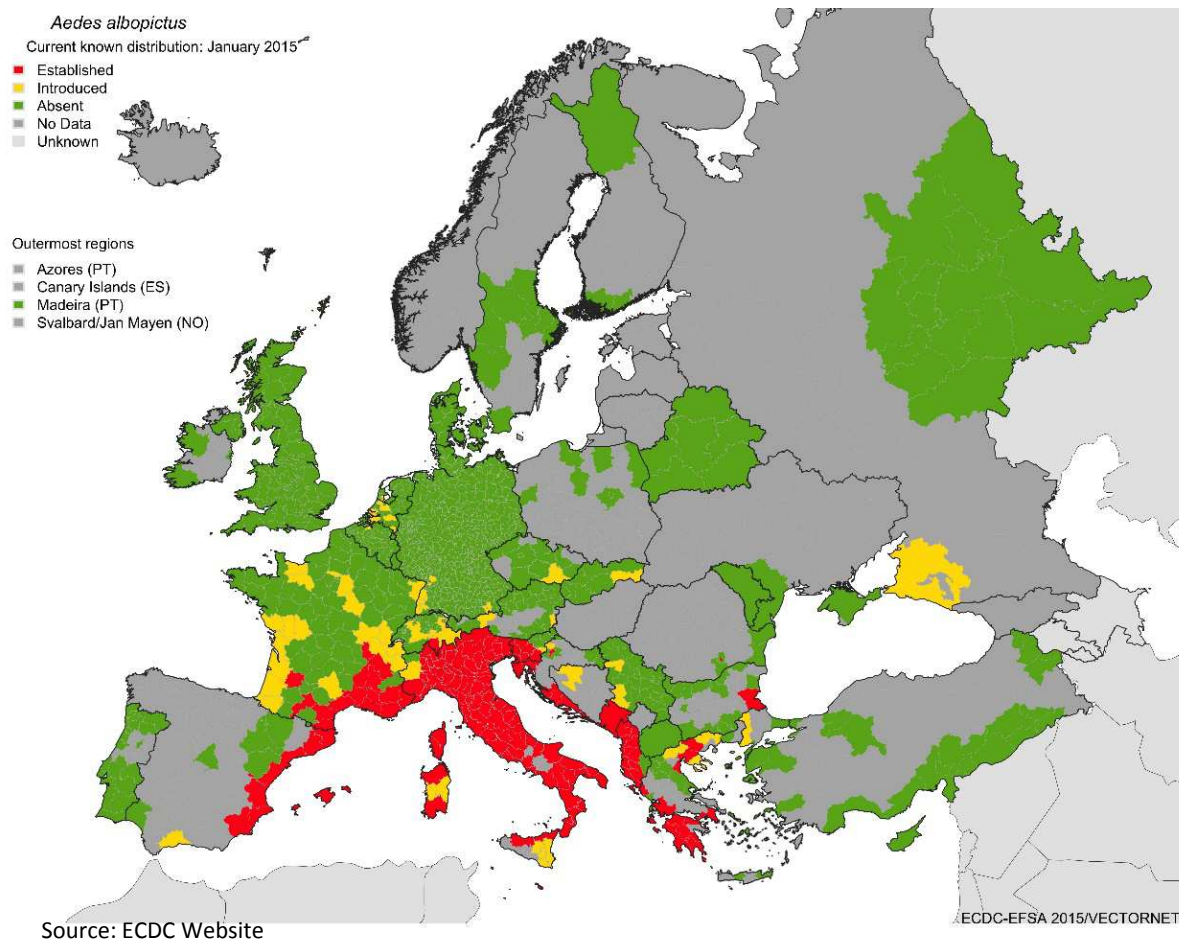
**DIPARTIMENTO DI SCIENZE E TECNOLOGIE
AGRO-ALIMENTARI**

Aedes albopictus – A global challenge

A. albopictus can be currently found in temperate and tropical Asia, most of Pacific Ocean islands, Africa, Northern and Latin America and Southern Europe. It is now considered to be the most invasive mosquito species



Aedes albopictus - Current distribution in Europe



The map shows the current known distribution in Europe (January 2015) of *A. albopictus* at regional administrative level NUTS3 (Source: European Centre for Disease Prevention and Control)

The map is based on confirmed data (published and unpublished) provided by experts from the respective countries as part of the VBORNET project

See more at:

http://ecdc.europa.eu/en/healthtopics/vectors/vector-maps/Pages/VBORNET_maps.aspx#sthash.2B0IUdev.dpuf

***Aedes albopictus* – The costs of the control**

- By the PUBLIC SECTOR: Regional Plan of the Emilia-Romagna Regional Health Authority for the fight against the Asian tiger mosquito and the prevention of Chikungunya and Dengue Fever
- By the PRIVATE HOUSEHOLDERS: Expenditure incurred by people to protect themselves from mosquito bites. Many kind of repellents, mosquito nets, etc..

Emilia-Romagna Area Wide Integrated Pest Management (E-R AW-IPM) Plan – Some figures

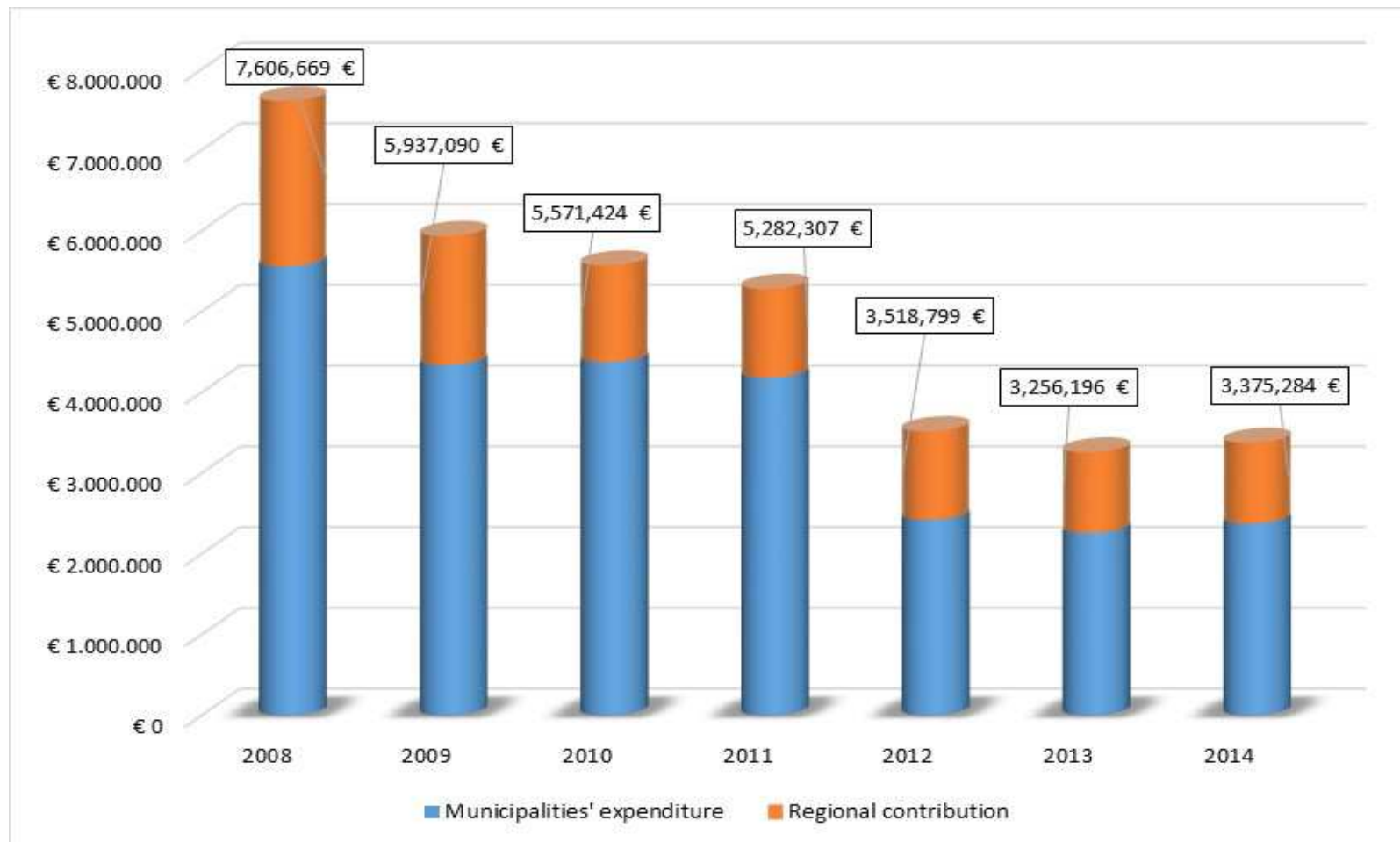
- Total area of the Emilia-Romagna region 22,452.78 Km²
- About **280 Municipalities involved** every year, over a total of 348 Municipalities in the region
- About **4.2 million people involved** every year, or 96% of the total population of the region
- 2015 is the 8th year of operation of the Plan

AW-IPM activities of the Regional Plan implemented by municipalities

Financial contribution of the Regional Health Authority

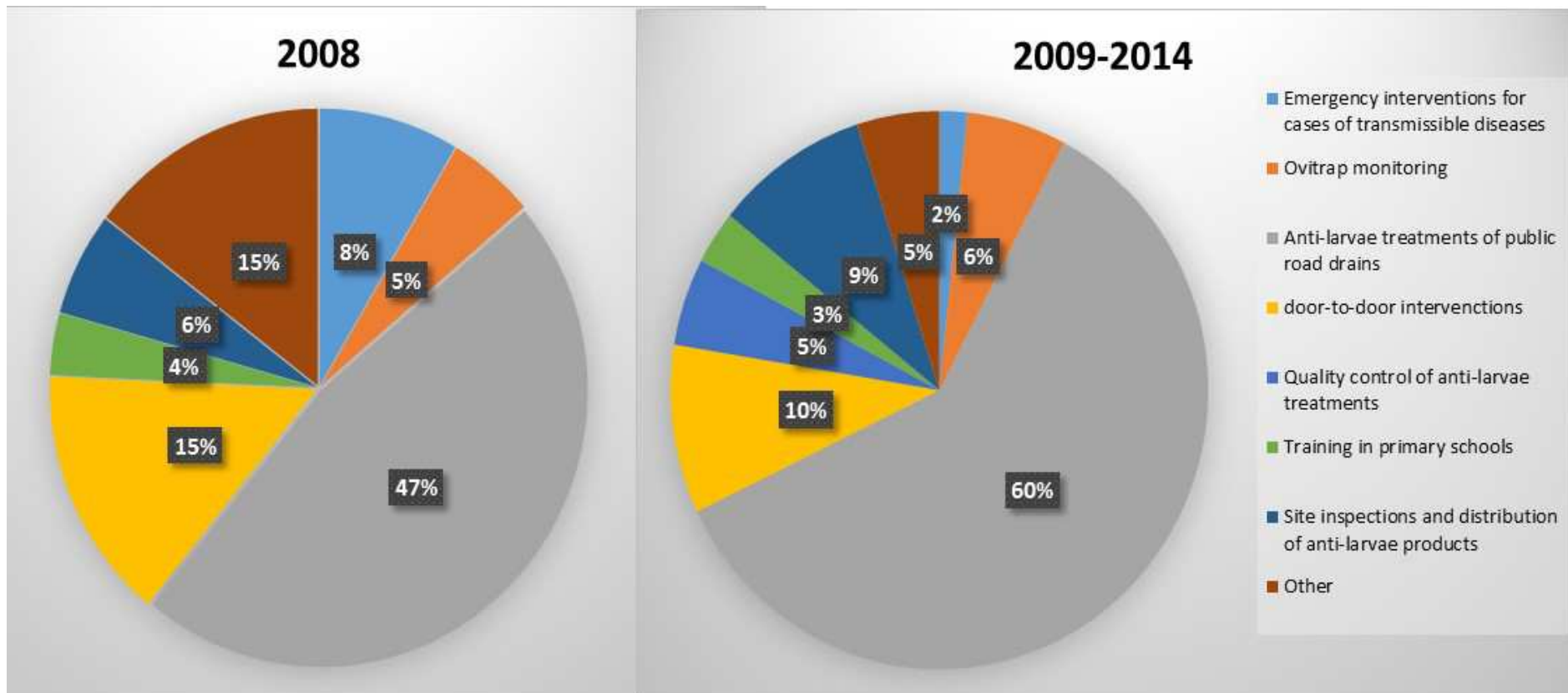
(1) Monitoring the intensity of the tiger mosquito infestation through a network of about 2,700 ovitraps distributed on the ER territory;	Lump sum supposed to cover 100% of the municipality expenditure;
(2) Regular anti-larvae treatments (from May to October) of road drains in public areas;	Variable % of the municipality expenditure, depending on the RHA budget remains after payment of (1), (4), (6), and (8);
(3) Door-to-door anti-larvae treatments in private areas;	The same as (2);
(4) Quality controls on the efficacy of anti-larvae treatments (b) in public areas;	50% of the municipality expenditure;
(5) Information to citizens through various activities (information campaigns, distribution of anti-larvae products, inspections in private areas under request, etc.);	The same as (2);
(6) Information activities in primary schools;	Lump sum supposed to cover 100% of the municipality expenditure;
(7) Other activities undertaken by municipalities;	The same as (2);
(8) In case of detection of potentially viraemic patients, a protocol activates emergency actions to reduce the possibility of epidemic outbreaks: this includes treatments against adult mosquitoes aimed at isolating the potential outbreak hotspots.	100% of the municipality expenditure;
(9) Delivering of municipality ordinances requiring citizens to adopt good practices to prevent proliferation of tiger mosquitoes in private areas (courtyards, gardens, etc.);	No specific expenditure from public administrations;

Total expenditure for the implementation of the E-R AW-IPM Plan (2008-2014)

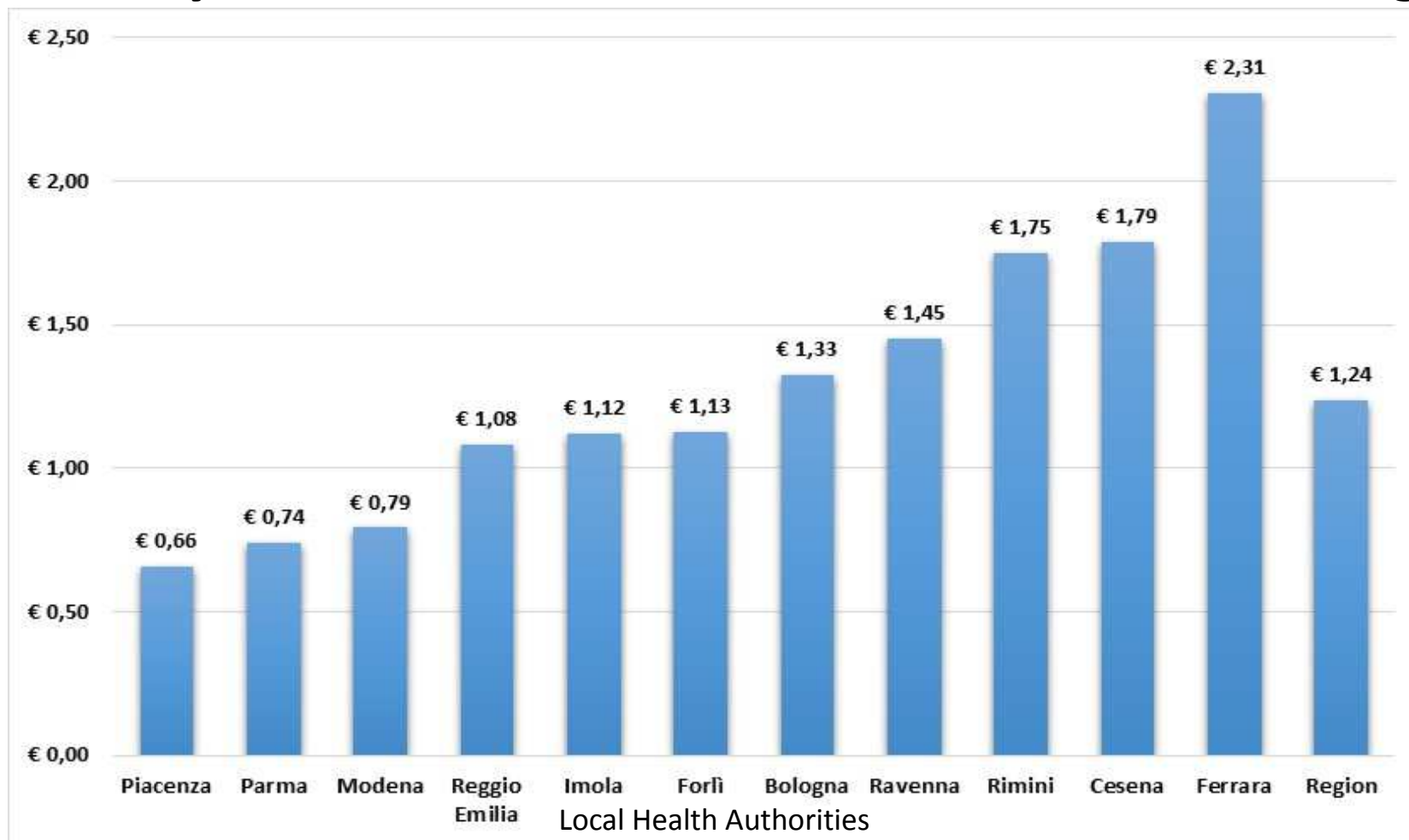


Distribution of the expenditure among the activities of the AW-IMP Plan

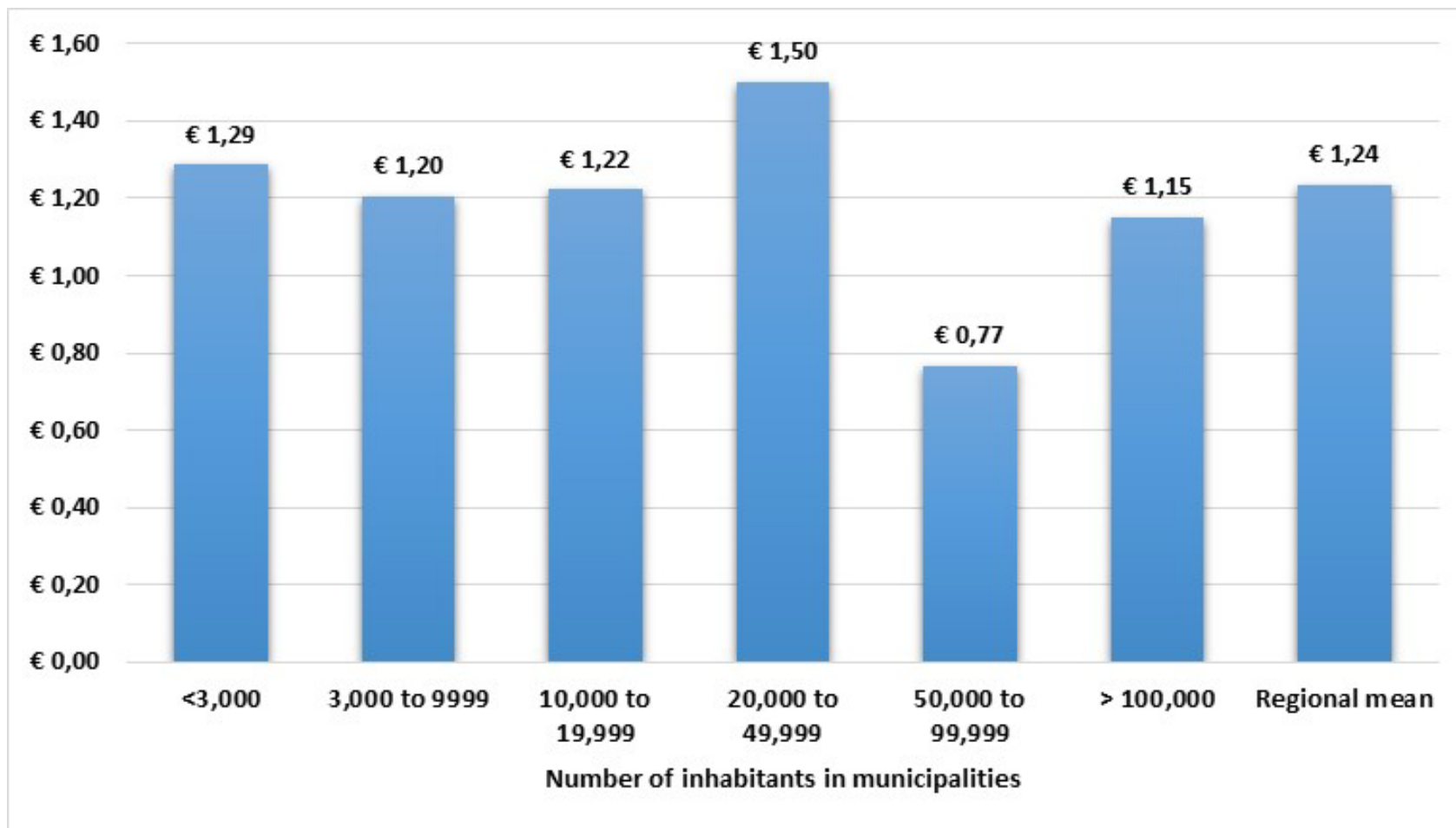
(2008 compared to 2009-2014 mean)



Municipalities' mean expenditure per capita (2009-2014) for the activities of the AW-IPM Plan in territory of the Local Health Authorities and in the region

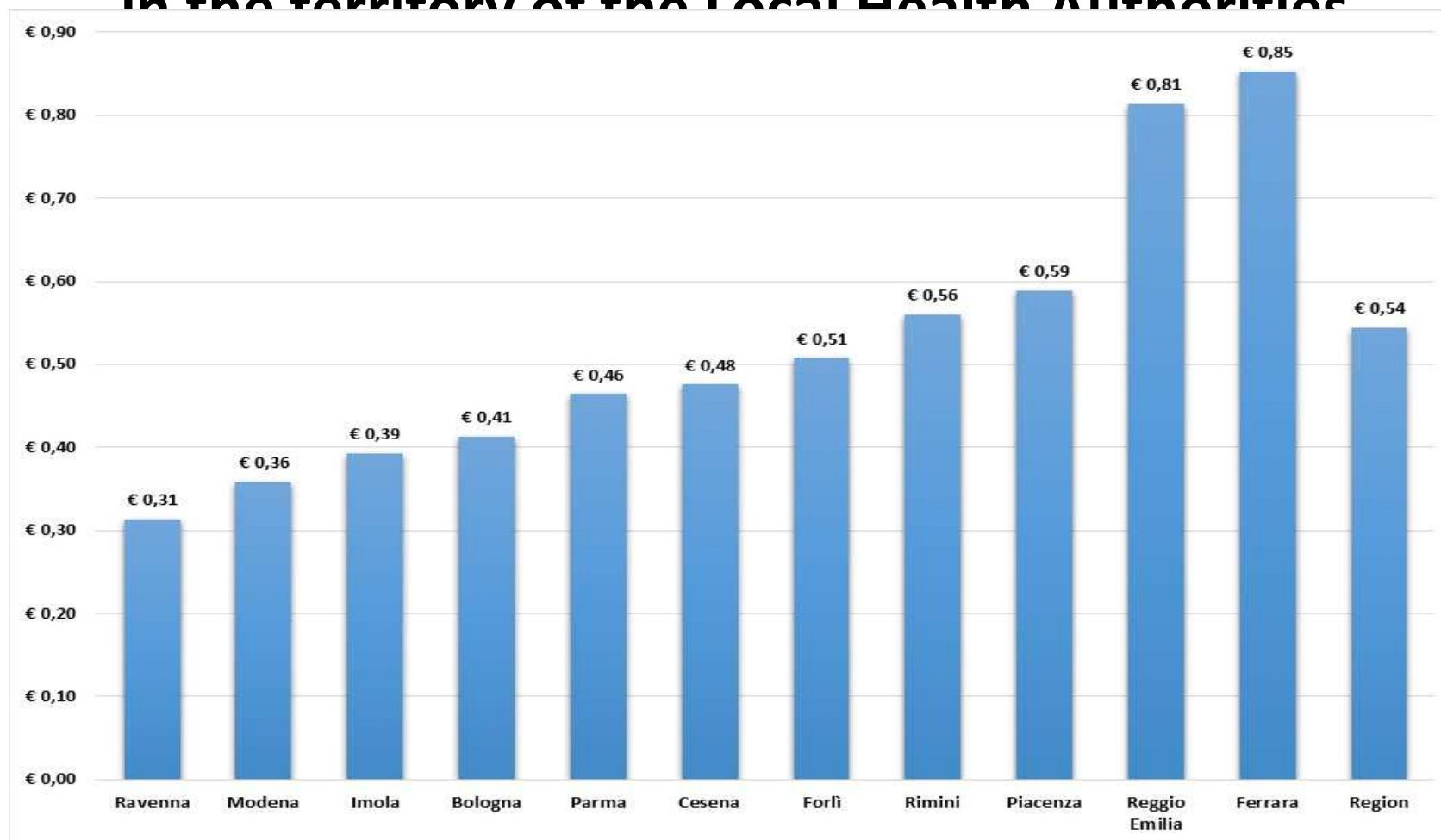


Municipalities' mean expenditure per capita (2009-2014) for the activities of the AW-IPM Plan by municipalities' demographic size



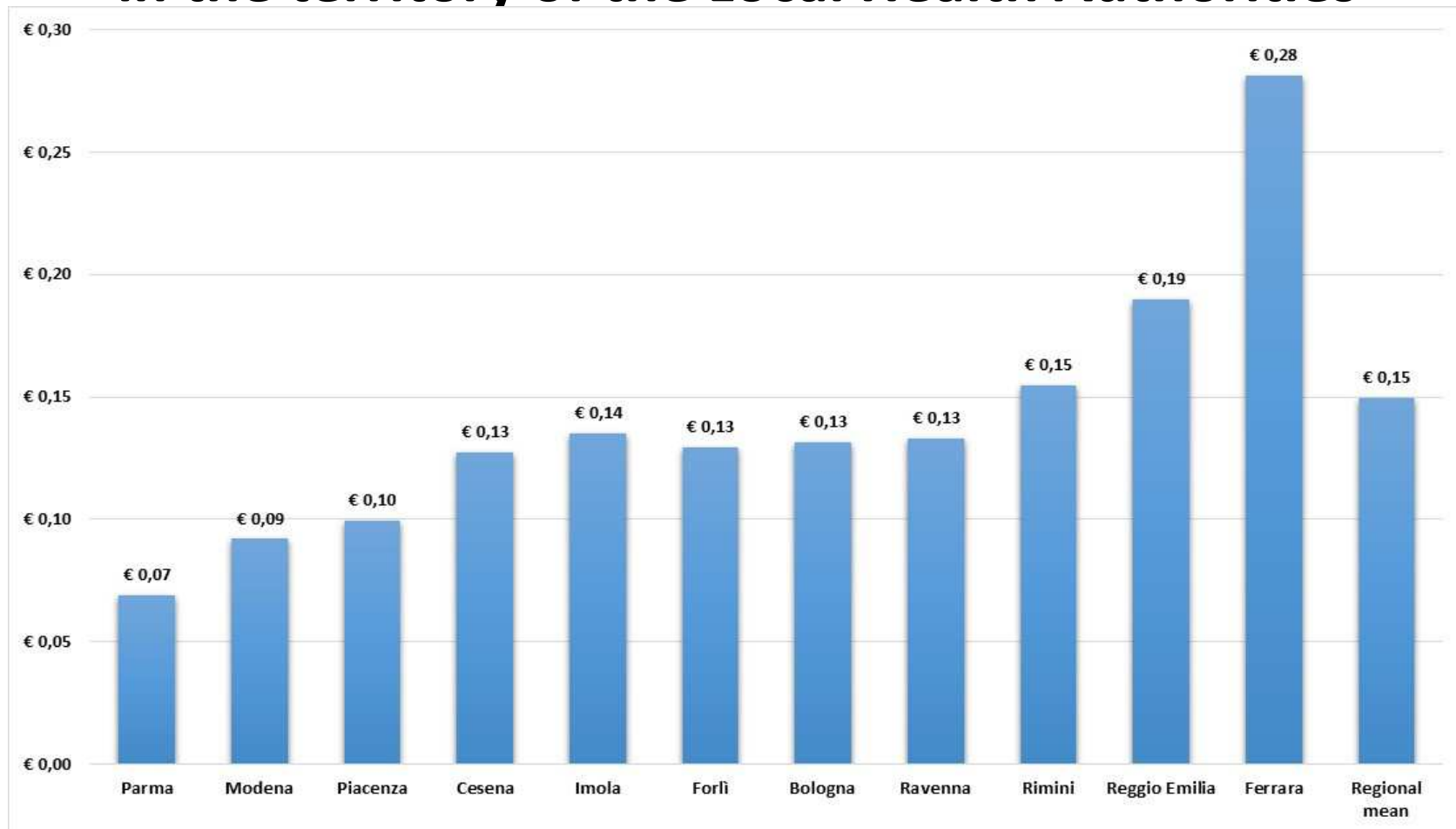
Municipalities' mean expenditure (2009-2014) per one single anti-larvae dose distributed in road drains

in the territory of the Local Health Authorities



Municipalities' mean expenditure per capita (2009-2014)

for one round of anti-larvae treatments
in the territory of the Local Health Authorities



Organizational aspects of the E-R AW-IPM plan at municipality level and reasons for variability of expenditure

Main Functions

- Anti-larvae interventions
- Anti-adult interventions
- Quality control of anti-larvae treatments
- Purchase of anti-larvae products
- Information to citizens
- Technical coordination

Entrustment

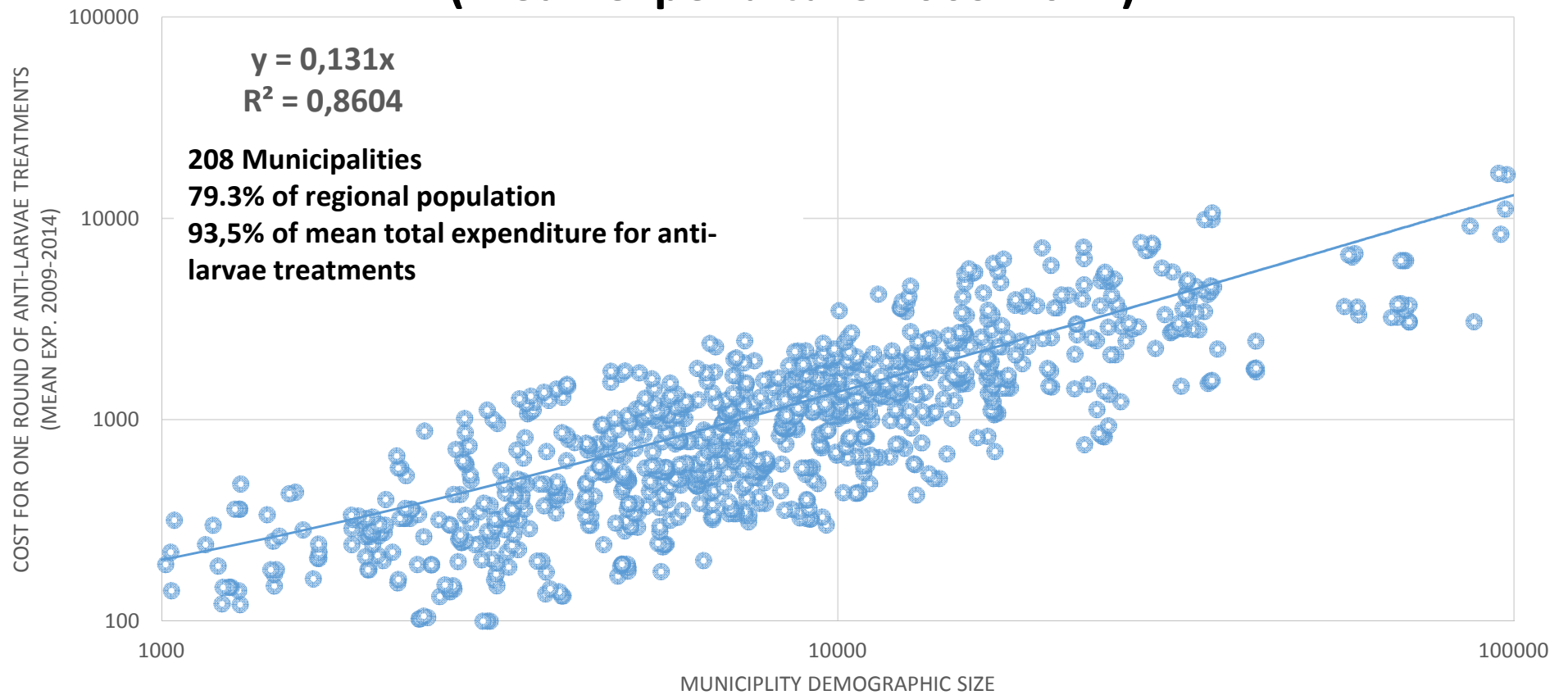
- Municipality services
- To external entities through direct procurement procedures
- To external entities through calls for tender

High variability of the costs

- Different types of entrustment
- Different budget potential
- Different perception (by local administrations) of the health risk and nuisance

Correlation between the expenditure for a round of anti-larvae treatments and municipality demographic size

(mean expenditure 2009-2014)



A.albopictus – The cost incurred by private householders

The **COSFA-T Project**: indagine sui Costi Sostenuti dalle Famiglie a causa della presenza della Zanzara Tigre

- Pilot phase realized as part of my PhD, supervised by Massimo Canali (University of Bologna) & Philippe Beutels (University of Antwerp)
- In collaboration with:
 - Ausl della Romagna – Cesena
 - Centro Agricoltura Ambiente «Giorgio Nicoli»
 - Gruppo di Coordinamento Tecnico Regionale «Lotta alla Zanzara Tigre»

The COSFA-T Pilot phase – Methodology

- Telephonic interviews with a structured questionnaire to a sample of householders randomly selected among the population
- Sections of the questionnaire:
 1. Characteristic of the dwelling (kind of dwelling, environment, presence of children, number of people...)
 2. Presence of invasive species and nuisance produced (which species, level of nuisance and expenditure incurred)
 3. Tiger mosquito (level of nuisance, use of gardens, perceived health risk, kind of products used and expenditure..)
 4. Initiatives of the apartments building
 5. Socioeconomic status

The COSFA-T Pilot phase – Methodology

2

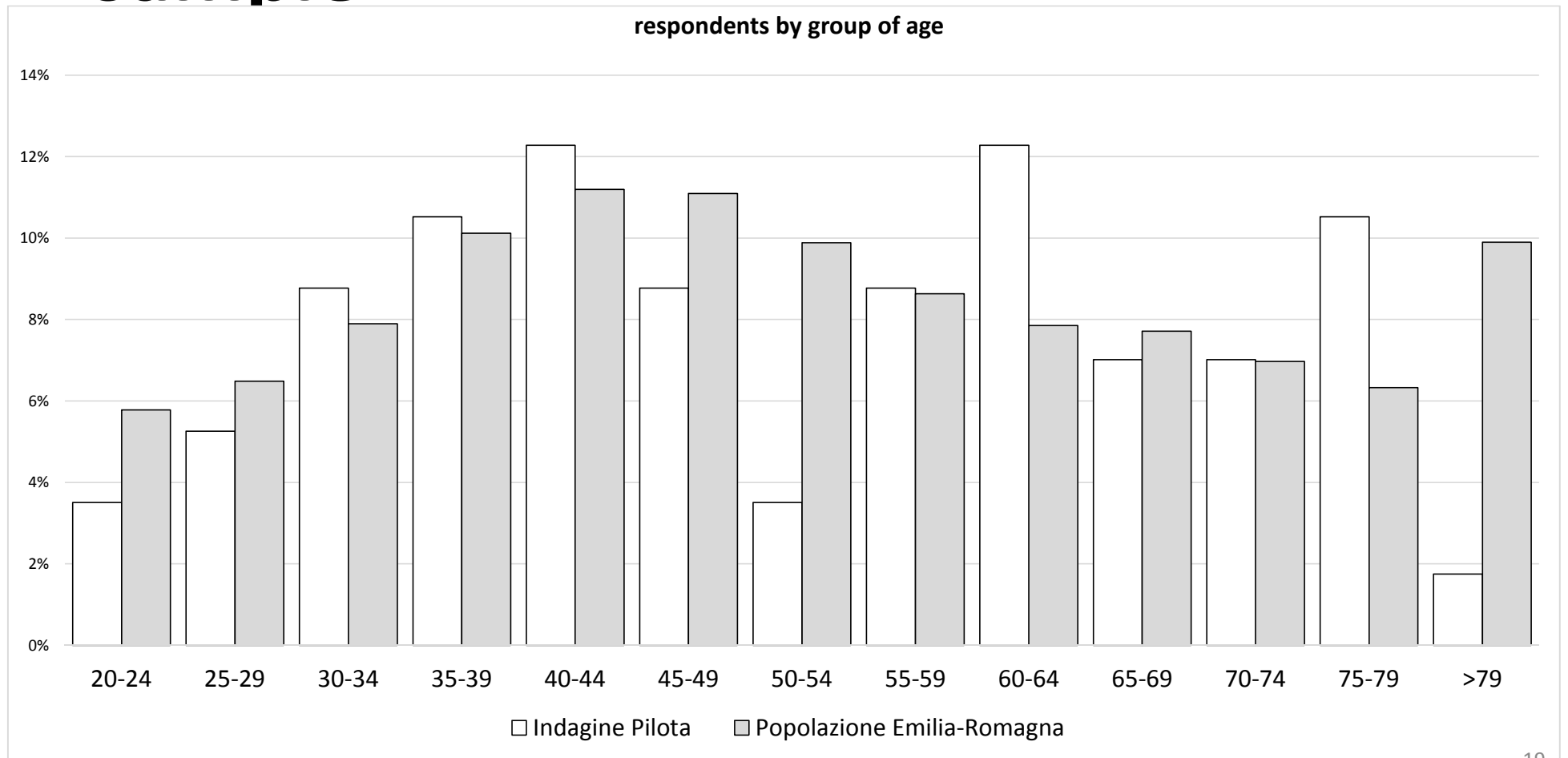
The sample:

- Extraction among E-R residents up to 20 years old
- Municipality demographic dimension, 3 groups: 0-10k, 10k-50k, more than 50k inhabitants
- Geographic position: 11 groups, one for each of the LHAs

The COSFA-T Pilot phase - Realized interviews

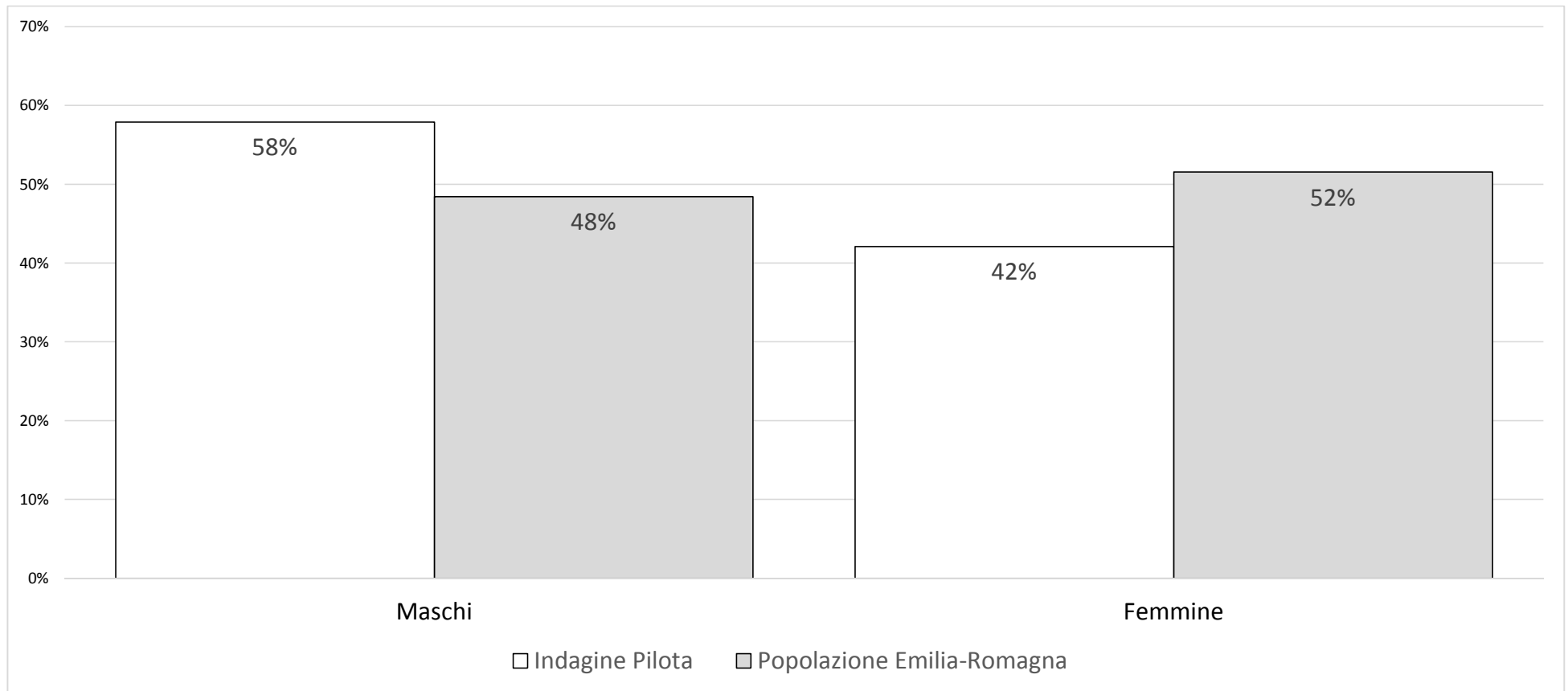
LHA/AUSL	Realized interviews	Planned interviews	% of realized	refused	Not found or other
Bologna	12	29	41%	4	22
Cesena	7	7	100%	4	4
Forlì	4	6	67%	3	6
Imola	4	4	100%	0	4
Parma	5	15	33%	2	17
Ravenna	7	13	54%	9	7
Reggio Emilia	8	17	47%	4	7
Rimini	10	11	91%	5	5
Totale	57	102	56%	27	50

The COSFA-T Pilot phase – The sample

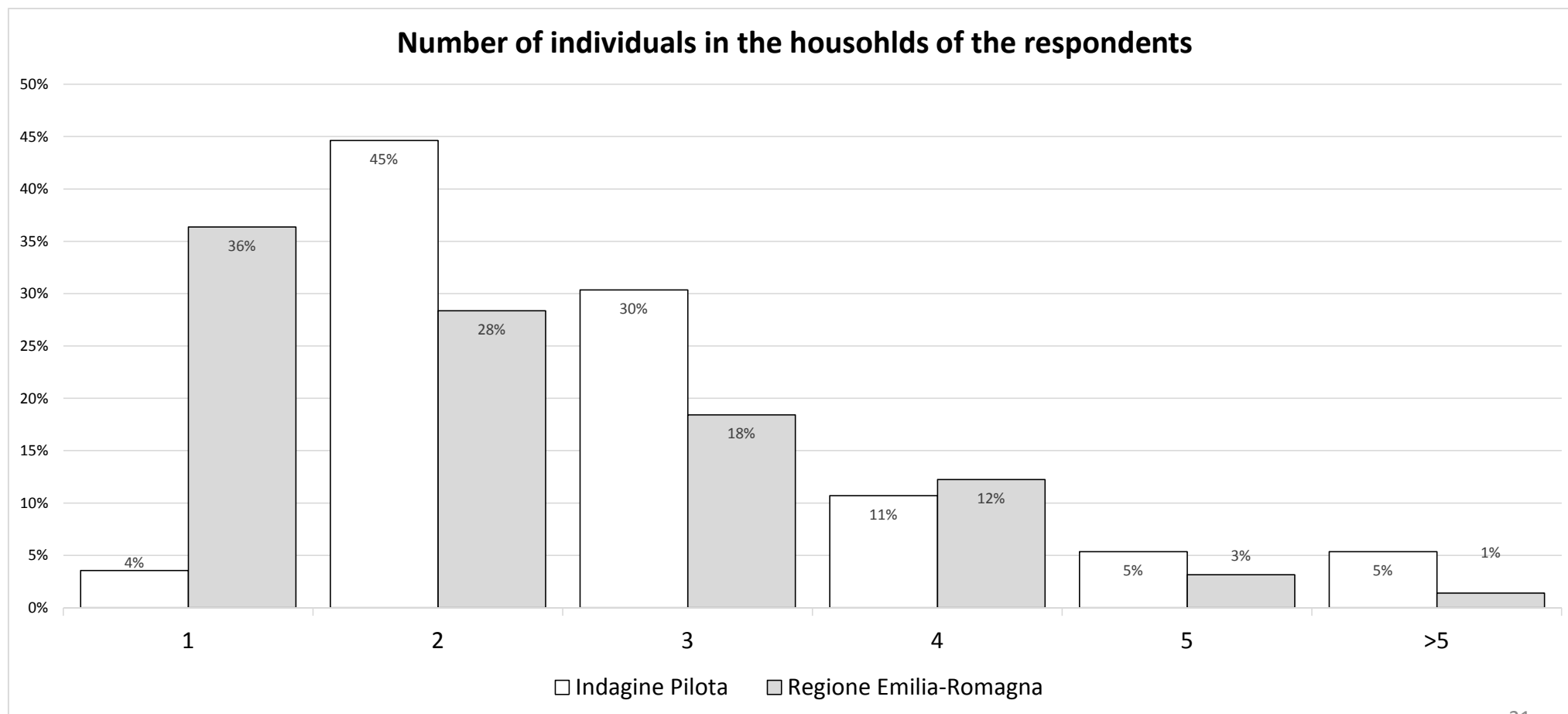


The COSFA-T Pilot phase – The sample

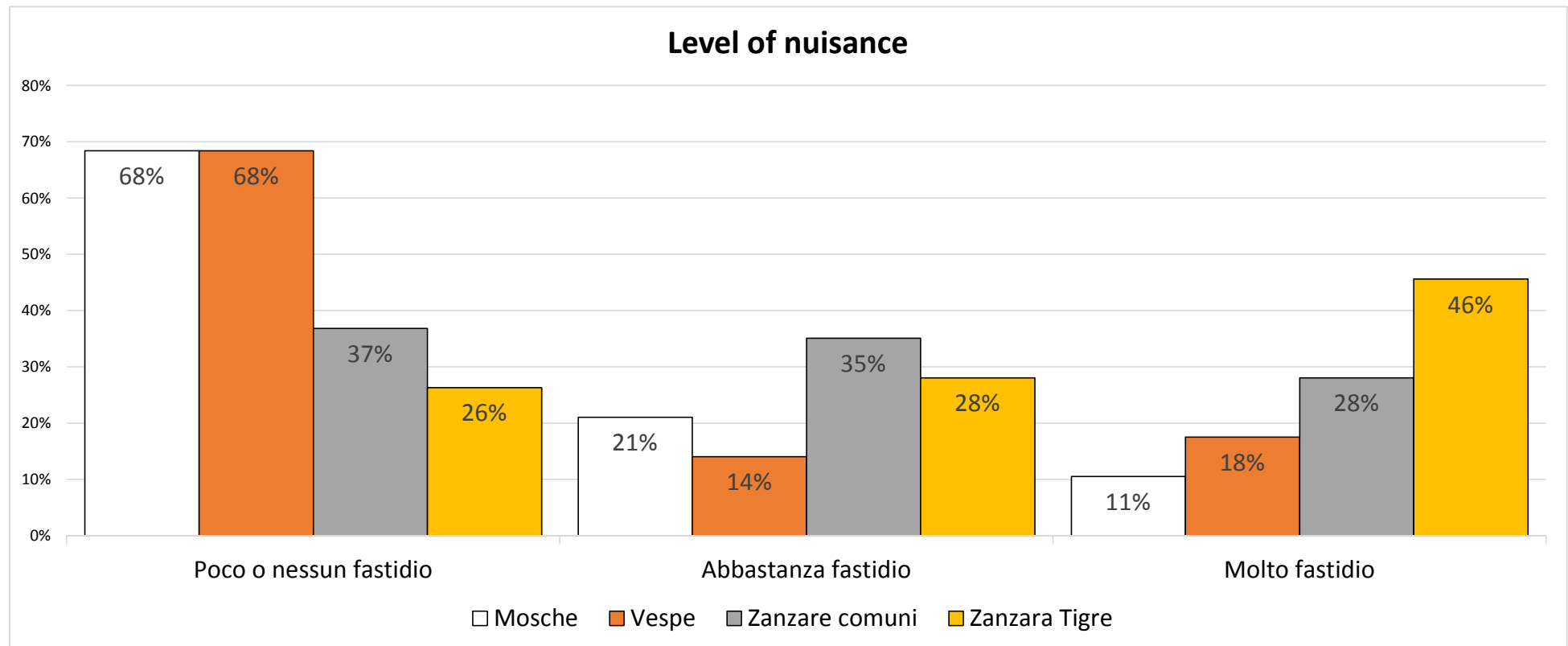
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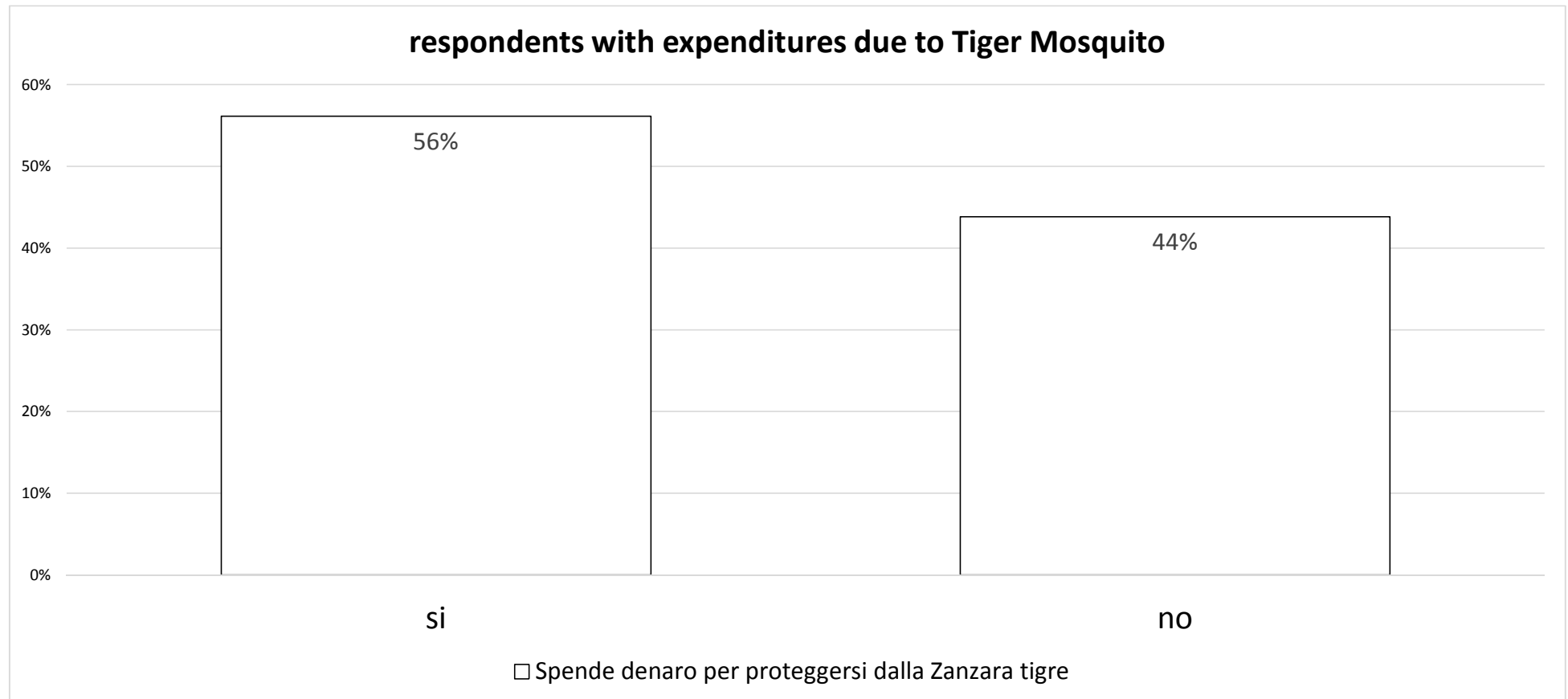
The COSFA-T Pilot phase – The sample 3



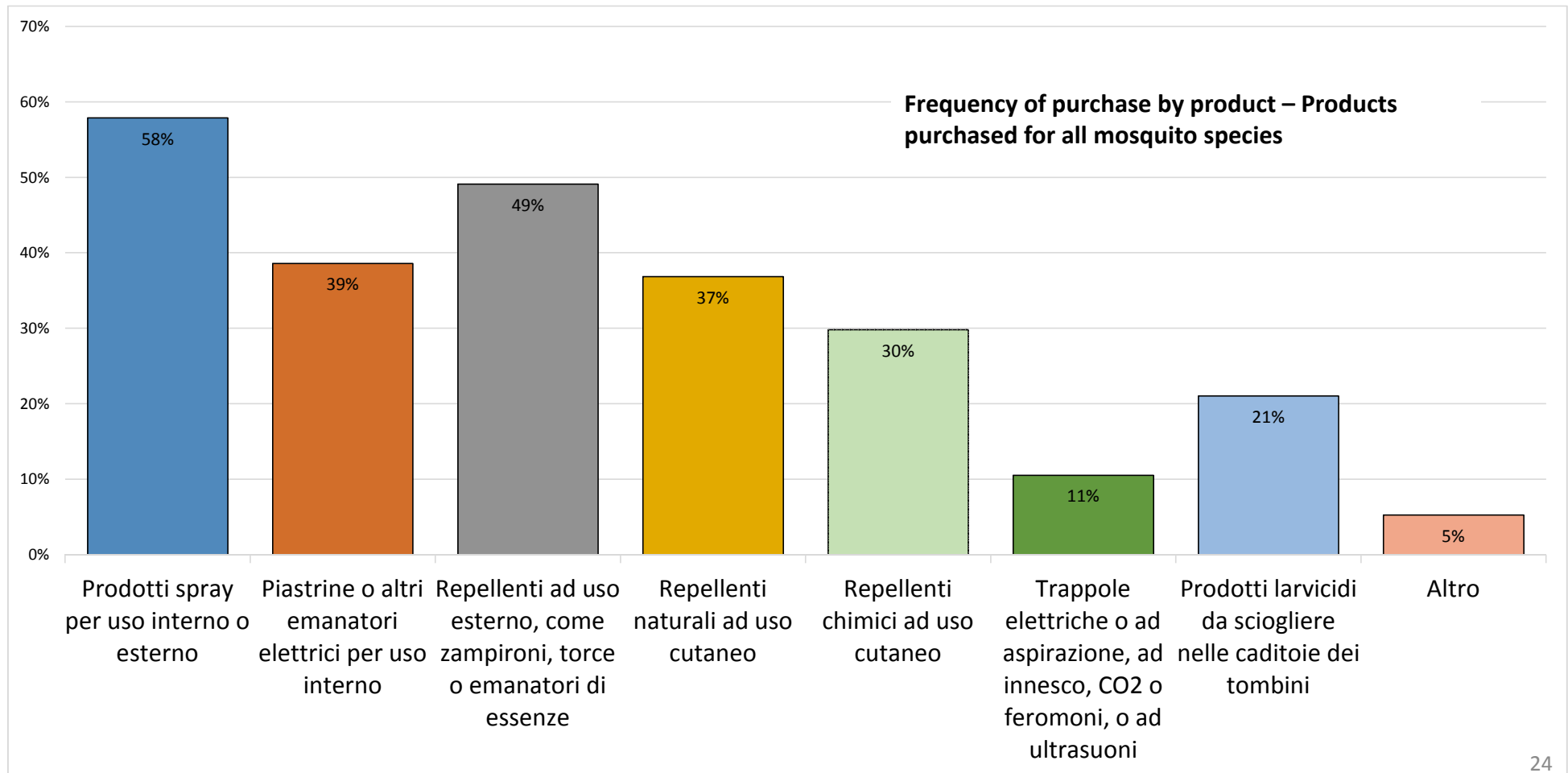
The COSFA-T Pilot phase - Results



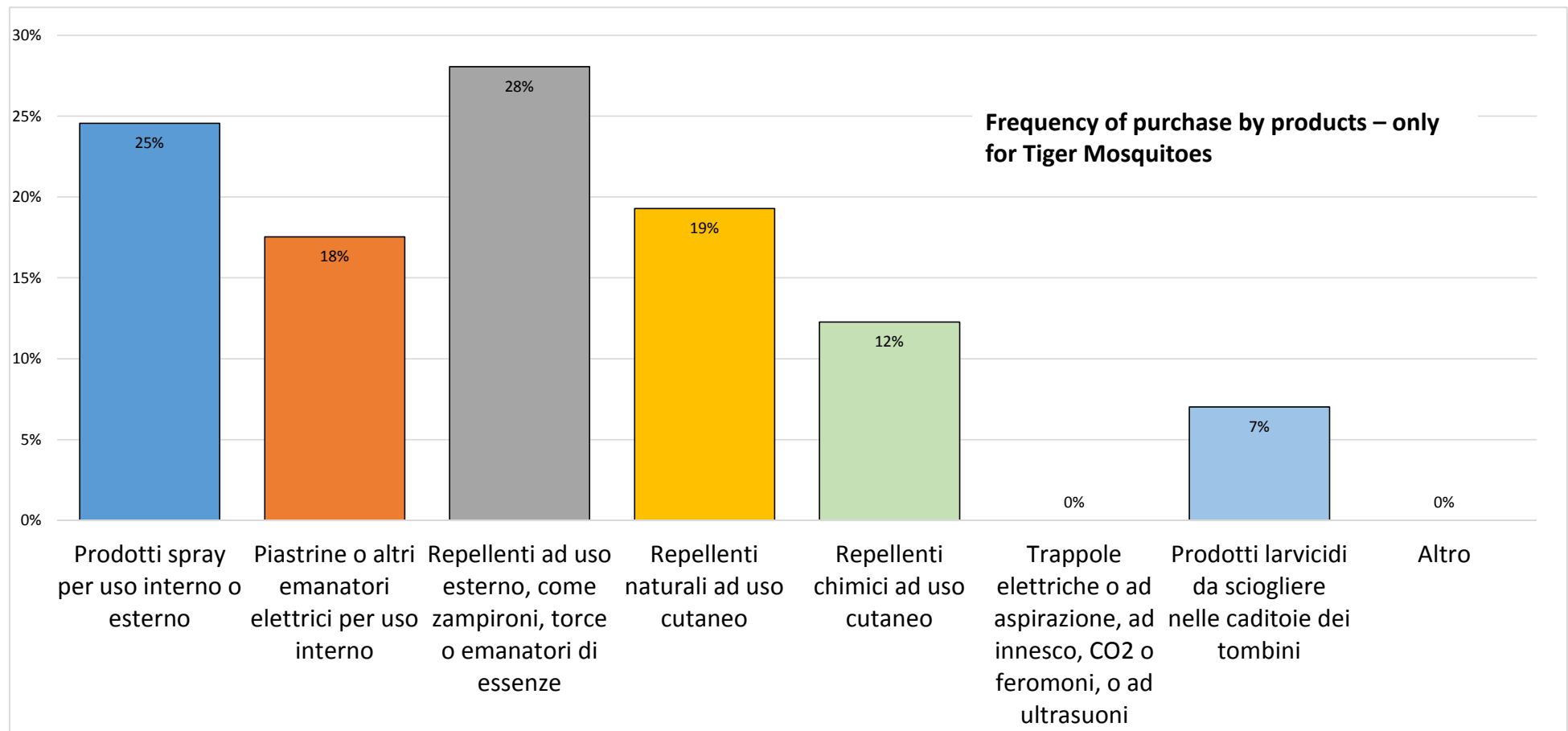
The COSFA-T Pilot phase – Results 2



The COSFA-T Pilot phase – Results 3



The COSFA-T Pilot phase – Results 4



The COSFA-T Pilot phase – Results 5

- Mosquito nets:
 - 77% of respondents declared to have mosquito nets at home
 - Mean expenditure between those who remember, €922,86
 - Mean lifetime of the nets: 20 years
- Apartment building control activity:
 - 27% of the respondents (7 on 26)
 - Mean expenditure (only 4 answers): €45,38

The COSFA-T Pilot phase – Results 6

Attività di prevenzione considerate	Frequenze assolute	Frequenze relative	Spesa media*
Prodotti acquistati esclusivamente per la zanzara tigre (A)	28	49%	€18,25
(A) + prodotti acquistati per difendersi dalle zanzare e altri insetti (B)	51	89%	€28,84
(A) + installazione delle zanzariere (C)	50	88%	€36,06
(A) + (B) + (C)	55	96%	€46,65
(A) + (B) + (C) + Attività condominiali (D)	55	96%	€49,83

A comment on the results

It was only the Pilot phase of COSFA-T Project, and the results can't be generalised for the Emilia-Romagna population

If €18,25 was the average household expenditure in the region, then the private expenditure could exceed €30 million

But at this stage we can't say it, more interviews are needed!

Aedes albopictus - A “weakest link” problem

- For public good economics, mosquito control poses a weakest link problem, i.e. the level of protection of the whole community depends on the level of protection given by the weakest part of the protection system
- Mosquito control requires **action by public authorities** and high involvement of both public and private operators
- For this reason, an **Area Wide - Integrated Pest Management (AW-IPM)** system is the most effective measure for mosquito control

Thank you very much for the attention!

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