Prevention and Early Detection of cancer: Priorities for the SEAR

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National Professional Officer- Non Communicable Diseases
Estimated age-standardized incidence and mortality rates, men, South-East Asia, 2012
Estimated age-standardized incidence and mortality rates, women, South-East Asia, 2012
Estimated age-standardized incidence and mortality rates, both sexes, South-East Asia, 2012
Natural history of cancer and levels of prevention

<table>
<thead>
<tr>
<th>Exposure</th>
<th>Onset of disease</th>
<th>Early detection</th>
<th>Onset of symptoms and/or signs</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D&lt;sub&gt;1&lt;/sub&gt; Cure, D&lt;sub&gt;2&lt;/sub&gt; Disability, D&lt;sub&gt;3&lt;/sub&gt; Death</td>
</tr>
</tbody>
</table>

Primary prevention

Secondary prevention

Tertiary prevention
Comprehensive Approach for cancer control

- Prevention
- Palliative care
- Treatment
- Early detection
1. **Screening:** *Systematic*, routine application of a suitable early detection *test* at specified *intervals* in a systematically *invited asymptomatic* population.

2. **Early clinical diagnosis:** *Searching* for *precancerous* or *early invasive cancer* in *symptomatic* or *asymptomatic* individuals in *opportunistic* settings.

   Improved awareness and access to health services promote early clinical diagnosis.
Early detection is associated with:

- Benefits/harms
- Costs to Individual and the Health Services

It is important to establish that benefits of early detection, particularly screening, outweigh harms and it is cost-effective in reducing incidence/mortality.
The need for action: cancer screening mostly absent

<table>
<thead>
<tr>
<th>WHO region</th>
<th>Cervical CA</th>
<th>Breast CA</th>
<th>Colon CA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cervical cytology</td>
<td>Acetic acid vis.</td>
<td>Breast palp</td>
</tr>
<tr>
<td>AFR</td>
<td>46</td>
<td>15%</td>
<td>30%</td>
</tr>
<tr>
<td>AMR</td>
<td>29</td>
<td>41%</td>
<td>66%</td>
</tr>
<tr>
<td>EMR</td>
<td>21</td>
<td>29%</td>
<td>43%</td>
</tr>
<tr>
<td>EUR</td>
<td>51</td>
<td>31%</td>
<td>80%</td>
</tr>
<tr>
<td>SEAR</td>
<td>11</td>
<td>9%</td>
<td>36%</td>
</tr>
<tr>
<td>WPR</td>
<td>27</td>
<td>26%</td>
<td>56%</td>
</tr>
</tbody>
</table>

WHO NCD survey 2010
Screening Requirements

1. Suitable disease
2. Suitable test
3. Suitable screening settings
Screening Requirements-1

1. Suitable disease

   a) Important problem
   b) Can be detected in preclinical stage
   c) Effective treatment available
   d) End result improved by early diagnosis
Screening Requirements-2

2. A suitable screening test

2.1 Adequate validity
   Sensitivity
   Specificity

2.2 Acceptability and cost
   ✓ Low cost
   ✓ Convenient
   ✓ Simple
   ✓ As painless as possible
   ✓ Does not cause complications
3. Suitable programme settings

a) Adequate infrastructure for diagnosis and treatment in health services

b) Adequate trained manpower

c) Adequate financial resources
Successful cancer prevention programme
Key elements

- Link Screening and Treatment
- Surveillance and monitoring
- Screening Coverage
- Effectiveness of Treatment
Evaluation of screening programmes

Process Measures

Target population

- Coverage rate
  - Participants to screening

Screened positive referred for confirmation

- Referral rate
  - Patients with referral

Confirmed cases with referral for treatment

- Confirmation rate
  - Confirmed cases with referral for treatment

Patients with completed treatment

- Treatment rate

Patients with follow-up visits

- Follow-up rate
Evaluation of screening programmes
Outcome Measures

Early outcome

• Stage distribution
• Case fatality and survival

Final outcome

• Reduction in incidence (if precancerous lesions are detected)
• Reduction in mortality (if invasive disease is detected)
Suitable cancers for early detection in LMIC

- **Oral cancer**
  - Visual inspection by trained health workers
  - Health education to prompt symptomatic high-risk individuals

- **Cervical cancer**
  - Visual inspection methods and HPV-DNA testing as alternatives of Pap smear
  - Health education on risk factors, symptoms and signs of cervical carcinoma
  - See-and-treat approach by trained health workers and physicians

- **Breast cancer**
  - Health education to improve awareness and to motivate high-risk women to demand early detection
  - Clinical breast examination and mammography may then be used
Non-suitable cancers for early detection in LMIC

- **Digestive tract cancer**
  - Endoscopy is not cost-effective nor feasible

- **Liver cancer**
  - High fatality rate and ineffective treatment
  - Primary prevention

- **Lung cancer**
  - Chest radiography and sputum cytology are ineffective
  - CT scan screening is not feasible
  - Tobacco control

- **Prostate cancer**
  - PSA testing with considerable over-diagnosis
  - Early detection not recommended for developing countries

- **Ovarian cancer**
  Efficacy of α-fetoprotein and ultrasound is not yet known
  - Screening is not feasible
In the context of the WHO action plan

- Implementation of tobacco control
- Prevention of liver cancer through hepatitis B immunization
- Establishment of cancer registration to monitor cancer incidence
- Prevention of cervical cancer through screening (visual inspection with acetic acid [VIA]) linked with timely treatment of pre-cancerous lesions
- Vaccination against human papillomavirus, as appropriate if cost effective and affordable, according to national programmes and policies
Natural History of Cervical Cancer

Population prevalence (not to scale)

HPV INFECTION

PRECANCER

CANcer

9 years old 15 years old 30 years old 45 years old 60 years old

Continuum of Care

PREVENTION

Early detection Screening

Diagnosis/Treatment

Palliative Care

World Health Organization

Country Office for Sri Lanka
Cervical Cancer Burden

- Cervical cancer is the **third** most common cancer in women worldwide with an estimated 530,000 new cases and 275,000 deaths each year.

- Over 85% of the global burden occurs in **developing** countries, where it accounts for 13% of all female cancers.

- SEAR records 188,000 new cases and 102,000 deaths from cervical cancer each year contributing to over 35% of the global burden of the disease.
Cervical cancer Incidence and mortality in Asia

Cervix uteri, all ages

ASR (W) per 100,000

Nepal, Bangladesh, Mongolia, Cambodia, India, Kyrgyzstan, Myanmar, Thailand, Lao PDR, Bhutan, Pakistan, Kazakhstan, Malaysia, Armenia, Maldives, Indonesia, Sri Lanka, Philippines, Viet Nam, Timor-Leste

Incidence
Mortality

GLOBOCAN 2008 (IARC) (12.6.2013)
Adopted and adapted in many countries, e.g., China, Sri Lanka, Viet Nam, Cambodia, Thailand, Nigeria, Malawi, Zambia, Tanzania, Uganda, some Latin-American countries, and others

Key messages:
- Health education integral part of cervical cancer control
- Cytology, but not <25 yrs or annually
- VIA /"See and treat", in pilot settings only
- HPV testing, in pilot settings only.
Screening program options

- **Age:** WHO recommends 30+ unless HIV+
- **Frequency:** depends on test and resources, achieve high coverage
- **Which test:** depends on resources and infrastructure
- **Care provider:** doctor, nurse, midwife, technician
- **Treatment:** cryotherapy suitable for most lesions and easy for non-physician to learn; need LEEP for large or advanced lesions
- **Community outreach:** interpersonal through community health workers or women’s groups; local radio; posters
Cervical Cancer Prevention Programmes: Operational framework

- Community level
  - Palliative care

- PHC level
  - VIA
  - VIA
  - VIA
  - VIA

- Secondary level
  - VIA and cryotherapy

- Tertiary level
  - Treatment

- Monitoring / Evaluation

- Awareness, Communication

- Training
screening using the Pap smear has never been rigorously tested in a randomized clinical trial in developed countries, the marked differences in the incidence and mortality figures for cervical cancer before and after the introduction of screening has been interpreted as “robust” evidence favoring the efficacy of these screening programmes.

Does the infrastructure and resources permit Pap smear-based national screening programmes? Are there alternative strategies that are feasible and scientifically valid should be identified.
Conventional pap smear (cont..)

- The success of a cytology screening programme is strongly influenced by
  - The percentage coverage of “at-risk” women
  - The quality of the infrastructure for screening
  - Compliance with regular follow-up

In our countries is this feasible?
Visual Inspection with Acetic Acid (VIA)

- Simple visual test, does not require laboratory
- Results available immediately
- Paramedical workers can be trained in 4 weeks

Visual inspection with acetic acid (VIA)
VIA Chart developed by IARC

VIA Negative

- Acetowhite areas far away from the TZ
- Faint acetowhite areas without a sharp outline
- Streak-like acetowhitening
- Line-like acetowhitening
- Dot-like pale areas in the endocervix

VIA Positive

Thick well-defined acetowhite areas, near the Transformation Zone (TZ) either on the endocervix or ectocervix (or both) are VIA positive
Visual inspection of the cervix after application of acetic acid has emerged as the **optimal screening tool** for LMICs, since it is **economical** and provides **immediate results**.

The test characteristics of VIA have been evaluated in several cross-sectional studies in LMICs and the results of these studies **strongly suggest** that VIA screening would be a useful alternative to conventional cytology.
HPV causality for cervical cancer is now firmly established and is considered a necessary cause of the disease. HPV 16 and 18 account for 70% of cervical cancer cases.

All reviews of the HPV-based screening have shown a significantly improved sensitivity (by 30-35%) and a slightly reduced specificity (by 8-12%) compared to conventional cytology.

“Care HPV” test. This is an HPV DNA test adapted for use in LMICs for primary screening and triage. Care HPV has the benefits of low cost, simple technology and short reporting period that allows for strategies incorporating the see-and-treat approach.
Cost of cervical cancer screening-1

* Includes cost of colposcopy in the field if required
** Pre-treatment biopsy
Cost of cervical cancer screening-2

VIA ($3.9)

Cytology ($6.6)

HPV-DNA test ($11.8)

Screening clinic
Programme costs
Biopsy

Laboratory costs
Screening clinic

Legood et al. Int. J. Cancer 2005
Comprehensive Cervical Cancer Prevention & Control – Programme guidance for countries

Taking into consideration the public health importance of cervical cancer & the challenges & opportunities presented by rapidly developing technologies, UNFPA together with technical experts from seven partner agencies including WHO formulated this publication following a technical consultation.
Two vaccines available, licensed and WHO-prequalified: Cervarix (16/18) and Gardasil (16/18 + 6/11)

Up to 30% of Cervical cancer are caused by other types than 16/18

Both vaccines require 3 doses over 6 months

Both vaccines are preventive only, target 9-13 year old girls

Post vaccination follow up exists only for 9 years

HPV in HIV positives is safe
Estimated age-standardized incidence and mortality rates, both sexes, South-East Asia, 2012

BREAST CANCER
Cost of breast cancer screening

For 100,000 women CBE screened with a 5% detection rate:

- 5000 mammography at $40  $200,000
- 5000 ultrasounds at $30 $150,000
- 1000 FNAC cytology at $50 $  50,000
- 500 biopsies at $60 $  30,000

Breast screening clinic ~ $4/woman
Staff salary ~ $2/woman

Mammo unit cost (new): $50,000 – $300,000; Ultrasounds (new): $50,000

~ $11/woman
Estimated age-standardized incidence and mortality rates, both sexes, South-East Asia, 2012

ORAL CANCER
| WHO Region | Most common cancer Male | | Male | Female | | Female |
|------------|------------------------|---|---|---|---|

World Health Organization
COUNTRY OFFICE FOR Sri Lanka
- **Highest incidence:**
  - Male: Maldives, Female: Bangladesh,

- **High incidence:**
  - Male: Maldives, Bangladesh, India, Nepal
  - Female: Bangladesh, India, Maldives

- **Moderate incidence:**
  - Male: Bhutan, Thailand
  - Female: Sri Lanka, Thailand

- **Low incidence:**
  - Male: Korea, Indonesia, Timor, Myanmar
  - Female: Korea, Indonesia, Bhutan, Myanmar, Timor
## Ranking of SEAR countries (overall incidence ASR)

1. Maldives (16.5)
2. Sri Lanka (10.3)
3. Bangladesh (9.7)
4. India (7.5)
5. Nepal (6.7)
6. Thailand (5.9)
7. Bhutan (5.7)
8. Myanmar (4.5)
9. Timor Leste (2.6)
10. Indonesia (2.4)
11. DP Korea (0.9)

(GLOBOCAN 2008)
Available Public Health Strategies

1. Primary Prevention
   Reducing exposure to risk factors

2. Secondary Prevention
   Screening for malignant and premalignant lesions

3. Tertiary Prevention
   Clinical care and rehabilitation
Primary prevention of oral cancer

Key risk factors:
- Tobacco, alcohol, HPV infection, consumption of carcinogens (areca nut, betel, etc), nutritional deficiencies, oral/dental neglect, other factors

- Common risk factor concept
- Shared broader determinants
- Similar socio-economic gradients and inequalities
Secondary prevention of oral cancer

- Visual screening
  Simple visual examination, no adjunctive tests, minimal training required, quick & simple
- Can be performed by non-dental professionals
- Good evidence for screening of high-risk populations
- Clear referral process and subsequent treatment must be ensured - otherwise screening is not appropriate
- Importance of self-examination and awareness

World Health Organization
Country Office for Sri Lanka
Tertiary prevention of oral cancer

- Surgery, radiotherapy, chemotherapy
  Usually complex interventions, survival rate depends on tumor stage and facility/surgeon competence

- Persistently low survival rates and highest impacts on quality of life

- High costs of care, lack of trained surgeons and specialised facilities make it difficult for low- and middle-income countries to offer appropriate services
NCDs can be Prevented by Available Low Cost Interventions

By eliminating common risk factors, such as unhealthy diet, physical inactivity, tobacco use and excessive use of alcohol,

It is possible to prevent:
- **80%** of heart diseases and stroke
- **80%** of Type 2 diabetes
- over **30%** of cancer

**Best buys** are interventions that are not only highly cost effective but also cheap, feasible and culturally acceptable to implement.

**Good buys** are interventions that may cost more or generate less health gains but still provide good value for money.
<table>
<thead>
<tr>
<th>Risk factor / disease</th>
<th>Interventions</th>
</tr>
</thead>
</table>
| Tobacco use                               | • Tax increases  
• Smoke-free indoor workplaces and public places  
• Health information and warnings  
• Bans on tobacco advertising, promotion and sponsorship |
| Harmful alcohol use                       | • Tax increases  
• Restricted access to retailed alcohol  
• Bans on alcohol advertising |
| Unhealthy diet and physical inactivity    | • Reduced salt intake in food  
• Replacement of trans fat with polyunsaturated fat  
• Public awareness through mass media on diet and physical activity |
| Cardiovascular disease (CVD) and diabetes | • Counselling and multi-drug therapy for people with a high risk of developing heart attacks and strokes (including those with established CVD)  
• Treatment of heart attacks with aspirin |
| Cancer                                    | • Hepatitis B immunization to prevent liver cancer (already scaled up)  
• Screening and treatment of pre-cancerous lesions to prevent cervical cancer |

Source: From Burden to “Best Buys”: Reducing the Economic Impact of Non-Communicable Diseases in Low- and Middle-Income Countries
GLOBAL ACTION PLAN
FOR THE PREVENTION AND CONTROL OF NONCOMMUNICABLE DISEASES
2013-2020

VOLUNTARY GLOBAL TARGETS

A 25% relative reduction in risk of premature mortality from cardiovascular diseases, cancer, diabetes, or chronic respiratory diseases.

World Health Organization
COUNTRY OFFICE FOR Sri Lanka
<table>
<thead>
<tr>
<th>Framework Element</th>
<th>Target</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality &amp; Morbidity</td>
<td>1. A 25% relative reduction in the overall mortality from cardiovascular diseases, cancer, diabetes, or chronic respiratory diseases</td>
<td>1. Unconditional probability of dying between ages of 30 and 70 from cardiovascular diseases, cancer, diabetes or chronic respiratory diseases</td>
</tr>
<tr>
<td></td>
<td>2. Additional indicator</td>
<td>2. Cancer incidence, by type of cancer, per 100,000 population</td>
</tr>
</tbody>
</table>

World Health Organization
Country Office for Sri Lanka
Reporting on indicators

2015 WHA68

2020 WHA73

2025 WHA78

2010 baseline
What is the source of data for monitoring indicators?

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Vital Reg with COD</th>
<th>Cancer Registry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality from main NCDs</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Cancer incidence by type</td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>

Source: World Health Organization (Sri Lanka)
Resource Kit for Strengthening CRVS

Resource kit is designed for use by all stakeholders who are engaged in strengthening the registration of births, deaths and causes of death within civil registration and vital statistics systems. It presents materials drawn from many sources to enable users to identify, locate and make use of the core standards, tools and materials needed to build stronger and more-efficient systems.
Rapid Assessment of National Civil Registration and Vital Statistics Systems

Tool designed to support countries in developing an understanding of the strengths and weaknesses of their civil registration and vital statistics system with a focus on births, deaths and causes of death. To facilitate the processes, the rapid assessment is also available in an electronic format which automatically calculates the scores and prepares summary tables.
Improving the quality and use of birth, death and cause of death information

Tool for reviewing country practices in improving the quality and use of birth, death and cause-of-death information.
Verbal autopsy instrument

WHO verbal autopsy instrument is for routine use as part of civil registration systems where deaths are not medically Certified. Instrument will permit the collection of uniform indicators from the field.
This electronic tool provides a step-by-step approach to quickly conduct a comprehensive analysis of data on mortality levels and causes of death. It automatically reviews the data for errors, tabulates the information, presents the results in the form of easy to use tables and charts, and provides the opportunity to compare the findings with those from other groups of countries.
ICD 10 training tool

Electronic ICD-10 training tool designed for self learning & class rooms.
State of the art technology
Easy and intuitive to use, specifically designed to enhance the training and learning experience
IARC GLOBOCAN 2008

Provides estimates of the incidence of, mortality, prevalence & DALY from major type of cancers at national level for 184 countries of the world.
National Cancer Control Program (NCCP) Core Capacity Assessment tool

This can be used to carry out short qualitative assessment and facilitates the evaluation of the countries capacity of cancer control plans and programs.
Global Health Observatory (GHO)

GHO data repository provides access to mortality, risk factor & health system response and capacity.
WHO Mortality Database

Life tables and all cause mortality profiles for WHO member states
This is a series of six modules, published in 2006, on how to develop and implement an effective Cancer Control Plan.
Thank You