Principles of Organized Population-Based Cancer Screening

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International Agency
for Research on Cancer

World Health
Organization

Cervical cancer elimination initiative

WHO
Cervical cancer elimination targets for 2030

Vision: A world without cervical cancer

Goal: below 4 cases of cervical cancer per 100,000 woman-years

2030 TARGETS

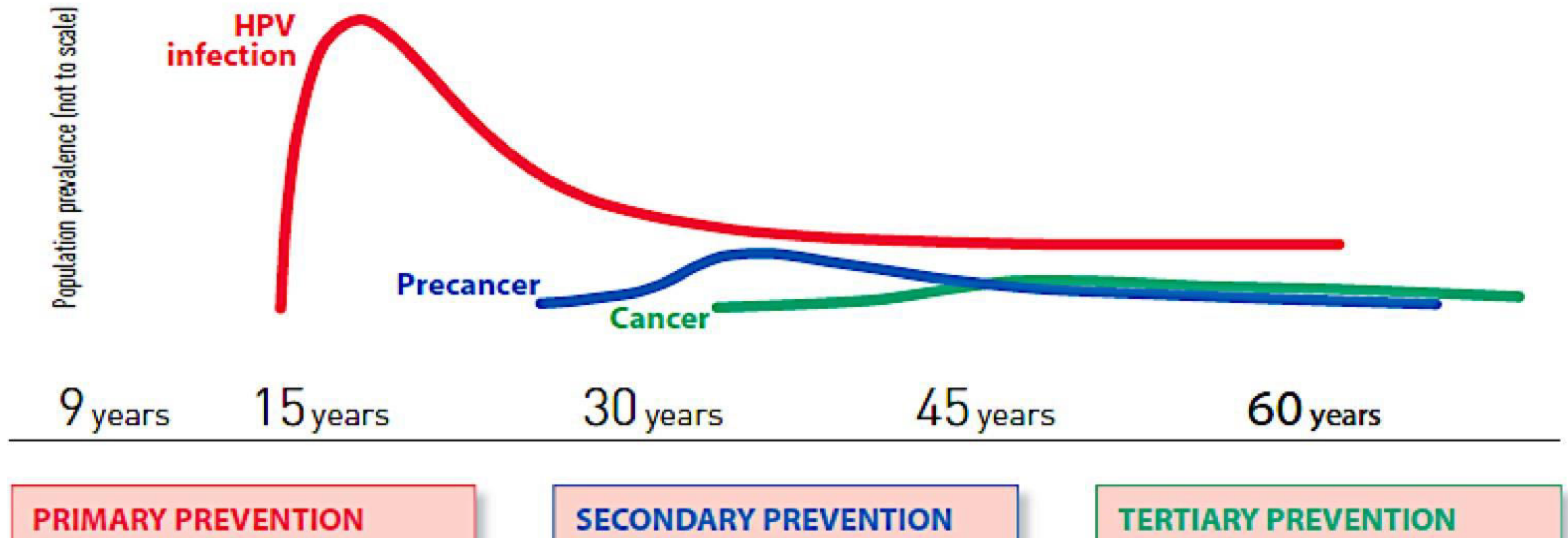**90%** of girls fully vaccinated with HPV vaccine by age 15 years.

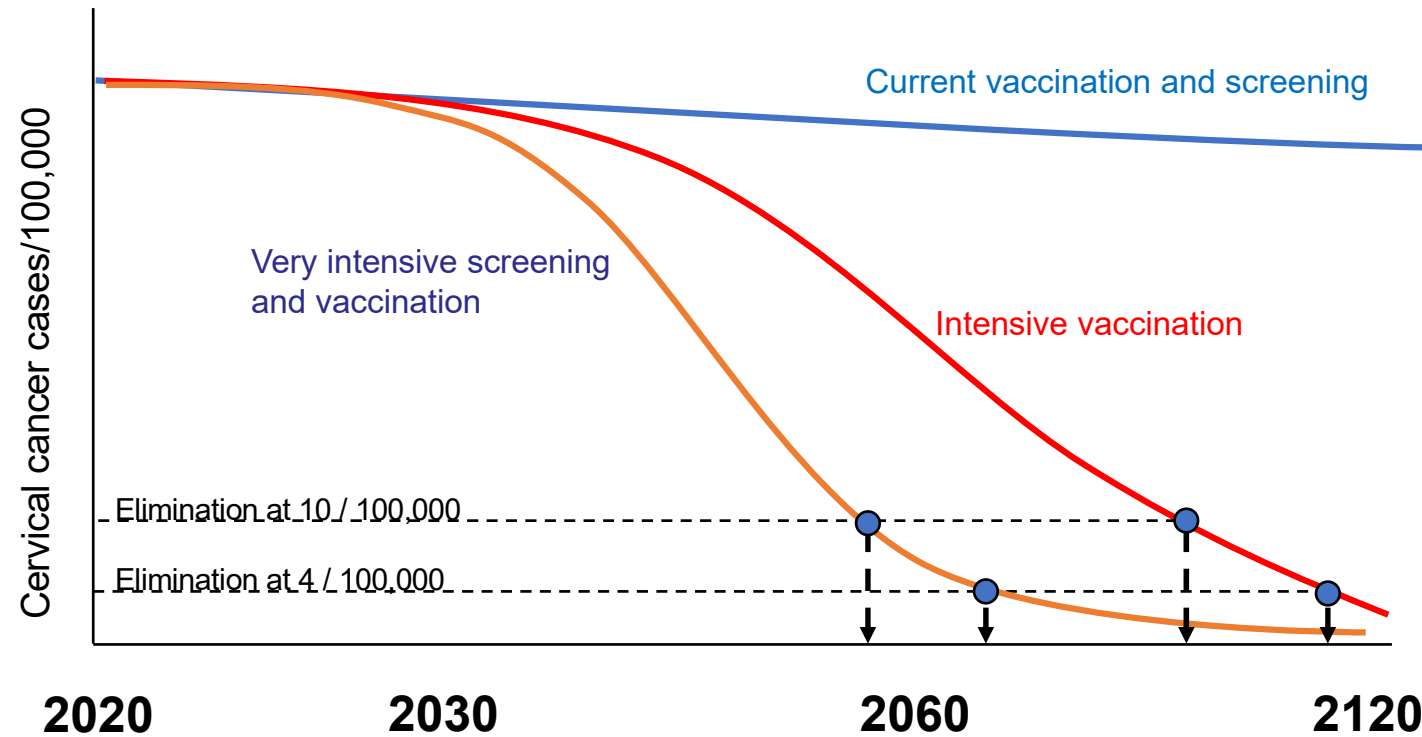**70%** of women are screened with a high-performance test by 35 years of age and again by 45 years of age.

90% of women identified with cervical disease receive treatment (90% of women with precancer treated, and 90% of women with invasive cancer managed).

Strategies for cervical cancer elimination

Cervical cancer elimination projection

World Health Organization

Global Breast Cancer Initiative Implementation Framework

Assessing, strengthening and scaling up services for the early detection and management of breast cancer

Pillar 1

Health promotion for early detection (pre-diagnostic interval)
KPI: >60% of invasive cancers are stage I or II at diagnosis

Pillar 2

Timely breast diagnostics (diagnostic interval)
KPI: diagnostic evaluation, imaging, tissue sampling and pathology within 60 days

Pillar 3

Comprehensive breast-cancer management (treatment interval)
KPI: >80% undergo multimodality treatment without abandonment

World Health Assembly Adopts More Best Buys to Tackle NCDs, Reconfirms Impact of Alcohol Policy Best Buys

Cancer

1. Vaccination against human papillomavirus (1-2 doses) of 9–14 year old girls

2. Cervical cancer: HPV DNA screening, starting at the age of 30 years with regular screening every 5 to 10 years (using a screen-and-treat approach or screen, triage and treat approach)

3. Cervical cancer: early diagnosis programs linked with timely diagnostic work-up and comprehensive cancer treatment

4. Breast cancer: early diagnosis programs linked with timely diagnostic work-up and comprehensive cancer treatment

5. Colorectal cancer: early diagnosis programs linked with timely diagnostic work-up and comprehensive cancer treatment

6. Prevention of liver cancer through hepatitis B immunization

7. Childhood cancer: early diagnosis programs linked with timely diagnostic work-up and comprehensive cancer treatment, focusing on 6 index cancers of WHO Global Initiative for Childhood Cancer

8. Early detection and comprehensive treatment of cancer for those living with HIV

The stage-based precaution adoption process model (PAPM) for cervical screening uptake. © IARC

Population-based screening   vs   Opportunistic screening

Individual identification of eligible population

Invitation system for each round
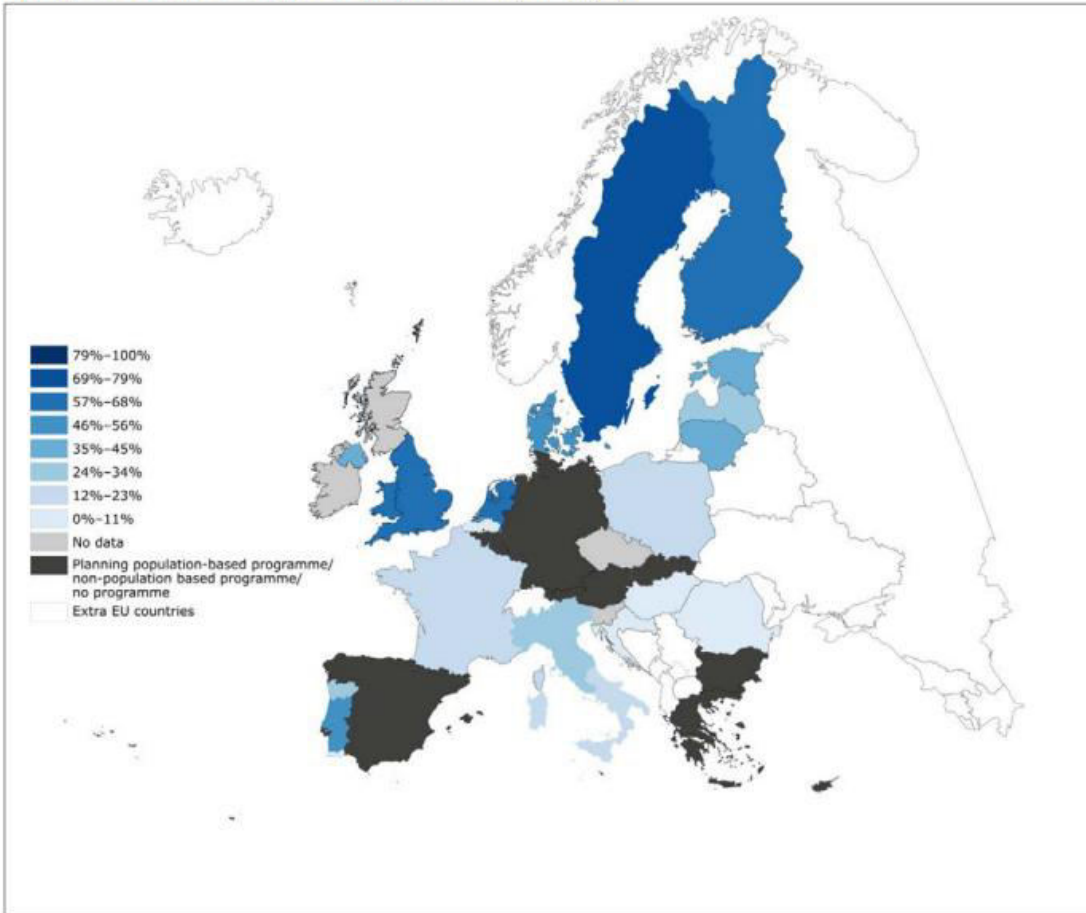
Non-compliant individuals may be 'tracked'

- recommendation during a routine medical consultation

- self-referral of individuals

Population-based screening alone can achieve a high coverage.

Figure 4.2. Cervical cancer screening programmes in the EU: examination coverage by programme specific age-range (table 4.9, all ages)*

79%–100%
69%–79%
57%–68%
46%–56%
35%–45%
24%–34%
12%–23%
0%–11%
No data
Planning population-based programme/ non-population based programme/ no programme
Extra EU countries

*The estimates do not take into account opportunistic screening and only include women invited and screened

70% women aged 30-59 and resident in EU Member states with implemented/ piloting/ planning population-based cervical cancer screening (CCS) (2016)
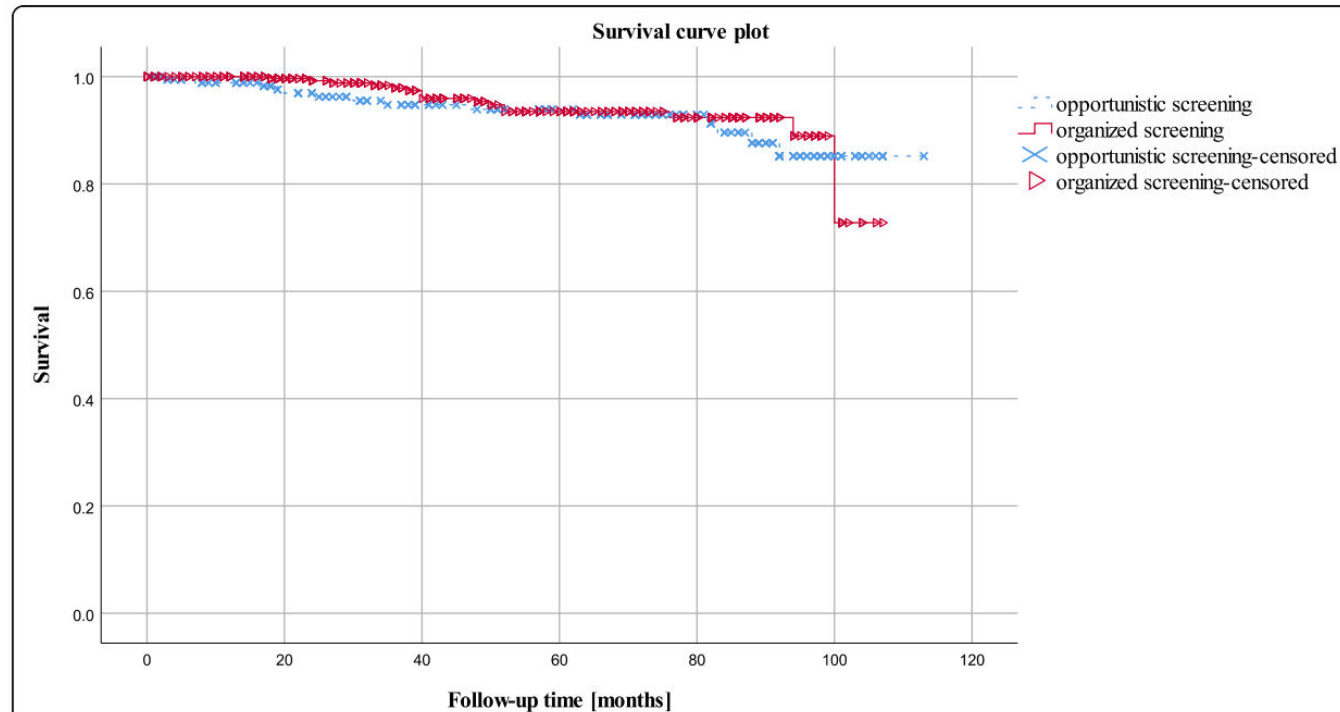
30% CCS coverage (average)

IARC. Cancer Screening in the European Union (2017). Report on the implementation of the Council Recommendation on cancer screening

Individuals screened through opportunistic pathway have worse outcomes.

No significant difference of overall survival of invasive breast cancer patients aged 50–69 years in organised & opportunistic mammography screening

Fig. 2 Overall observed survival of invasive breast cancer patients aged 50–69 years in organised and opportunistic mammography screening (Kaplan Meier Survival curve compared by Log Rank test). Fribourg cancer registry 2006–2014

Peisl et al., 2019

Breast cancer screening programmes in the EU
Completeness of further assessment results
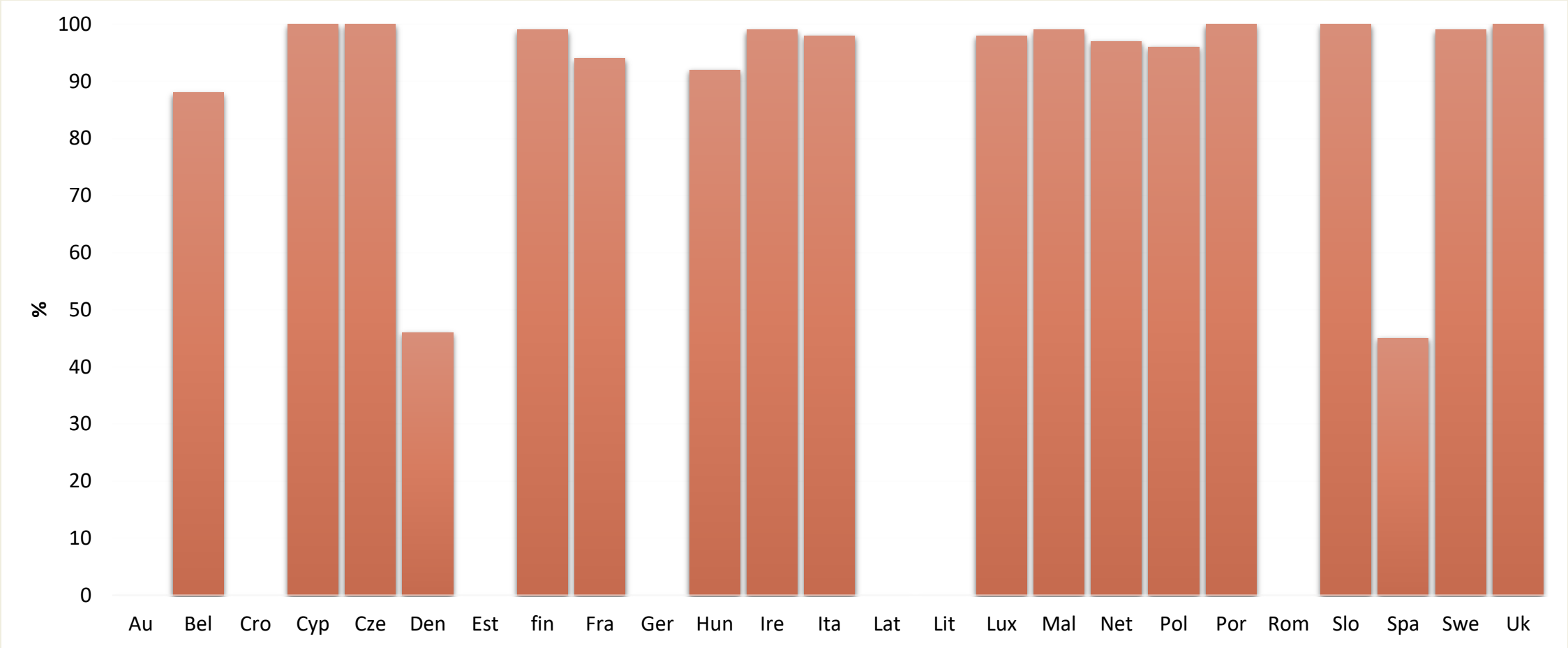
IARC. Cancer Screening in the European Union (2017). Report on the implementation of the Council Recommendation on cancer screening

Breast cancer screening programme in Morocco   (CBE, 40-69 y, 2 y)
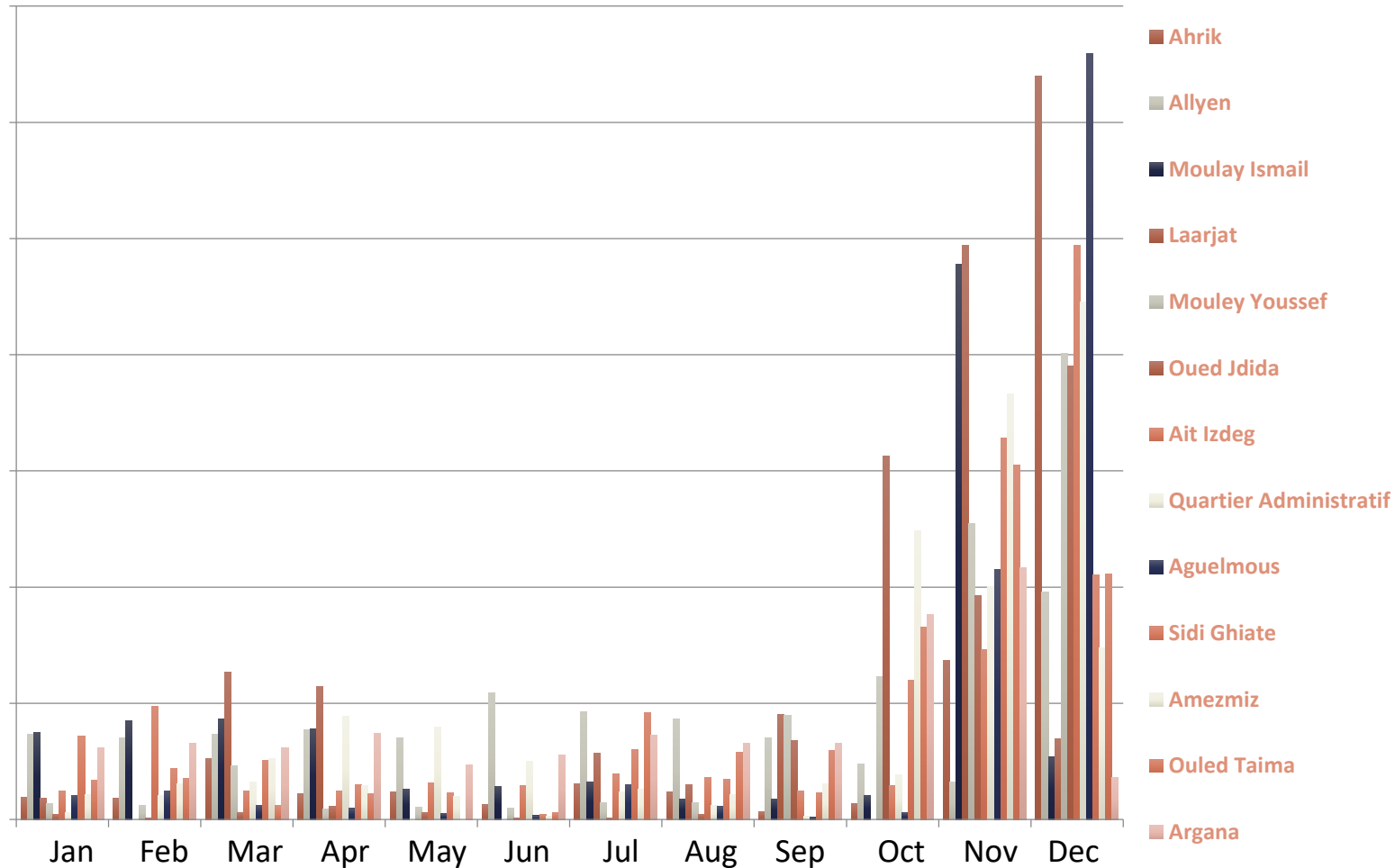
MYTHS!

Breast cancer screening coverage in Morocco

56% screening coverage

CanScreen5, 2019

Basu et al., 2018

Legend: Ahrik, Allyen, Moulay Ismail, Laarjat, Mouley Youssef, Oued Jdida, Ait Izdeg, Quartier Administratif, Aguelmous, Sidi Ghiate, Amezmiz, Ouled Taima, Argana

X-axis: Jan, Feb, Mar, Apr, May, Jun, Jul, Aug, Sep, Oct, Nov, Dec
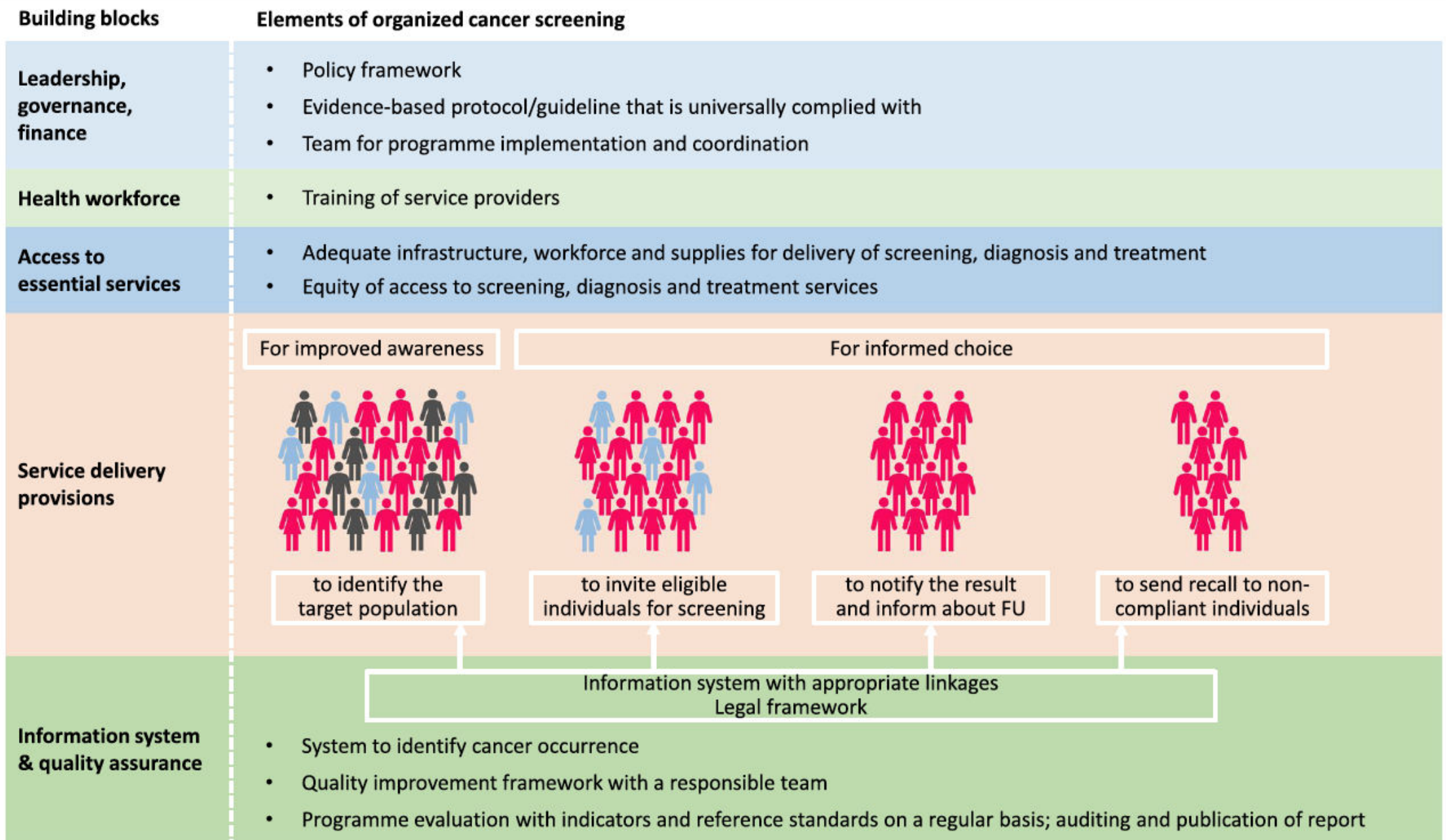
Organized cancer screening

"Due to such complexities in programme implementation and extreme heterogeneity in programme organization, it may be **futile or even unfair to label screening programmes dichotomously as either organized or nonorganized**"

Zhang et al., 2022

Building blocks for core elements of an organized screening programme

Zhang et al., 2022

Governance

Policy framework → governance structure, financing, goals and objectives of the programme
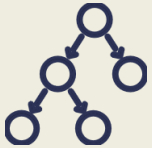
Evidence-based **protocol/guideline** developed in consensus with majority of stakeholders
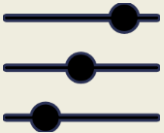
Protocol/guideline describing at least the **target population, screening intervals, screening tests, referral pathway, and management of positive cases**.

Protocol/guideline describing **monitoring and evaluation**

Team/organization **responsible** for programme implementation and/or coordination

Health workforce

Provision of **continued training** for service providers

Access to services

Availability of adequate infrastructure, workforce and supplies for delivery of screening, diagnosis and treatment services
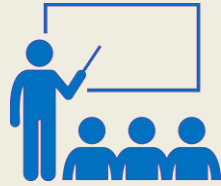
Equity of access to screening, diagnosis and treatment services

International consensus of essential and desirable criteria of organized cancer screening programmes

Zhang et al, 2022

Service delivery provisions

Identification of population eligible for screening

Notification of results and information on follow up

Identification of **cancer occurrence** in the target population (e.g., PBCR)

Informed choice with information on benefits and harms

Appropriate **legal framework** (registration of individuals and data linkages)
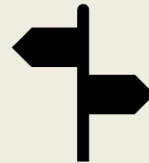
Invitation of population eligible for screening

Recall of non-compliant individuals

Operational plan to improve **awareness** of target population

Compliance of health care professionals with protocol/guideline

International consensus of essential and desirable criteria of organized cancer screening programmes

Zhang et al, 2022

Inf. system & quality assurance
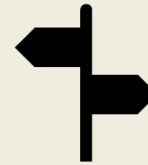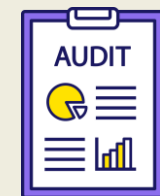
Information system with **appropriate linkages** (between population databases, screening information, cancer registry, etc.)

Team/organization **responsible** for quality assurance/ improvement

Reference standards for the indicators

Quality improvement framework

Appropriate **indicators**

Regular **evaluation, publication and dissemination** of performance

Auditing of the programme

Organizational level and examination coverage for cervical cancer screening

Zhang et al., unpublished data

Charts depicting selected characteristics of colorectal cancer screening programs/initiatives in Canadian provinces.

Column headers

Leadership, governance, finance:
1. Is there an individual/team/institution responsible for managment/coordination of the cancer screening activities?
2. Does the Health Ministry/Authority allocate a budget to cancer screening?
3. Is there a policy document from the Health Ministry/Authority that recommends cancer screening?
4. Is there a screening protocol or guideline?
5. Is there a defined target age?
6. Is there a defined primary screening test?
7. Is there a defined screening interval?

Access to essential services:
8. Are the screening tests available free of charge to the eligible population?
9. Are the diagnostic tests available free of charge to the screen positive individuals?
10. Are treatment services available free of charge to individuals with a diagnosis of precancer/cancer?
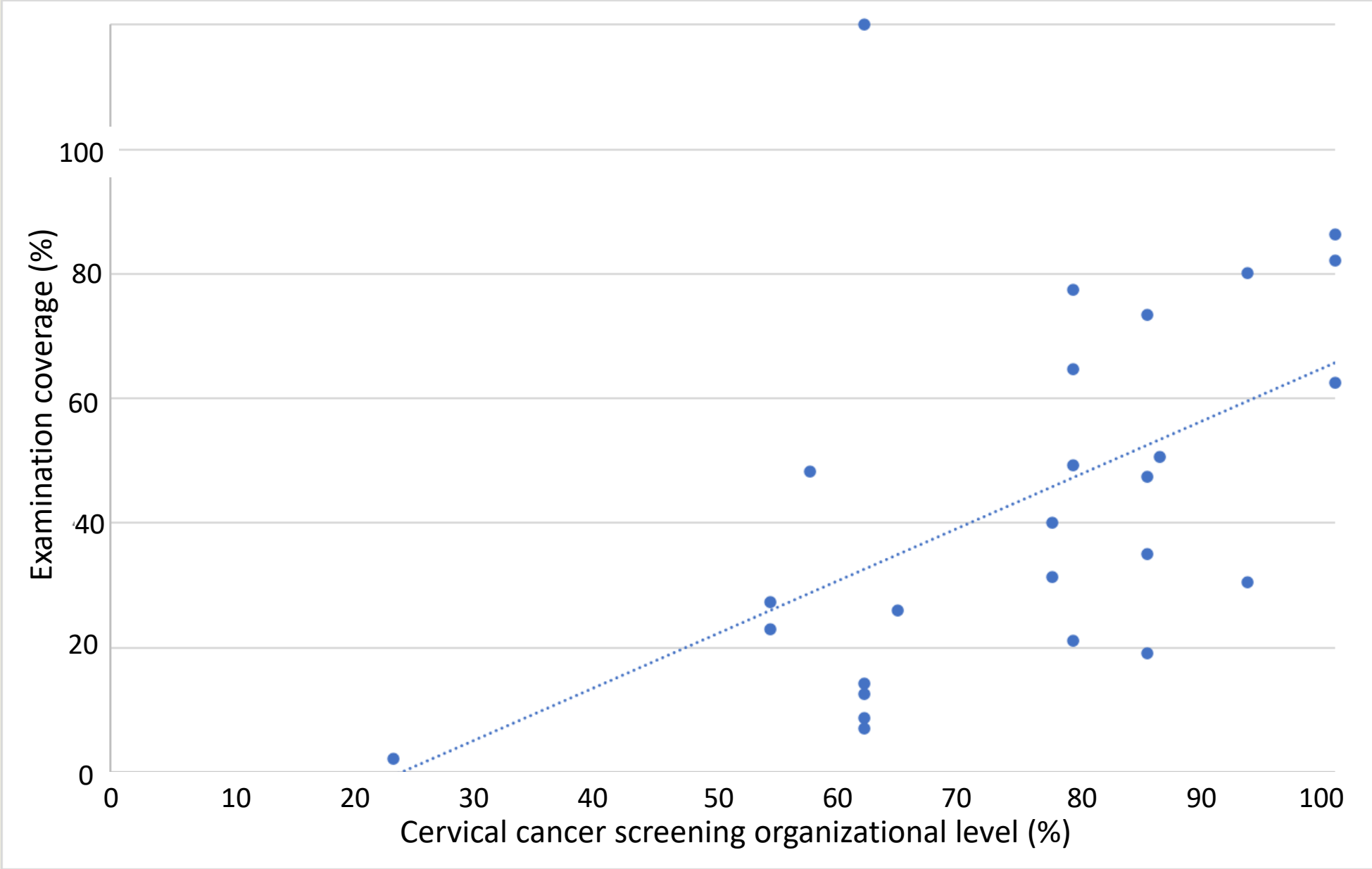
Service delivery provisions:
11. Are there any initiatives to create population awareness by the Health Ministry/Health Authority?
12. Is there a system to send individual invitations to all the eligible population?
13. If yes to previous question, does the invitation include a screening kit?
14. Are the screen positive individuals actively contacted to ensure compliance with further assessment?
15. Are the individuals with a precancer/cancer diagnosis actively contacted to ensure compliance with further management?

Information system & quality assurance:
16. Is there a documented guideline/policy for quality assurance of the screening service delivery?
17. Is there an individual/team/institution responsible for quality assurance of the screening service delivery?
18. Is there a system of accreditation of endoscopy units?
19. Is there a system of accreditation for pathology services?
20. Are there specified performance indicators to assess the performance of screening?
21. Is there a computerized information system that collects screening related data on an individual basis?
22. Is there a system that gathers aggregated data on screening activities?
23. Are screening data linked with population-based cancer registries?
24. Does the programme collect data on the stage of the cancers detected through the programme?
25. Does the programme collect data on the treatment of the precancers/cancers detected through the programme?

Legend: G = green (Yes), R = red (No), K = black, O = orange

Region	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Alberta	G	G	G	G	G	G	G	G	G	G	G	R	K	G	R	G	G	G	G	G	G	G	G	G	R
British Columbia	G	G	G	G	G	G	G	G	G	G	G	R	K	G	R	G	G	G	G	G	G	G	G	G	G
Manitoba	G	G	G	G	G	G	G	G	G	G	G	G	G	G	R	G	G	G	G	G	G	G	G	G	R
New Brunswick	G	G	G	G	G	G	G	G	G	G	G	G	R	G	G	G	G	G	G	G	G	G	G	G	R
Newfoundland and Labrador	G	G	G	G	G	G	G	G	G	G	G	R	K	G	R	G	G	G	G	G	G	G	R	G	R
Northwest Territories	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	R	R	G	G	G	G	G	O	G	G
Nova Scotia	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
Ontario	G	G	G	G	G	G	G	G	G	G	G	G	R	G	R	G	R	G	G	G	G	G	G	G	R
Prince Edward Island	G	G	G	G	G	G	G	G	G	G	G	G	R	G	R	G	R	G	G	G	G	G	R	R	G
Quebec	G	G	G	G	G	G	G	G	G	G	G	R	K	R	R	G	G	G	R	G	R	G	R	G	G
Saskatchewan	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	R
Yukon	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	R	G	G	R	G	R	G	R

Improving cancer care coordination and screening
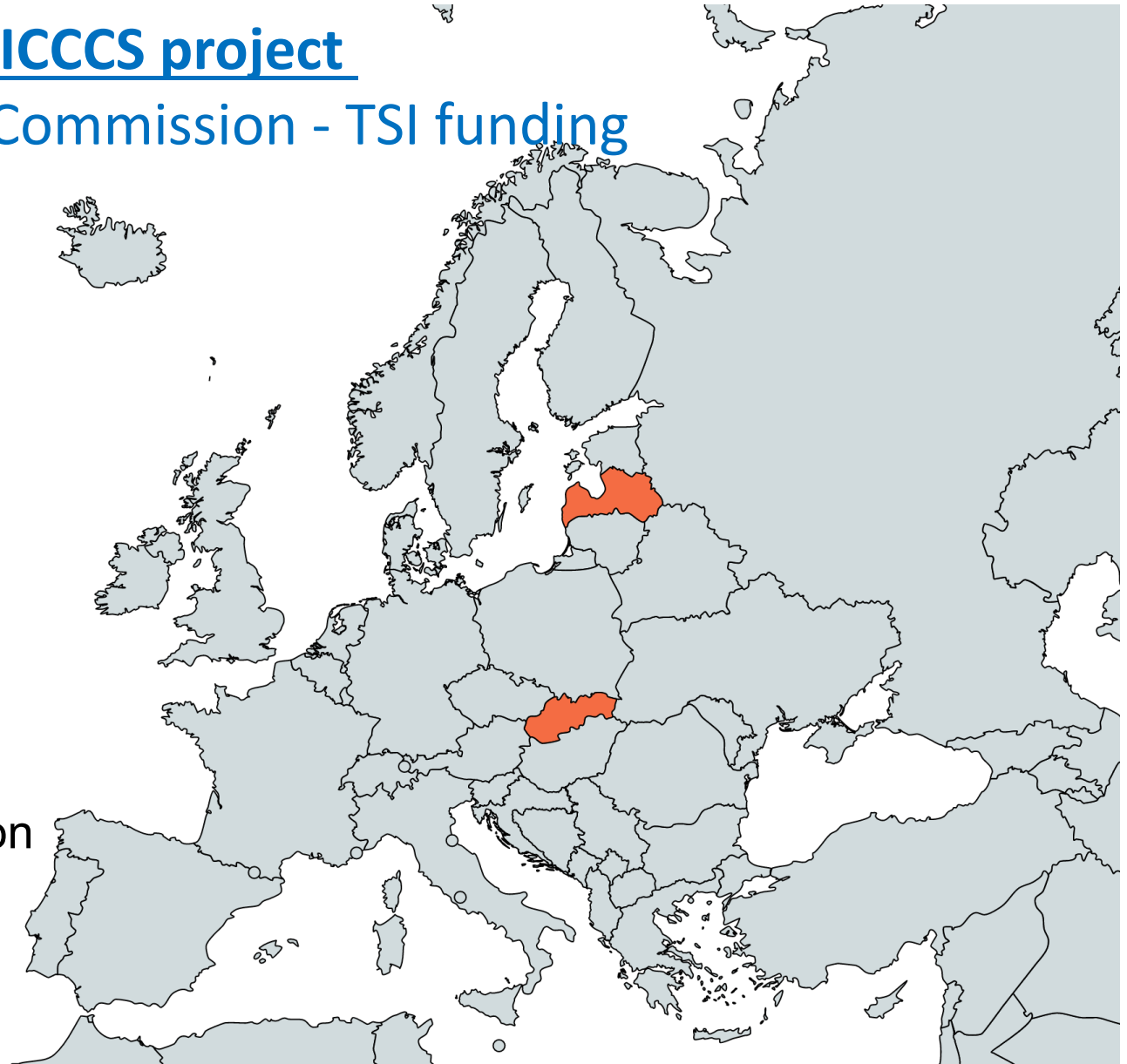
ICCCS project
European Commission - TSI funding

Latvia
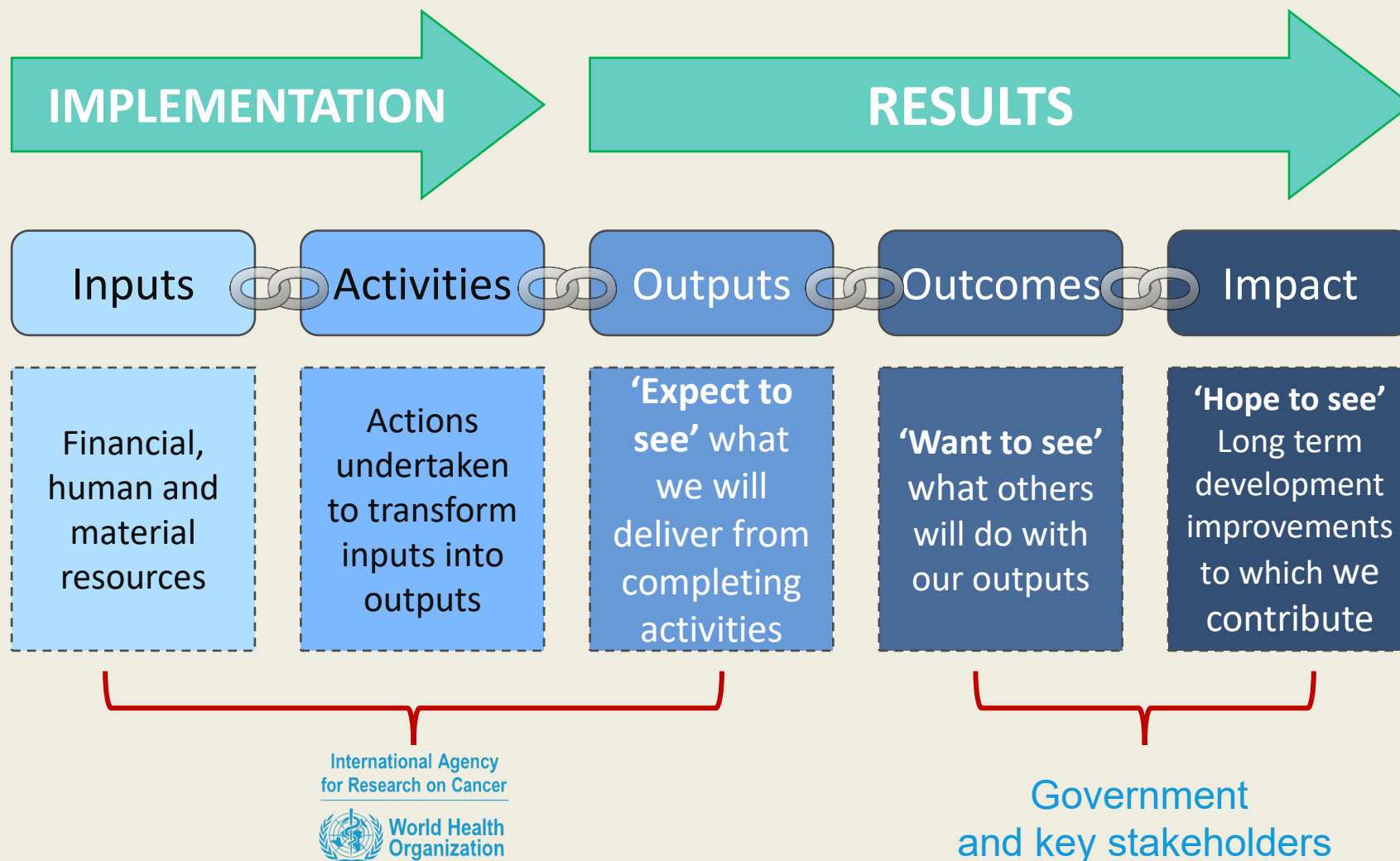
- ✓ Cancer Registry
- ✓ Cancer Screening
  - • Digitalisation
  - • Data protection
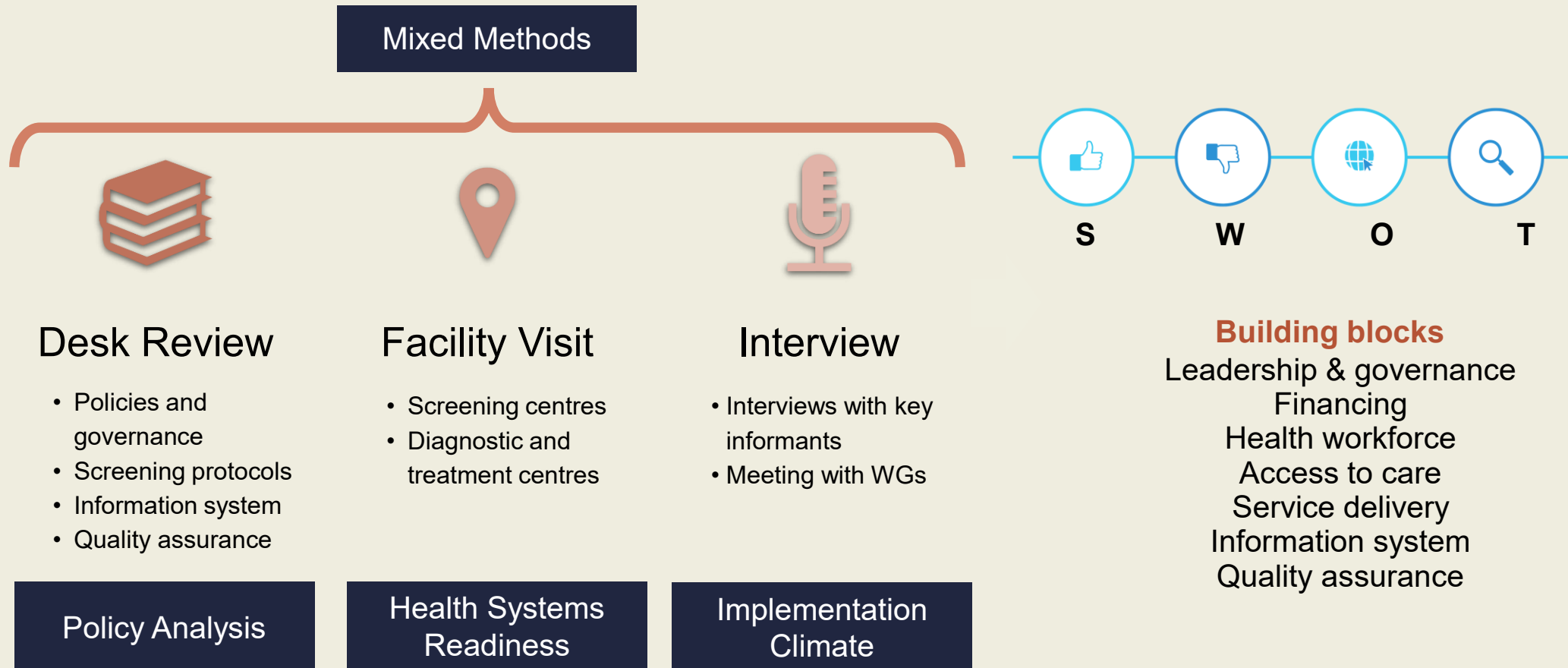- ✓ Comprehensive Cancer Network

Slovakia

- ✓ Cancer Awareness
  - • Stakeholders sensitization
  - • Public campaign plan
- ✓ Cancer Screening
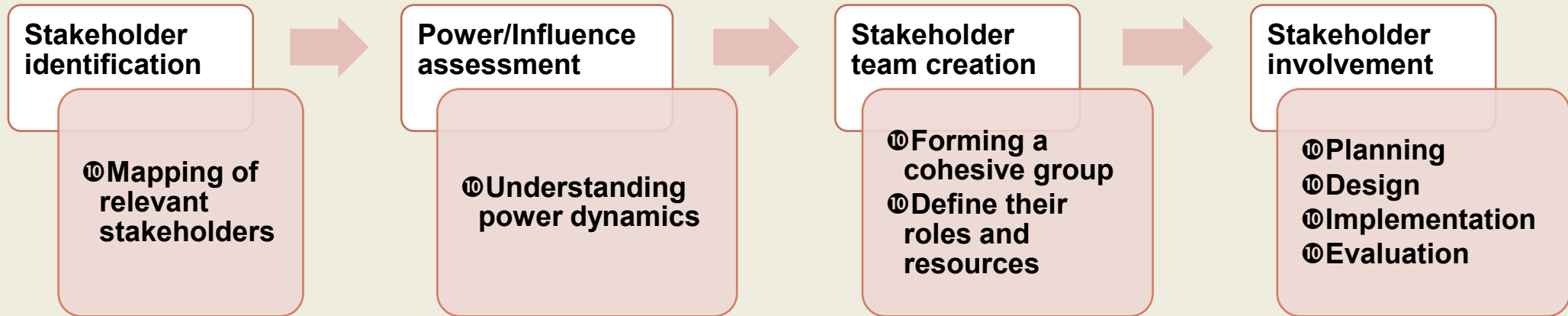 - • Digitalisation
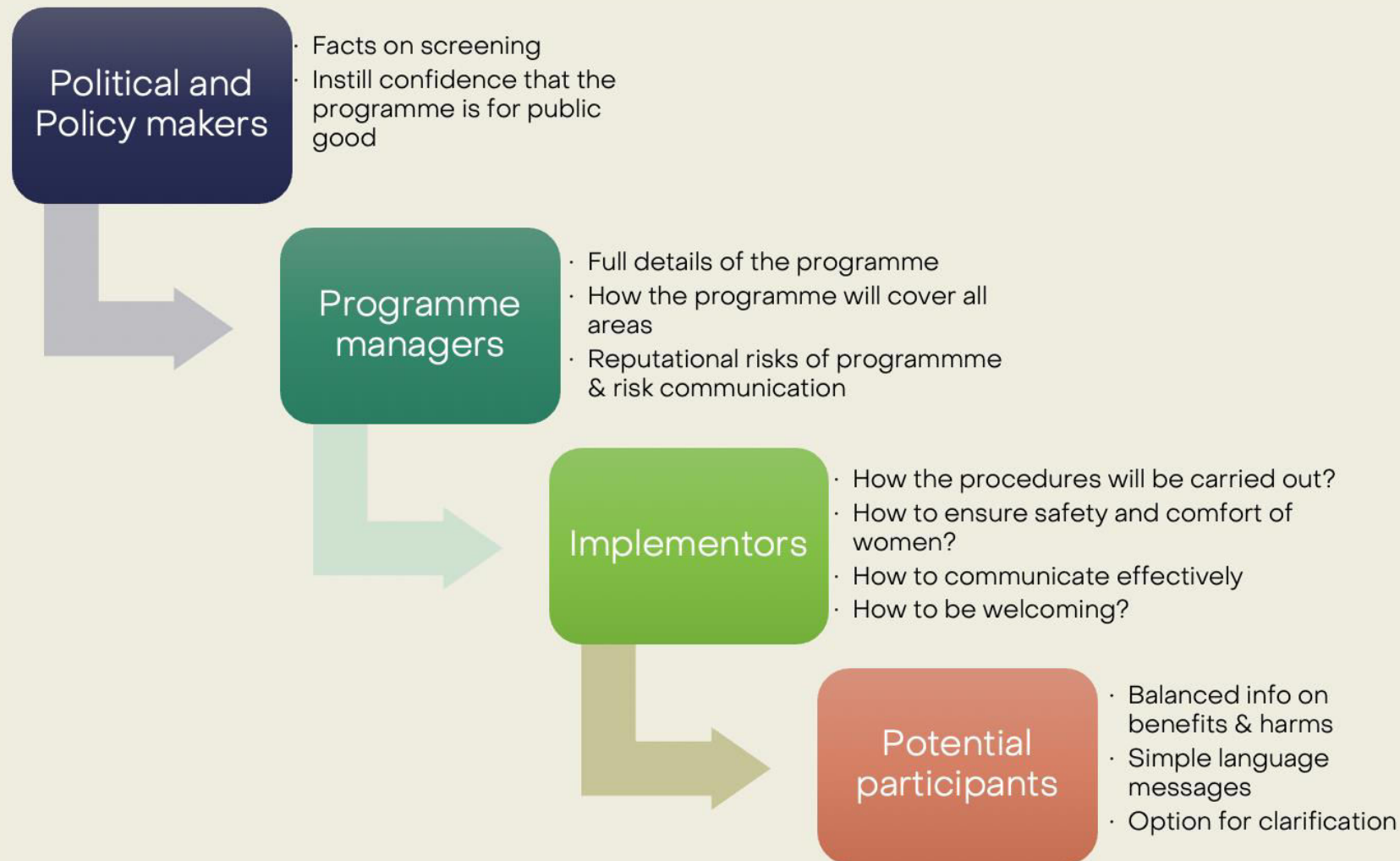 - • Data protection

Logical Framework approach

IMPLEMENTATION **RESULTS**

Inputs	Activities	Outputs	Outcomes	Impact
Financial, human and material resources	Actions undertaken to transform inputs into outputs	**'Expect to see'** what we will deliver from completing activities	**'Want to see'** what others will do with our outputs	**'Hope to see'** Long term development improvements to which we contribute

International Agency for Research on Cancer

World Health Organization

Government and key stakeholders

European Commission

Capacity Assessment

Mixed Methods

Desk Review

- Policies and governance
- Screening protocols
- Information system
- Quality assurance

Policy Analysis

Facility Visit

- Screening centres
- Diagnostic and treatment centres

Health Systems Readiness

Interview

- Interviews with key informants
- Meeting with WGs

Implementation Climate

S   W   O   T

Building blocks
Leadership & governance
Financing
Health workforce
Access to care
Service delivery
Information system
Quality assurance

Source: A Chandran/IARC

Stakeholder Mapping

Process

Stakeholder identification	→	Power/Influence assessment	→	Stakeholder team creation	→	Stakeholder involvement
⑩Mapping of relevant stakeholders		⑩Understanding power dynamics		⑩Forming a cohesive group ⑩Define their roles and resources		⑩Planning ⑩Design ⑩Implementation ⑩Evaluation

Stakeholder Engagement

Political and Policy makers
- Facts on screening
- Instill confidence that the programme is for public good

Programme managers
- Full details of the programme
- How the programme will cover all areas
- Reputational risks of programmme & risk communication

Implementors
- How the procedures will be carried out?
- How to ensure safety and comfort of women?
- How to communicate effectively
- How to be welcoming?

Potential participants
- Balanced info on benefits & harms
- Simple language messages
- Option for clarification

Framework of barriers to cancer screening pathway

Courtesy of Hannah Theriault

To design a action plan strategy

The findings of the situational analysis and SWOT was synthesized and triangulated to feed the action plan

Action plan was presented to a stakeholders team workshop.

Collaboratively, identify the intervention elements that are 'best fit'. Interventions may be different to suit the local context.

Improving cancer care coordination and screening
Main bottlenecks

- ✓ **Governance and legislation**

- ✓ Screening test and diagnosis – guidelines and protocols

- ✓ **Organisation, funding and staff**

- ✓ Invitations and communication with the screening participants

- ✓ Raising awareness

- ✓ **Data and IT system**

- ✓ Quality assurance

- ✓ Research

International Agency
for Research on Cancer

World Health
Organization

Screening governance/leadership coordination and interaction
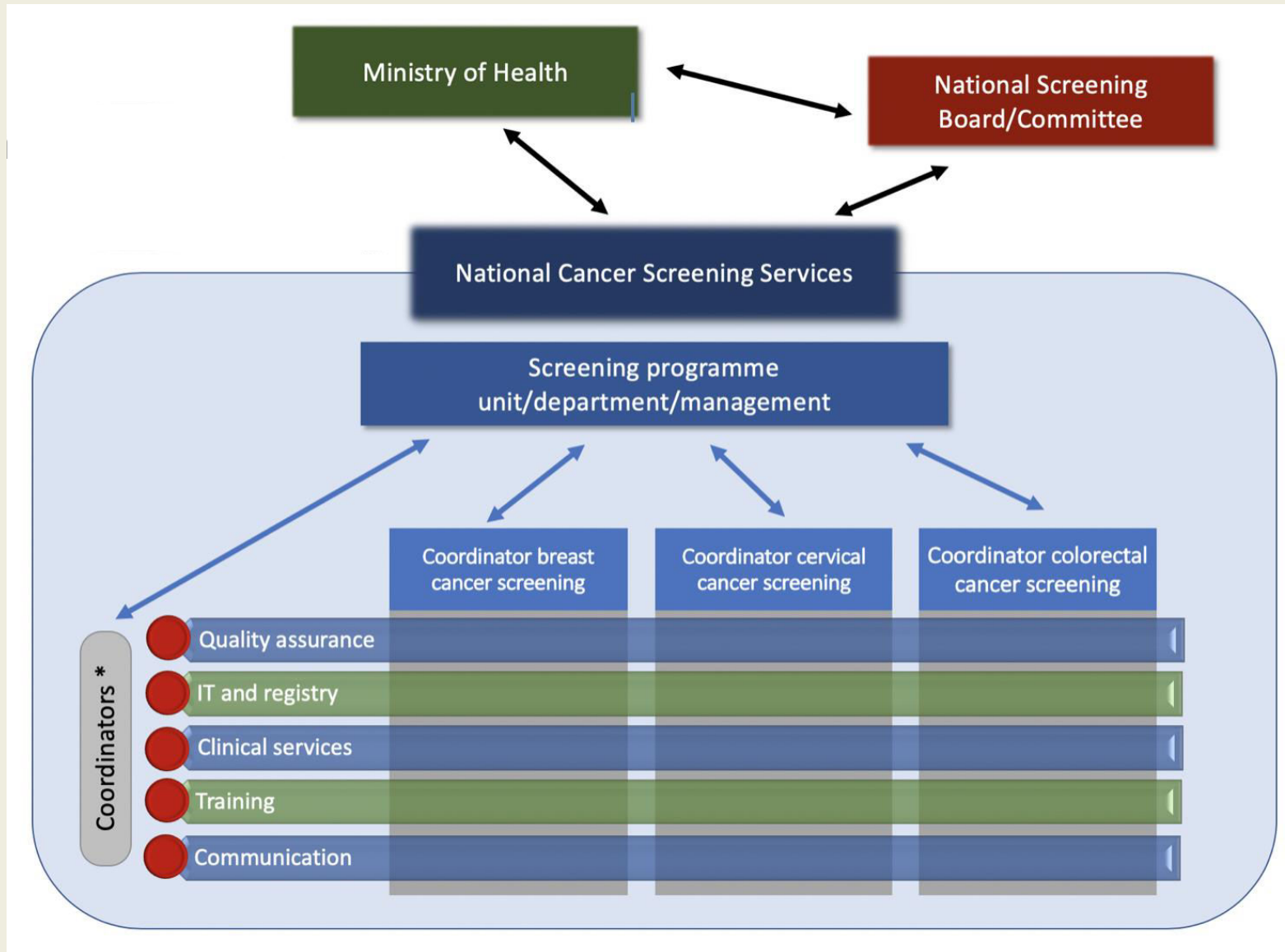
CANCER CARE PATHWAYS IN CANADIAN HEALTHCARE

Data migration to NCSR

- NCSP States & Territories
- NBCSP

Directory services and authentication

- NASH Directory
- myGov
- HI Service
- PDS
- NHSD
- ELS

Reporting to and from the NCSR and ongoing flows

- Department of Health's EDW
- My Health Record
- AIHW
- Fact of Death Register
- States & Territories
- NHPVR
- DHS

End Users
- Specialists
- Pathology Labs
- PFUP officers
- Eligible persons / participants
- Healthcare providers

NCSR

1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 11, 12, 13, 14, 15

Health Information System   Tracking of participants

Possibilities:
- Negative test - Reassured
- Positive test - Treated immediately and reassured
- Positive test - Referred for further assessment

Screening

Possibilities:
- Treated and reassured

Possibilities:
- Confirmed negative - reassured
- Confirmed positive for pre-cancer or invasive cancer - treated immediately or referred for treatment

Treatment

Alternative possibilities
- Not show
- Did not get the results
- Refuse to continue

Further Assessment

Alternative possibilities
- Not show
- Not yet treated
- Refused treatment
- Refused to continue

Alternative possibilities
- Not show
- Diagnosis not reported
- Not yet evaluated
- Refused to continue

Results

Prioritized barriers by representatives of MoH from selected countries

IARC unpublished data
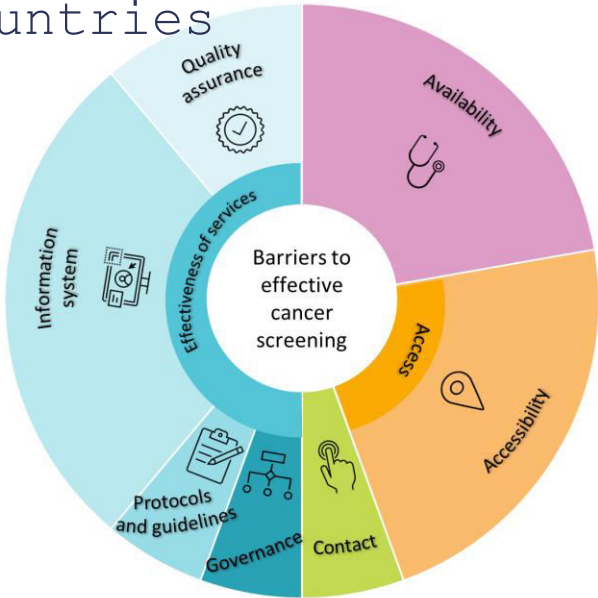
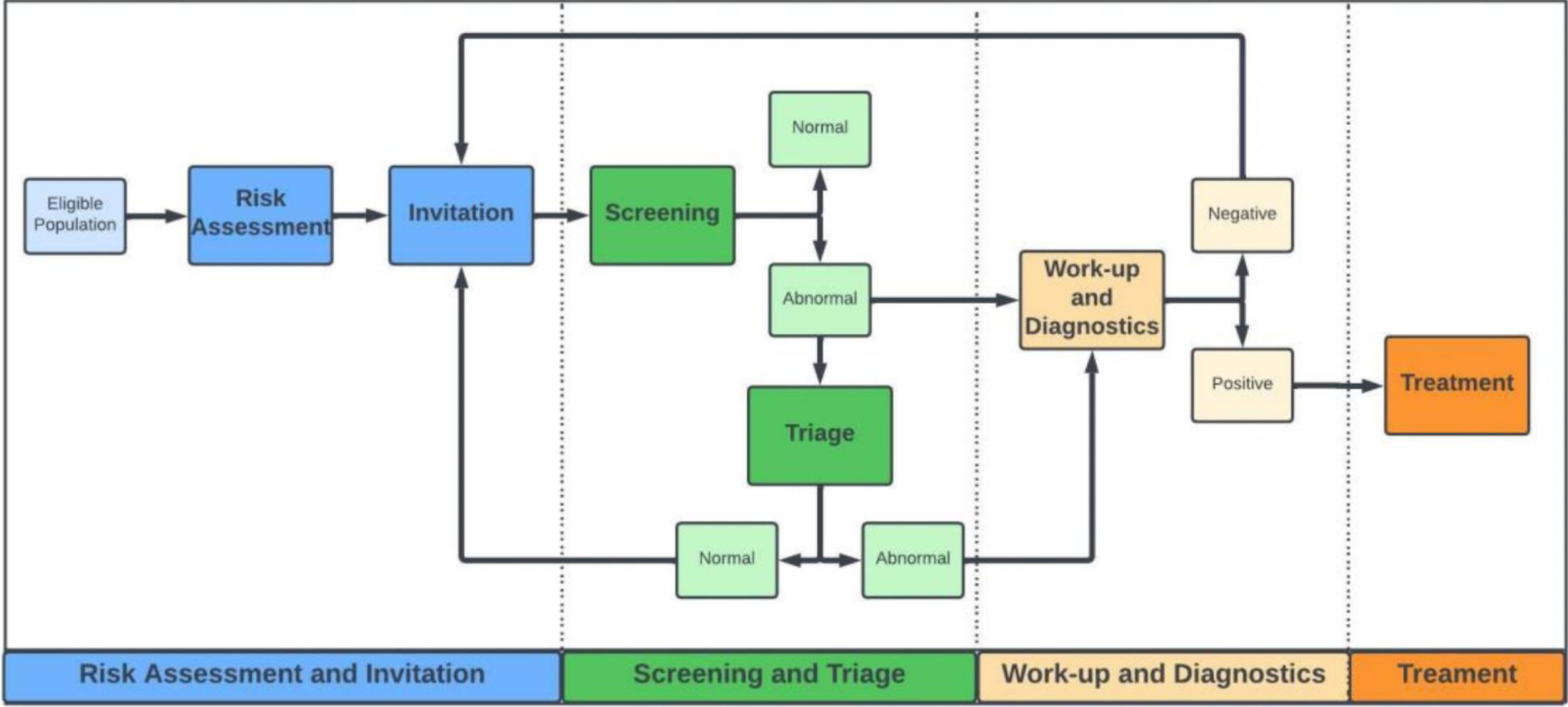**Chile**
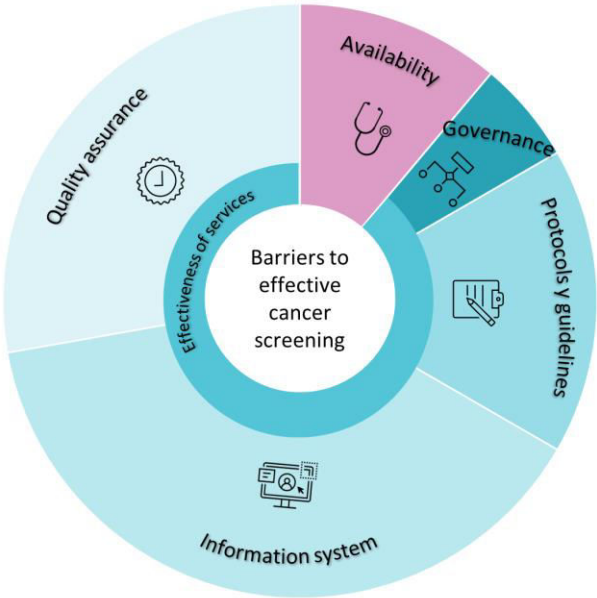
Cuba
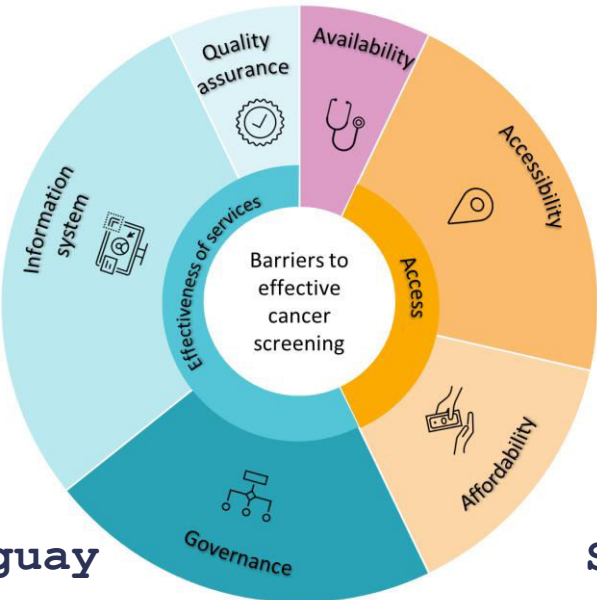
Paraguay

Suriname
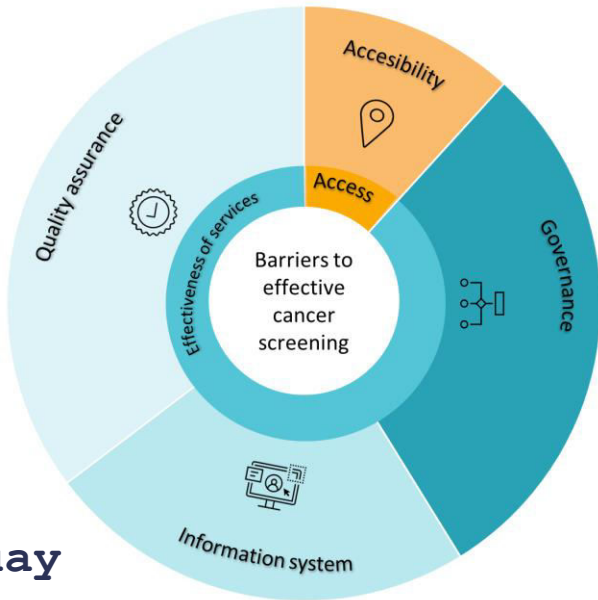
Uruguay

DELIVERABLE 2.1

PROCEEDINGS OF WORKSHOP TO DELIBERATE ON PERFORMANCE INDICATORS

Delphi Study: Results

Round 2 Final Scores

1. Detection Rate
2. Interval Cancer Rate (after screening test and further assessment)
3. Test Result
4. Compliance with Further Assessment
5. Participation Rate
6. Time from Positive Screen to First Diagnostic Procedure
7. Examination Coverage
8. Opportunistic Testing
9. Cause-Specific Mortality
10. Interval Cancer Rate (after negative screening test)
11. Invitation Coverage
12. Complications Screening Test
13. Positive Predictive Value Screening Test
14. False Positive Rate
15. Complications Further Assessment
16. Episode Sensitivity
17. Retention Rate
18. Crude Incidence Rate
19. Time from Screen Test to Notification of Result

Improving the Quality of Cancer Screening
SELF-PACED LEARNING PROGRAMME

Español (Spanish), Русский (Ruso)

For cancer screening programme managers, clinicians, nurses and midwives, and social and community workers

Share this resource

3 online learning modules
Of about 1.5 to 2 hours each

Case studies and quizzes
In each module, to consolidate new knowledge

Pre-course test and final test
To measure your progress

References
Quick links to references and resources

https://learning.iarc.fr/edp/courses/pgm-cancer-screening/

Conclusions

- Countries should work towards a **highly organized cancer screening programme**.

- Lessons learnt from **pilots** will allow an adequate scaling up.