WHO-EM/NCD/060/E

Towards a strategy for cancer control in the Eastern Mediterranean Region

World Health Organization

Regional Office for the Eastern Mediterranean

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WHO Library Cataloguing in Publication Data

World Health Organization. Regional Office for the Eastern Mediterranean
Towards a strategy for cancer control in the Eastern Mediterranean Region / World Health Organization. Regional Office for the Eastern Mediterranean
p.
WHO-EM/NCD/060/E
1. Neoplasms - prevention and control – Eastern Mediterranean Region 2. Neoplasms – diagnosis - therapy 3. Health Planning 4. Early Detection of Cancer I. Title II. Regional Office for the Eastern Mediterranean
(NLM Classification: QZ 200)

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Preface

Cancer is an increasing problem in the Eastern Mediterranean Region. It ranks as the fourth leading cause of death in the Region and is one of the leading causes of death in the world, particularly in developing countries. Although the incidence of cancer is still well below that in developed countries, the Region is expected to experience the highest increase among all WHO regions in the coming two decades. The increasing trend can be attributed to many factors including population ageing and exposure to risk factors, such as smoking, unhealthy diet and physical inactivity and environmental pollution. It is estimated that 40% of cancers can be prevented by risk factor modification. Prevention therefore offers the greatest public health potential and the most cost-effective long-term approach for cancer control.

Towards a strategy for cancer control in the Eastern Mediterranean Region was developed in response to the increasing burden of cancer and the need for coordinated action in this regard. Work on a strategy to control cancer has been gathering momentum for a number of years. Two expert meetings were held in Cairo and Morocco to oversee the development of the strategy. International and regional experts participated in the process of development and review of the draft document. The draft document was circulated for comments and these were taken into account.

This publication reflects a shared commitment to reducing the incidence of cancer and improving the quality of life of those who develop cancer. By promoting an integrated approach to the provision of cancer control activities and services, it is hoped the publication will encourage and assist government and non-government service providers to work more closely together in:

- reducing the overall incidence and impact of cancer in the Region;
- preventing cancer so that as many of the population as possible enjoy cancer-free lives;
- detecting cancer and providing treatment as early as possible;
- ensuring that, once a diagnosis is made, those affected have prompt access to high-quality care throughout their experience of cancer;
- reducing barriers and inequality for cancer services;
- coordinating cancer research;
- strengthening cancer control training and providing specialist training opportunities;
- regularly monitoring cancer control activities to ensure they are effective and remain effective.

This publication is targeted at government and non-government agencies whose work impacts on the delivery of cancer services and activities, as well as the wide range of individuals involved in the management and delivery of cancer activities and services and people affected by cancer. Each country is invited to set its own priorities and to implement prevention and control strategies appropriate to its national situation.

1. Introduction

1.1 Rationale

According to WHO mortality estimates, cancer is the fourth ranked cause of death in the Eastern Mediterranean Region, after cardiovascular diseases, infectious/parasitic diseases and injuries. It is estimated that cancer kills 272 000 people each year in the Region [1]. In addition, the largest increase in cancer incidence among the WHO regions in the next 15 years is likely to be in the Eastern Mediterranean Region, in which projection modelling predicts an increase of between 100% and 180% [2]. Cancer is already an important health problem and will become increasingly important not only in terms of rank order, as infections are better controlled, but also in terms of incidence and mortality, which will both increase as populations continue to grow and age, and as risk factors for cancer associated with greater affluence, such as smoking and changes in diet (qualitative and quantitative), continue to increase.

At present, resources for cancer control in the Region as a whole are not only inadequate but directed almost exclusively to treatment. This strategy, although successful to a degree, is suboptimal because the impact of preventive measures on incidence is not taken full advantage of, while the lack of approaches to earlier diagnosis reduce the value of therapy. The curability of cancer is directly related to its stage at the time of diagnosis, and in the majority of countries of the Region, cancer is generally diagnosed when at a relatively advanced stage. According to WHO, 40% of cancers could be avoided (prevention), 40% could be cured (if detected early) and the rest should be managed with palliation.

While this estimate is an average and will vary markedly from one country to another, a situation analysis (see section 2) shows that there is much that can be done to improve cancer control in the Region, even in the poorest countries. While economic considerations must be taken into consideration, a more broad-based approach to cancer control should also limit the escalating costs of care. Member States of WHO have declared that the enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being (WHO Constitution). This statement encompasses the right to appropriate health care, and this should not be denied to patients with cancer, or to anyone at high risk of developing cancer.

1.2 Purpose and target audience

This publication outlines strategic directions for cancer control in the countries of the Region 2009–2013. It is intended to provide a foundation for the development of a coordinated approach that seeks to take advantage of the strengths of some of the regional resources in order to overcome some of the weaknesses. It therefore emphasizes improved communication and regional collaboration such that the benefits of concerted action can be realized. It cannot replace national cancer control planning, but may lead to more effective national planning through the ability of countries to learn from each other and to participate, where appropriate, in joint endeavours. An important function of this publication resides in its twin goals of sensitizing national authorities to the need to control cancer more effectively, while at the same time providing technical guidance and a foundational formula for regional cooperation in this endeavour. It includes an assessment, in outline, of the present situation with respect to the pattern and prevalence of cancer in the Region. It presents measures that may be introduced at public health and clinical levels to reverse, hopefully, and at least to slow the rapidly increasing incidence and mortality rates of cancer. The strategic directions outlined draw on the previous strategy for cancer control in the Region produced more than 10 years ago [3,4] and are in keeping with the WHO Global Action Plan against Cancer (GAPAC), pursuing the same goals, which are to:

- prevent preventable cancers (through avoiding or reducing exposure to risk factors, i.e. prevention strategies);
- cure curable cancers (early detection, diagnostic and treatment strategies);
- relieve pain and improve quality of life (palliative care strategies);
- manage for success (strengthening health care systems; management, monitoring and evaluation of interventions).

The intended audience of this publication is wide, and includes national and international leaders and decision-makers directly or indirectly involved in cancer control, i.e. politicians, policy makers, technical and financial advisers and a broad range of health professionals (including practitioners and researchers) and health-related organizations (including those focused on health education) from both the private and public sectors who are in a position to influence the development of effective cancer control strategies.

1.3 Diversity of the Eastern Mediterranean Region

The Region includes a wide range of economically diverse countries, from technically advanced countries with high level cancer care to countries with little or no cancer treatment capabilities. There are large differences in population size, wealth and health expenditure (see Table 1). The needs of the countries are likely to be very different in terms of cancer control, such that a uniform approach across the Region would not be feasible, although there are likely to be many areas where similar or concerted approaches, of different actions, are possible. Thus, recommendations are tailored, to the extent possible, to different resource levels, both among countries and in different regions or populations within countries. It is hoped that resources available in the high-income countries of the Region may be mobilized to augment programmes in the lower-income countries, with benefits accruing, wherever possible, to both partners.

Table 1. Countries of the Eastern Mediterranean Region by income group and total expenditure on health

Country	Population (thousands)[a]	World Bank income grouping[b]	Total expenditure on heath per capita (US$)[a]
Qatar	1 305	High	2 186
United Arab Emirates	4 106	High	833
Kuwait	3 328	High	687
Bahrain	743	High	710
Lebanon	3 928	Upper middle	460
Saudi Arabia	24 242	Upper middle	448
Oman	2 557	Upper middle	312
Libyan Arab Jamahiriya	5 419	Upper middle	223
Jordan	5 600	Lower middle	241
Occupied Palestinian territory	3 762	Lower middle	NA
Tunisia	10 225	Lower middle	159
Iran, Islamic Republic of	70 495	Lower middle	212
Morocco	30 841	Lower middle	89
Syrian Arab Republic	19 172	Lower middle	61
Egypt	73 435	Lower middle	78
Djibouti	720	Lower middle	61
Iraq	29 000	Lower middle	59
Yemen	21 535	Low	39
Sudan	37 239	Low	29
Pakistan	156 000	Low	15
Afghanistan	24 500	Low	20
Somalia	7 960	Low	NA

[a] Source: *Demographic, social and health indicators for countries of the Eastern Mediterranean 2008.* Cairo, WHO Regional Office for the Eastern Mediterranean, 2008

[b] Source: http://web.worldbank.org/

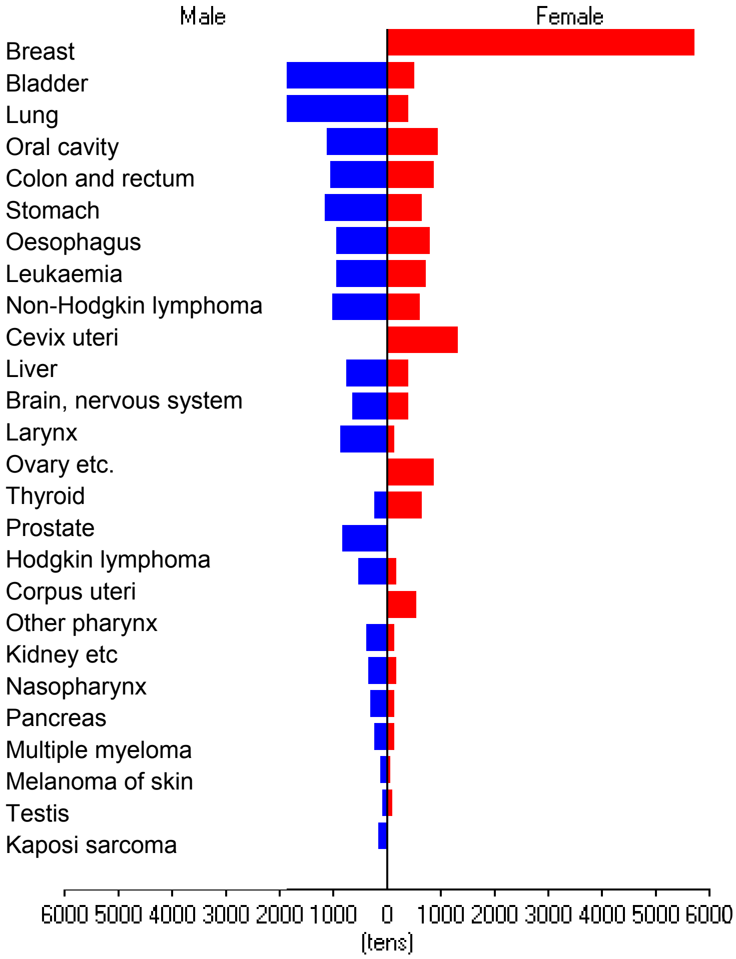
2. Cancer in the Eastern Mediterranean Region

2.1 Introduction

No cross-national survey of cancer control has been performed to date in the Region and data are both scarce and often of sub-optimal quality, such that it is not possible to conduct a comprehensive and precise situation analysis. However, some high quality information is available, and often sufficiently realistic extrapolations can be made for the purposes of strategic planning and prioritizing cancer control activities. The information presented here was obtained from publications in local and international journals or directly from cancer centres. The lack of data highlights an important priority for the Region: the development of additional data and its systematic analysis, so that cancer control interventions can be based on the most accurate evidence available.

2.2 Incidence and mortality

Incidence and mortality figures presented in this section are extracted from the Globocan database created by the International Agency for Research on Cancer (IARC) in 2002. This database provides estimates of cancer incidence and mortality for all countries of the Region except the occupied Palestinian territory. These estimates are derived from multiple sources, including data from all the population-based registries existing in the countries (for more details about Globocan estimates, see Pisani et al. 2002 [5], Ferlay et al. 2004 [6]). The age standardized incidence (ASR) of all cancers in the Region is currently 3 to 4 times lower than in the industrialized countries but is expected to double in the next 15 years as risk factor exposure increases (including that related to population aging). Half of the cancers in the Region occur before age 55 which is 10–20 years younger than in industrialized countries. The mortality/incidence ratio is 70%, which is high (40% in America, 55% in Europe), indicating significantly lower survival rates from diagnosed cancer. The top five cancers in the Region when males and females are combined are breast, bladder, lung, oral and colon cancer (see Figure 1).



* Number of cases, occupied Palestinian territory excluded
Source: [7]

Figure 1. Cancers in the Eastern Mediterranean Region*

These cancers can either be prevented (bladder and lung), or detected early (breast, oral and colon), although the methods used and cost-benefit ratios will vary according to incidence and available resources. The striking predominance of breast cancer, ranked first in incidence even when males are included, suggests that this cancer should be given a particularly high priority in both regional and national cancer control plans.

There are marked variations in the incidence of various cancers in the Region (see country profiles on Regional Office website [www.emro.int/ncd/stepwise.htm], or Globocan). For example, stomach and oesophageal cancer have a higher incidence in the Islamic Republic of Iran and oral cancer has a higher incidence in Pakistan. Breast cancer is among the five most common cancers in all countries. It is worth noting that cancer incidence does not correlate precisely with socioeconomic status. Thus, Afghanistan, Pakistan and Somalia, all low-income countries, have high rates, while Oman, an upper middle income country has one of the lowest rates. The top five cancers in rank order for each country are given in Table 2.

Table 2. Top five cancers in the Eastern Mediterranean Region

Countries	**Rank order of incidence**				
	1st	**2nd**	**3rd**	**4th**	**5th**
Afghanistan	Stomach	Breast	Oesophagus	Lung	Oral Cavity
Bahrain	Lung	Breast	Bladder	Colon	Prostate
Djibouti	Cervix	Liver	Oesophagus	Breast	Kaposi
Egypt[a]	Breast	NHL	Bladder	Liver	Lung
Iran, Islamic Republic of	Stomach	Oesophagus	Breast	Colon	Bladder
Iraq	Breast	Lung	Bladder	Larynx	NHL
Jordan[b]	Breast	Lung	Colon	Bladder	NHL
Kuwait	Breast	Lung	Colon	NHL	CNS
Lebanon[b]	Breast	Lung	Prostate	Bladder	Colo-rectal
Libyan Arab Jamahiriya	Bladder	Breast	Lung	Cervix	Colon
Morocco[b]	Rectum	Thyroid	Liver	Colon	Stomach
Oman[b]	Leukaemia	NHL	Breast	Stomach	Thyroid
Pakistan	Breast	Oral cavity	Lung	Oesophagus	Bladder
Qatar	Breast	Colon	Lung	Liver	NHL
Saudi Arabia[b]	Breast	Colo-rectal	NHL	Leukaemia	Thyroid
Somalia	Cervix	Liver	Oesophagus	Breast	Prostate
Sudan	Breast	Oral cavity	Cervix	Oesophagus	Liver
Syrian Arab Republic[b]	Breast	Lymphomas	Lung	Leukaemia	CNS
Tunisia	Lung	Breast	Bladder	Colon	NHL
United Arab Emirates[b]	Breast	Colon	Leukaemia	Lymphomas	Thyroid
Yemen	Breast	Oesophagus	NHL	Liver	Colon

Source: [20]
Source: GLOBACAN 2002, IARC
[a] Gharbiah population-based cancer registry report 2000–2002
[b] National cancer registry, Cancer incidence report, Jordan 2004, Lebanon 2003, Morocco 2004, Oman 2006, Saudi Arabia 2004, Syrian Arab Republic 2006, United Arab Emirates 2000–2004.

2.3 Cancer registries

Population-based cancer registration involves continuous and systematic collection, collation (comparing), storage, analysis and reporting of data on new cancer cases occurring in a defined population in a specific geographical area (including patients who live in the Region, but seek care elsewhere). Accurate information of this kind is important in identifying priorities, and also observing trends over time, which can help to determine the impact of an intervention. In this regard, the collection of survival data, although not always easy, should be included wherever possible. Population-based cancer registries exist in 14 countries of the Region (see Table 3) but the quality of the data and reports from these registries is very varied. In 2000, the Gulf Cooperation Council initiated an innovative Gulf Centre for Cancer Registration, serving all the member countries, which could serve as a model for other registries. Centres of excellence for population-based registration have also been developed by the Middle East Cancer Consortium at the Tanta Cancer Centre (Egypt) and the national cancer registry at the King Hussein Cancer Centre, Jordan.

Table 3. Population based cancer registries in the Eastern Mediterranean Region

Country	Registry name	Population covered	Status
Bahrain	Bahrain cancer registry	National: 742 562	Last data produced in 2004. Data of 1998-2002 was published in CI5IX. Uses CANREG
Egypt	Tanta population based registry	Gharbiah district : 3.4 million	Last data published 2007, and before that 2000-2002 Uses CANREG
Iran, Islamic Republic of	National cancer registry of Iran	Iran: 66.7 million	Last data published 2005-2006 Does not use CANREG but a locally made software (PARS)
Iraq	Iraqi cancer registry	Iraq (Duhok, Erbil and Sulaimaniya provinces excluded): 23.5 million	Last data published 2004 Uses CANREG
	Mosul population based cancer registry	Ninawa province: 2.25 million	Last data published 2002 Uses CANREG
Jordan	National cancer registry	5.6 million	Last data published 2004 Uses CANREG
Kuwait	Kuwait cancer registry	Kuwaitis and non-Kuwaitis: 2.48 million	Last data published 2003 Uses CANREG
Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, United Arab Emirates	Gulf Cancer Centre for Cancer Registration	All GCC countries: 19.5 million	Possible training centre Last data published 2002 Uses CANREG
Lebanon	National cancer registry	Lebanon: 4.5 million	Last data published 2003 Uses CANREG
Libyan Arab Jamahiriya	Benghazi cancer registry	Eastern Libya: 1.63 million	Last data published 2003 Does not use CANREG but an Italian software
Morocco	Registre du grand Casablanca	Grand Casablanca district (4 million)	Last data published 2004 Uses CANREG
Syrian Arab Republic	National cancer registry	All Syria: 18.2 million	Last published data 2005 Uses local software
Saudi Arabia	National cancer registry	Saudi Arabia: 15.6 million	Last data published 2003 Uses CANREG
Tunisia	Register of North Tunisia	North Tunisia (10 governorates): 4.4 million	Last data published 1995-98 Does not use CANREG but a locally made software
	Register of South Tunisia	South Tunisia (7 governorates): 2.2 million	Last data published 1997
Yemen	Aden cancer registry		No publication Uses CANREG

Source: Data derived from published cancer registry reports [8–18]

Hospital-based frequencies from the major cancer treatment centres are available in almost all countries of the Region. Although some may be biased because of differences in referral patterns, when such figures are used in conjunction with data from the neighbouring population-based registries they provide added insight into the cancer pattern prevailing in the Region.

Although incidence data, coupled to institutional data, are sufficient, at this point, to provide the information required to determine cancer control priorities, data on stage at presentation, mortality and survival are lacking; no population-based registry in the Region is currently publishing survival data, and only one registry, the national registry of Saudi Arabia, publishes data on stage.

2.4 Prevention

Cancer prevention involves eliminating or minimizing exposure to known environmental causes of cancer. It is estimated that more than 50% of the cancers in the world are attributable to three factors: tobacco, infection and unhealthy lifestyle (diet, obesity and lack of physical exercise). However the attributable fraction associated with these three factors differs between developing and developed countries. The tobacco epidemic, for example, is much less advanced in the low-income countries. Dietary factors play an important role in the etiology of cancer; in some countries obesity is prevalent and in others consumption of a specific foodstuff plays an important role. Infections are associated with a much greater fraction of the cancer burden in developing countries (26%) than in developed countries (8%) [19] but the fraction of cancers related to infection varies greatly in different regions of the world. In some countries or regions it may be as important as smoking or dietary factors, resulting in marked differences in the pattern of cancer, e.g. the high incidence of both bladder and liver cancer in Egypt. In such circumstances, control of the infection process also results in cancer control. While a widespread public belief strongly associates cancer and pollution, the burden of cancer due to environmental factors is less than 2% in developed countries and is not expected to be higher in developing countries [20], although this may be a much more important cause in specific locations where there are particularly high levels of pollution, or in particular occupations where chemical exposure is high. Where such circumstances can be identified, specific measures can usually be taken to protect the at-risk population.

Tobacco consumption

Tobacco is responsible for up to 30% of the cancer burden in some industrialized countries; the corresponding proportion for the Eastern Mediterranean Region is not known but is likely to be much lower since the tobacco epidemic is in its early stages [21,22]. However, the prevalence of tobacco consumption is increasing rapidly and is already above 30% in men in 12 countries of the Region (Table 4). It has been proven that tobacco use increases the risk of cancer of the lung, trachea and bronchus, oral cavity, cervix, pharynx, oesophagus, larynx, urinary bladder, renal pelvis, pancreas and kidney. Tobacco control is, thus, a crucial part of any cancer control strategy and the timely institution of appropriate measures, as recommended by the WHO Framework Convention on Tobacco Control, could markedly decrease the scale of the impending epidemic of smoking related diseases, particularly cancer, cardiovascular and lung diseases.

Table 4. Prevalence of tobacco smoking and overweight/obesity in the Eastern Mediterranean Region

	Prevalence of tobacco smoking [a] (%)		Prevalence of BMI≥25 [b] (%)	
	Males > 15 years	**Females > 15**	**Males**	**Females**
Afghanistan	–	–	11.2	15.6
Bahrain	23.5	3.1	60.9	66.0
Djibouti	57.5	4.7	17.6	28.8
Egypt	35.0	1.6	64.5	69.7
Iran, Islamic Republic of	27.2	3.4	47.3	55.7
Iraq	41.5[c]	6.9[c]	63.6	69.6
Jordan	48.0	5.7	63.3	70.4
Kuwait	29.6	1.5	69.5	79.6
Lebanon	46.0	35.0	51.7	52.9
Libyan Arab Jamahiriya	–	–	47.6	56.0
Morocco	34.5	0.6	30.6	47.8
Oman	15.5	1.5	43.4	46.0
Pakistan	36.0	9.0	16.7	23.3
Palestine	40.7	3.2	–	–
Qatar	37.0	0.5	56.9	62.9
Saudi Arabia	22.0	1.0	62.4	63.0
Somalia	–	–	9.8	19.3
Sudan	23.5	1.5	16.0	27.0
Syrian Arab Republic	48	8.9	52.9	58.8
Tunisia	61.9	7.7	42.8	65.4
United Arab Emirates	18.3	<1.0	66.9	58.8
Yemen	77.0	29.0	24.6	27.8

[a] Source: [23]
[b] Source: [24]
[c] Source: STEPwise survey Iraq, 2006

Infections

Some chronic infections can cause cancer (see Table 5). It is estimated that cancers due to infections represent 11% of the cancer burden in North Africa and 16% of the cancer burden in west Asia [25]. This percentage may be higher in specific countries.

- Human papillomaviruses (HPVs): HPV infection is the main cause of cervical cancer. It also may be a risk factor for other types of cancer.
- Hepatitis B and hepatitis C viruses: Liver cancer can develop after many years of infection with hepatitis B or hepatitis C.
- Human T-cell leukaemia/lymphotropic virus (HTLV-1): Infection with HTLV-1 increases a person's risk of lymphoma and leukaemia.
- Human immunodeficiency virus (HIV): HIV is the virus that causes AIDS. People who have HIV infection are at greater risk of cancer, such as lymphoma and a rare cancer called Kaposi's sarcoma.
- Epstein-Barr virus (EBV): Infection with EBV has been linked to an increased risk of lymphoma.
- Human herpesvirus 8 (HHV8): This virus is a risk factor for Kaposi's sarcoma.
- *Helicobacter pylori*: This bacterium can cause stomach ulcers. It also can cause stomach cancer and lymphoma in the stomach lining.

Unhealthy lifestyle

An unhealthy diet and obesity are important risk factors for cancer, accounting for 20% to 30% of the cancer burden in the world. In the Eastern Mediterranean Region obesity is a rapidly growing problem; already more than 50% of the population is overweight in 12 countries (see Table 4). A number of cancers have been associated with obesity, particularly colorectal cancer, post-menopausal breast cancer and endometrial cancer.

From Table 5 it is possible to calculate that around 70% of the infection-related cancers in the Region are attributable to four infectious agents: human papilloma virus (HPV) (27%), *Helicobacter pylori* (23%), and hepatitis B and C virus (20%). Prevalence of HTLV-I is low in the Region [26]. Schistosomiasis, which may have caused a substantial part of the bladder cancer burden in the high incidence countries of the Region, has been almost eradicated in Egypt, where the incidence of bladder cancer was the highest due to irrigation methods and lifestyles of the rural population [27]. Schistosomiasis prevalence in Egypt has decreased from 38% in 1980 to 2% in 2003; bladder cancer incidence is likely to be markedly reduced in 30 to 40 years time [28]. Tobacco is an important risk factor for transitional type bladder cancer, accounting for an estimated 75% of of bladder cancers in males below 60 in Europe [29]. Increased smoking doubtless is a factor in the increased proportion of transitional bladder cancer in Egypt [28].

Table 5. Cancer related to infection and corresponding burden in the Eastern Mediterranean Region (adapted from [19])

Cancers	Infectious agent (attributable fraction for the whole world)	Crude incidence in the Eastern Mediterranean Region[a] (per 100 000 population)
Bladder	Schistosoma (3%)	5.0
Stomach	Helicobacter pylori (63%)	3.8
Non-Hodgkin lymphoma	HTLV-I (18%)	3.3
Cervix	HPV (100%)	2.8
Liver	HBV, HCV (86%)	2.4
Hodgkin lymphoma	EBV (46%)	1.5
Nasopharyngeal carcinoma	EBV (98%)	0.9

Chemical and physical factors

Among the most important physical factors known to predispose to cancer is unprotected exposure to sunlight, which is an important risk factor for skin cancers. Among the more important chemical exposures is that to asbestos. Asbestos has not been banned in most of the countries of the Region and safety regulations governing exposure to asbestos are not strong enough, or are not enforced. Similar problems may apply to other occupational exposures, including agricultural chemicals. There is little evidence about pesticides and fertilizers which have been used for food production and regulations for food additives or preservatives such as nitrites in the countries of the Region.

2.5 Early detection

Most cancers present at an advanced stage in developing countries when cure is improbable even with the best treatments. A major element in improved survival rates in many cancers in the USA and Europe has been shown to be the much earlier stage of disease at diagnosis brought about by public education and, in some cases, screening for pre-malignant lesions or early cancer. Most population-based registries in the Region lack information on disease staging. However, disease data are recorded in some registries including Saudi Arabia, Egypt and Jordan. These data for breast and cervix cancers are reported in Table 6; US data are provided for comparison. In Saudi Arabia, only 29% of breast cancer and 35% of cervical cancer cases present at an early stage. In Egypt, 25.5% of cases of breast cancer and 35.9% of cases of cervical cancer present at an early stage.

Institutional data regarding stage at presentation in breast cancer were collected for this document from major cancer centres in the Region and are shown in Table 7. It is clear that a high fraction of patients reaching these centres predominantly have advanced stage (stage III and IV).

Table 6. Stage at diagnosis in breast and cervical cancer as reported by population-based registries in Saudi Arabia, Egypt and United States of America [9,18,30]

	Breast cancer			Cervical cancer		
Stage	**USA**	**Saudi Arabia**	**Egypt**	**USA**	**Saudi Arabia**	**Egypt**
Localized	65%	29%	25.5%	58%	35%	35.9%
Regional	30%	55%	58.0%	33%	51%	53.2%
Distant	5%	16%	16.5%	9%	14%	10.9%

Table 7. State at presentation in breast cancer according to institutional data

Region	Advanced stages[a]	Data source
Sudan	78%	Ministry of Health 2007 (unpublished)
Nile delta, Egypt	70%	Fakous hospital registry data 2006 (unpublished)
Cairo, Egypt	66%	Omar et al. 2003 [31]
Syrian Arab Repubic	73%	National population based registry 2002-2005 (unpublished)
Jordan	69%	National population based registry 2004 (unpublished)
Tunis, Tunisia	49% (40% > 5cm)	Institute Salah Azaiz hospital registry report 1999 [32]
Iraq	47%	Alwan N. et al [33]
Lahore, Pakistan	46%	Jinnah hospital 2000 – INCTR study (unpublished)
Bahrain	33% (70% > 2 cm)	Fakhro et al. 1999 [34]
Iran, Islamic Republic of	25% (72% > 2 cm)	Mousavi et al. 2007 [35]

[a] Stage III and IV

In most countries, primary health care workers are rarely provided with sufficient education about the early signs of cancer or where to refer suspected cases. This could be remedied by short training courses (ideally coupled to continuing education programmes), brochures or posters, and by establishing links between those who deliver primary health care and referral centres.

National population screening of breast cancer has been implemented in a number of countries in the Region. In Iraq a national programme for early detection and downstaging of breast cancer was initiated by the Ministry of Health in collaboration with WHO in 2000; referral centres and specialized clinics for early detection of breast cancer were established in all 18 governorates. The programme has been endorsed by the Iraqi Parliament, Prime Minister's office and the Ministries of Women's Affairs, Higher Education and Education. Jordan started, in 2006, a national breast cancer early detection programme, utilizing the down staging as well as the universal screening approaches, with a focus on women aged 40–59 years. Bahrain started nationwide mammography-based screening for breast cancer among women in 2005 with acceptable detection rate so far, although the coverage is still below the expected.

2.6 Diagnosis and treatment

Resources for cancer treatment in the Region have not been recently surveyed. However, the DIRAC database (Directory of Radiotherapy Centres), maintained by the International Agency for Atomic Energy (IAEA) since 1968, provides information about radiotherapy facilities, machines and cancer professionals in a substantial proportion of the countries. Some of the data are outdated (>5 years) but still convey the order of magnitude of the problem (see Table 8).

Table 8. Cancer treatment facilities and human resources in the Eastern Mediterranean Region

Countries	Comprehensive cancer centres [a,b]	Radiotherapy		Oncologists[c]	Incident cancer cases (new patients/year)[d]
		Co16	Lin Acc		
Afghanistan	–	–	–	–	16 124
Bahrain	–	–	2	8	612
Djibouti	–	–	–	–	674
Egypt	5	25[e]	43[e]	560[e]	71 250
Iran, Islamic Republic of	–	49	6	180[e]	55 854
Iraq[f]	0	4	7 only 2 in use	24	14 520
Jordan	2	2[e]	7[e]	26[e]	3503
Kuwait	–	2	1	–	1393
Lebanon	1	4	9	16	5182
Libyan Arab Jamahiriya	1	4[e]	1[e]	29[e]	3610
Morocco	4	9[e]	11[e]	48	20 390
Oman	1	–	–	–	1421
Pakistan	–	16	7	35	141 299
Occupied Palestinian territory	–	–	–	–	–
Qatar	1	–	–	–	620
Saudi Arabia	–	2	18	13	16 437
Somalia	–	–	–	–	7317
Sudan	2	3[e]	3[e]	17[e]	19 950
Syrian Arab Republic	1	5[e]	2[e]	26[e]	11 500
Tunisia	3	7	2	12	7787
United Arab Emirates	1	2	4	16	2737
Yemen[g]	1	1	0	11	11 193

[a] Regional Office for the Eastern Mediterranean survey 2006 (unpublished)
[b] Those centres which provide diagnostic and treatment modalities (should include: surgery, radiotherapy and chemotherapy)
[c] Radio oncologists + medical oncologists
[d] GLOBOCAN estimates
[e] Ministry of health 2007 (unpublished)
[f] Alwan N: personal communication
[g] Ministry of Health 2006 (unpublished)
– No data available

From Table 8 it is possible to calculate that the number of new cases per oncologist per year varies from 135 in Jordan to 4037 in Pakistan. The number of incident cases per radiotherapy machine varies from 1393 in Kuwait to 11 193 in Yemen. In comparison, the numbers in Austria are 230 incident cases per oncologist and 777 incident cases per radiotherapy machine (calculation based on DIRAC database and Globocan estimates). It appears that neither the number of radiation and clinical oncologists nor the number of radiotherapy machines is sufficient to serve the population needs in most of the countries of the Region.

According to international and regional cancer experts, a multidisciplinary approach to treatment is not systematically implemented in some treatment centres (i.e. involving pathologists, radiologists, surgical, radiation and medical oncologists). In many countries the cost of treatment is an important deterrent for patients, particularly the cost of chemotherapy, which is usually an out-of-pocket expense.

An increasing number of cancers are being treated with combined modality therapy which includes systemic therapy. A major issue in this regard is the cost and availability of cytotoxic drugs. National lists of essential medicines for oncology are generally available at the ministry of health. A survey conducted by the Regional Office in 10 countries in 2006 showed that the WHO essential medicines list for cancer was available in 9 out of 10 ministries of health. The delivery of cytotoxic drugs requires special training as well as efficient management to ensure that patients receive therapy on schedule over an often relatively long treatment period and are effectively supported (medically and psychologically) during this time. Unfortunately, there are relatively few trained radiation, medical or paediatric oncologists in many countries of the Region, and very few oncology nurses and social workers. Economy of effort could be achieved by a redistribution of tasks.

Thus, the roles of nursing staff and paramedicals could be expanded to reduce the load on specialists.

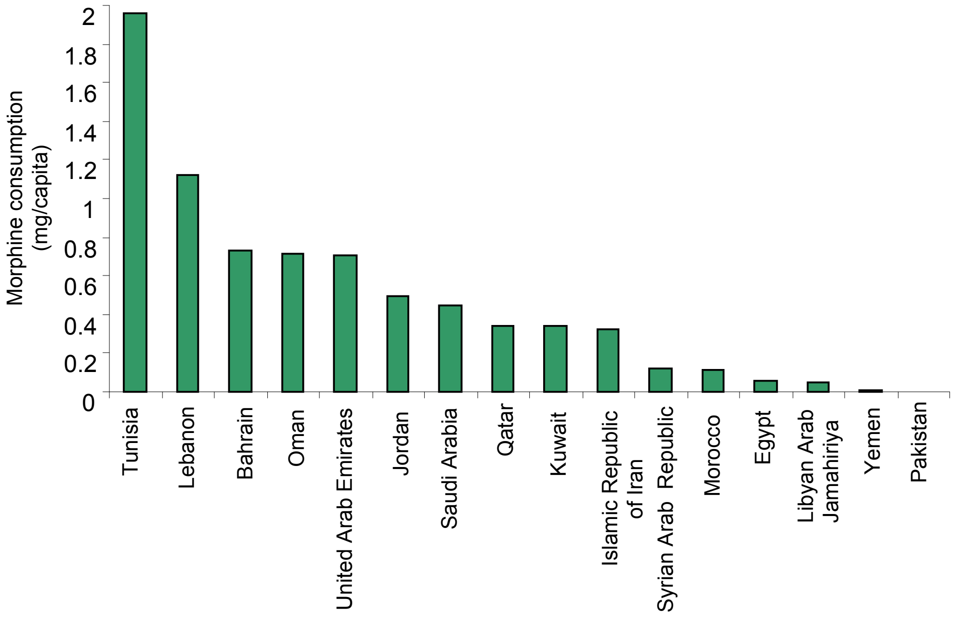
Although there are limited data, it is probable that the administration of chemotherapy is frequently less than optimal. This results from many factors, including the knowledge of the oncologist, the ability of the patient to pay for treatment, and problems relating to returning for appointments. In addition, follow-up is of variable quality, such that very often the results of therapy remain unknown.

2.7 Palliative care

Palliative care reduces suffering and improves the quality of life of cancer patients and their families through the early identification, assessment and treatment of pain and other problems, of a physical, psychosocial or spiritual nature. Although palliative care used to be defined as the control of physical symptoms and attention to the social, psychological and spiritual needs of the patient and family when there is no curative option, many palliative care experts now consider that palliative care includes not only the care of patients who do not have a curative option, but symptom control and psychosocial support throughout the clinical course of the cancer patient.

Given the impact of the late presentation problem, palliative care is of paramount importance in the Region. In 2006 the Regional Office conducted a survey of palliative care in the Region via a questionnaire sent to Ministries of Health. Of the 10 countries which answered (Islamic Republic of Iran, Iraq, Jordan, Lebanon, Morocco, Oman, Tunisia, Syrian Arab Republic, Sudan and United Arab Emirates) only 7 had at least one palliative care service in the country and none had a home care or hospice programme (WHO, unpublished, 2006). Home care is the most practical approach for countries with limited resources [36], and preferred by many patients in high-income countries, although obstacles relating to the geographical distribution of patients and the need for a high health care worker to patient ratio may need to be addressed. The number of doctors trained in palliative medicine in the countries surveyed varied between one (Morocco) and 13 (Sudan) except in Tunisia, where a post-university diploma has been established, which benefits 20 to 30 doctors per year. The number of nurses trained in palliative care was also very low. These findings emphasize the need to develop human resources, home care and hospice care.

Opioids were available in all countries, but in half the countries only oncologists could prescribe narcotic analgesics. The duration of the prescription varied from 1 week to 1 month except in Lebanon where 4 month prescriptions were authorized. These latter results suggest that access to opioids is a major issue in the Region, very probably because of concern about drug abuse, as in most other regions of the world [37,38]. Figure 2 shows that use of opioids in the Region, a recognized



Source: International Narcotic Control Board [39]
N.B. Countries not included did not report morphine consumption to the International Narcotic Control Board for 2004

Figure 2. Morphine consumption in the Eastern Mediterranean Region

surrogate marker for the quality and quantity of palliative care, is low compared to most industrialized countries, where it is around 50 mg per capita. Tunisia, which is a leader in palliative care in the Region, has a consumption of 1.96 mg per capita while the other countries display lower rates. These amounts are undoubtedly not meeting the needs of patients. In some countries, the need for palliative care services is not fully appreciated by authorities and health providers. For example a WHO-IAEA mission to Yemen reported that in 2006 awareness about the necessity of palliative care was low at both the level of care providers and the Ministry of Health.

In conclusion, it appears that the Region suffers from the same barriers to palliative care as other developing regions of the world. These can be summarized as: 1) insufficient development of palliative care and lack of awareness of the "human right to a peaceful death" or how to assure this in both the health care community and the general public; 2) too few palliative care programmes and of insufficient quality; and 3) policies (or attitudes among health care providers) restricting access to opioids mainly because of an over-concern about drug abuse. Policy regarding who can prescribe opioids, the duration of prescriptions and the attitudes of health care workers to the administration of opioids needs to be better documented in order to identify obstacles and develop approaches to overcoming them.

3. Strategic directions for cancer control in the Eastern Mediterranean Region

3.1 Development of a national cancer control plan

In May 2005, the World Health Assembly resolved that all countries should develop and implement national cancer control programmes (WHA58.22). This resolution signified the recognition of both the rising importance of cancer as a global health problem (which, by 2010 will become the leading cause of death globally, ahead of ischemic heart disease) and the importance of implementing a coordinated approach to cancer, using all of the recognized approaches to cancer control, but with variable emphasis depending upon both the national pattern (or patterns) of cancer and the available resources. Even with limited resources, a significant impact on cancer incidence and survival, and consequently on mortality, can be achieved with appropriate strategies. Resource limitations dictate the need to establish national priorities also. Such priorities are best decided by a National Cancer Control Committee (NCCC) (see Box 1), and should not be interpreted as indicating that activities in lower priority areas should not take place, or that the priorities should necessarily be dealt with one by one. Frequently, multiple interventions given different priority rankings may be initiated simultaneously. Cancer treatment will continue in all countries to cover a broad range of cancers, even though the NCCC may assign other approaches (such as prevention or early detection), or the treatment of specific diseases, a higher national priority e.g., with respect to the utilization of available funds. Without a national cancer control programme, most available resources will continue to be directed towards cancer therapy in tertiary care facilities. These efforts, however laudable, will inevitably have a lesser impact on mortality rates unless associated with prevention and early detection. Clearly, developing such a programme is the essential first step towards more effective cancer control.

A national cancer control programme is an integrated set of activities covering 1) primary prevention, 2) early detection, 3) diagnosis and treatment, 4) palliative care, 5) cancer registration and 6) cancer research. The programme is required to be put in writing (the document is normally referred to as the national cancer control plan (NCCP)) such that it can be reviewed and contributed to by all stakeholders. It is normally essential for the document to be endorsed and supported by the Ministry of Health, so that the necessary political commitment with respect to resource allocation required for its implementation, or at least for the implementation of high priority actions, is assured.

Box 1. Functions of the National Cancer Control Committee (NCCC)

- Set policy directions and coordinate cancer control activities in the country
- Advocate for political commitment for cancer control activities
- Secure the necessary resources to implement the plan of action
- Formulate the technical comittees and their terms of reference
- Oversee the work of the technical comittees
- Establish lines of communication with the technical comittees for periodic reporting
- Take the necessary decisions based on the recommendations of the technical comittees
- Develop and revise the national cancer control plan
- Assume responsibility for implementation
- Obtain political commitment from the government or concerned authority
- Coordinate the work and functions of all official partners and agencies that can contribute (including nongovernmental organizations)
- Supervise and follow up the implementation of the national cancer control programme activities including prevention, early diagnosis, treatment and palliative care
- Oversee financial aspects of the programme including budgeting and fund-raising
- Recommend lesiglative actions to change the cancer control policy
- Recommend research priorities
- Supervise health profession education programmes in the field of cancer control
- Coordinate the strategic development of health services in that field
- Supervise relevant training activities
- Develop and supervise the information, monitoring and evaluation systems

In developing an NCCP, the following four steps should be undertaken. These steps are further detailed in the cancer control planning module developed by WHO in 2006 (see Box 2)

1. Investigate the present state of the cancer problem and cancer control services and programmes (where are we now?).
2. Set the goals and objectives of the NCCP, define the priorities and target population (where do we want to be?).
3. Identify the steps needed to implement the NCCP (how do we get there?).
4. Establish an evaluation process, with clearly defined outcome measures, that enables documentation of progress towards agreed upon goals.

A defined timetable to achieve the four steps is required. Several publications and tools have been developed to help countries to set up their NCCP (see Box 2). The core tool is the cancer control planning module [40] which is available free from the internet. Several countries have written national cancer control plans that can provide inspiring models, some of which are available from the internet (for example Canada, France, Korea, the Netherlands, United Kingdom, United States of America,) and or can be obtained directly from the country’s NCCC.

Box 2. Documentation and tools to set up a national cancer control plan

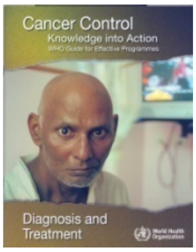
WHO cancer control module series

Available from: http://www.who.int/cancer/modules/en/index.html

Planning

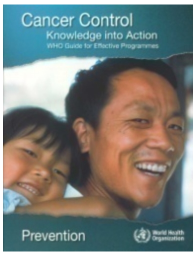
How to plan overall cancer control effectively, according to available resources and integrating cancer control with programmes for other chronic diseases and related problems.

Diagnosis and treatment



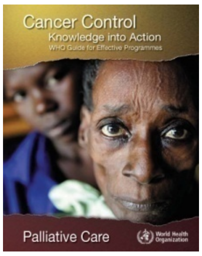
How to implement effective cancer diagnosis and treatment, particularly linked to early detection programmes or curable cancers

Prevention



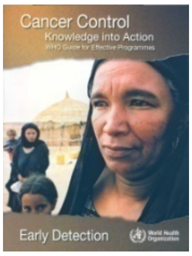
How to implement effective cancer prevention by controlling major avoidable cancer risk factors.

Palliative care



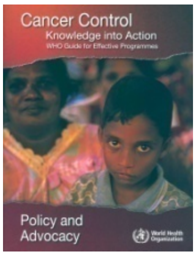
How to implement effective palliative care for cancer, with a particular focus on community-based care.

Early detection



How to implement effective early detection of major types of cancer that are amenable to early diagnosis and screening.

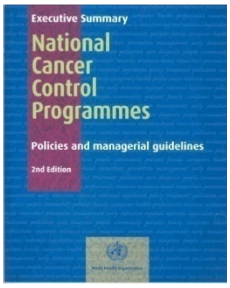
Policy and advocacy



How to advocate for policy development and effective programme implementation of cancer control.

Web resources for cancer control planning. WHO. This document lists comprehensively all the web links to NCCP tools which are part of the planning modules.

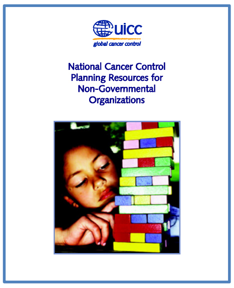
http://www.who.int/cancer/modules/Web%20resources%2007.pdf



National cancer control programmes, policies and managerial guidelines, 2nd edition.

This monograph provides guidance for policy-makers and others on the establishment of national cancer control programmes. It outlines the scientific basis of feasible approaches to the control of cancer, and considers possibilities for prevention, early detection, cure and care. It discusses the appropriateness of particular technologies, and describes how to manage national programmes tailored to different resource settings.

Available from: http://www.who.int/cancer/publications/en/index.html .



National cancer control planning resources for nongovernmental organizations

This guide points to how cancer planning actions can be prioritized and implemented for maximum impact when working towards a national cancer control programme. They are designed around five key questions: 1) What is our country's cancer picture? 2) Who can help us develop and implement a cancer plan? 3) What will be in our plan? 4) How do we communicate and implement our plan? 5) how will we know if we are successful?

Available from:

http://www.uicc.org/index.php?id=1294&L=0%Fsupplement_rami.html

3.2 Setting priorities for cancer control according to level of resources

Priorities for cancer control at country level depend on various factors: the incidence and mortality rates of various cancers, and the availability of relevant evidence on which to base actions (note that available evidence does not always address the particular circumstances of the country, and may not, for a variety of reasons be cost-effective in a setting different to that originally examined, while proposed various interventions may not be feasible within the context of available resources (human, material and financial). Within the Region, there are some common priorities (e.g. more effective tobacco control and improved opioid availability for palliative care), while other priorities may apply to groups of countries at similar levels of socioeconomic development.

In countries with low levels of resources, where the vast majority of patients are diagnosed at a late stage in the course of their disease, low-cost, effective palliative care is likely to be considered the first priority and tobacco control the second. Early diagnosis is also likely to be high on the agenda. The NCCP will need to ensure that its strategy does not give an inappropriate message (e.g. via an exclusive focus on palliative care) and should aim to achieve a progressively more comprehensive approach that eventually includes enhanced treatment facilities, and relevant national research. The establishment of early detection programmes (whether involving public education or screening) should be considered very carefully in the context of both specific cancers and the approaches that can be used. For example, the cost–effectiveness may be low if the incidence of the disease is also low (e.g. uterine cervical cancer in most countries of the Region), or if the technique used is expensive. Some approaches may not be feasible in the context of low-income countries which lack the necessary human resources (e.g. for mammography), while adequate treatment must be available to meet the needs of patients detected with both early disease and more advanced disease (as is frequently the case in the early phases of screening programmes).

Countries with mid-level resources will have similar priorities, but may be in a position to address the issue of prevention, early diagnosis, palliative care and treatment more vigorously, perhaps focusing particularly on breast cancer, which is prevalent in most countries of the Region. Programmes for the early detection or screening of pre-malignant lesions of cervical cancer and oral cancer may also be established if these cancers are prevalent. Ideally, early detection programmes should be approached in a stepwise manner in such a way that systematic expansion, both in terms of programme content and geographical scope is possible. Demonstration programmes relating to early detection and screening is an effective approach to fine-tuning the organization of chosen programmes and developing human resources for subsequent extension to the whole country via training courses conducted at the demonstration sites.

Countries with a high level of resources can afford full implementation of evidence-based strategies. They may choose to focus considerable effort on performing a review of current resource allocation, followed by an adjustment of strategies to allow more efficient and effective use of resources.

All countries should establish a national cancer control committee with representation of all stakeholders and designate at least one cancer centre as the focal point for cancer control activities. A synopsis of the specific priorities in each of the areas of cancer control is given in Table 9. These priorities are discussed in more detail in subsequent sections.

3.3 Cancer prevention

Considerable evidence exists with respect to what works and what does not work in terms of action for cancer prevention, but this evidence is not necessarily universally relevant (e.g. optimal approaches to public education about tobacco control, dietary issues or exercise may differ according to the cultural environment). It is essential to ensure that measures adopted are based on relevant evidence, and not simply "common sense" or the ideas of the most influential leaders without exploring the existing evidence base to determine what is known about the likely impact of such measures and whether additional national research is needed prior to wide introduction of the measures. The existing evidence is not compiled in one ready-to-use document; several entry-points to the evidence on the effectiveness of various approaches to prevention exist (see, for example [36,41–44]). It is important to bear in mind that while prevention may represent the optimal approach to cancer control, recognized approaches to cancer prevention do not exist for all cancers, and the impact of preventive measures can take decades, in which time millions of new patients will develop cancer. Thus, prevention can never be considered the sole approach to cancer control.

The devastating impact of tobacco consumption, particularly smoking, on health in the industrialized countries leaves no doubt that tobacco control must be a high priority in all countries. In countries where the smoking epidemic is still at an early stage, the possibility exists of markedly diminishing the anticipated impact of smoking. Similarly, the extremely rapid increase in obesity in industrialized and high-income countries demonstrates the dangers with respect to noncommunicable diseases that affluence can create, and indicates, again, that this second epidemic should be addressed in its earliest phases before it becomes a major public health problem with a high associated cost to the country's economy. Healthy eating habits and healthy lifestyle are particularly important to promote in middle-income and high-income countries (the population at risk in low-income countries remains small), while infection control may be a more important issue in low resources countries. These priorities are likely, of course, to change over time. All countries

Table 9. Suggested cancer control priorities/recommendations according to level of resources

Note. Mid-level and high-level resource countries should ensure that the facilities and programmes recommended for lower resource countries are in place before implementing more advanced programmes. Level of resources includes both income level (as defined by the World Bank) and in-country resources available for cancer control.

NCCP	All countries	Low-level resources	Mid-level resources	High-level resources
Prevention	• Ratify and implement the FCTC • Promote a healthy diet and physical activity • Reduce exposure to occupational and environmental carcinogens, such as asbestos • Ensure vaccination against hepatitis B in infancy	• Focus on major risk factors such as tobacco • Ensure that behavioural changes are embraced by groups able to influence and spearhead changes at the population levels (doctors, teachers, religious leaders, etc.) • Consolidate the role of health personnel in prevention	• Develop integrated programmes for risk factors prevention via primary health care, schools and workplaces • Develop model for community-based initiative for cancer prevention, integrated with general disease prevention	• Expand the prevention programmes to cover the entire population
Early detection	• Promote education of the public and health care providers about the early manifestations of cancer and other factors that constitute barriers for early detection • Ensure that proper diagnostic and treatment facilities are available for detected cases • Increase the number of access points to the health system where required • Develop guidelines for primary health care professionals and non-oncologists about early manifestations and proper referral	• Introduce education programmes for the public and health care providers about early manifestations of cancers in pilot areas • Introduce organized pilot early detection programmes for selected cancers (e.g. breast cancer) in pilot areas • Investigate and expedite the referral process from first visit to a doctor to treatment initiation	• Scale up education and screening programmes to cover a larger proportion of the population	• Scale up education and screening programmes to cover the whole population • Ensure that screening programmes achieve full coverage of the population at risk
Diagnosis and treatment	• Avoid inappropriate therapy when cancer is incurable and patient should be offered palliative care instead • Improve communication among health professionals (e.g. multidisciplinary meeting to discuss individual patients, regional cancer societies with regular meetings) • Explore quality of diagnostic services and consider collaborative programmes for training and consultation • Ensure availability of essential drugs and appropriate safety precautions in their preparation and use	• Organize diagnostic and treatment services giving priority to curable cancers with at least one focal point for cancer treatment in the country • Develop training courses for doctors and nurses in high priority topics relating to diagnosis and treatment • Upgrade treatment facilities through twinning with more advanced institutions and seek help from international organizations • Consider introducing standardized guidelines for selected cancers	• Develop a network of comprehensive cancer centres • Develop continuing education for doctors and nurses • Introduce standard care guidelines for selected cancers • Ensure results of treatment are documented and institute necessary training programmes in data-management and evaluation • Ensure availability of essential drugs and diagnosis	• Ensure access to full cancer services across the country • Develop a national plan for triage of cancer patients and service provision • Introduce quality assurance measures • Develop a national committee that determines which new treatments will be made available via national health system or insurance

Table 9. Suggested cancer control priorities/recommendations according to level of resources *(concluded)*

NCCP	All countries	Low-level resources	Mid-level resources	High-level resources
Palliative care	• Raise sensitivity to the need for palliative care at all levels, and introduce palliative care into the curricula of doctors and nurses • Implement palliative care that provides pain relief, other symptom control and psychosocial and spiritual support • Ensure availability and accessibility of opioids, especially oral morphine	• Develop one or more focal points for service delivery (in-patient, outpatient and home care) and palliative care education for different levels of providers • Ensure that minimum standards for pain and palliative care are progressively implemented at all levels of care and that there is high coverage of patients • Make generic morphine easily available • Introduce guidelines for the management of pain	• Ensure that minimum standards for palliative care are implemented at all levels of care across the country	• Ensure that high level standards for palliative care are implemented at all levels of care cross the country
Cancer registries	• Aim to develop at least one efficient population– based cancer registry that covers a population not less than one million and not more than 5 million • Introduce stage, mortality and survival measurement at the earliest time	• Ensure that all institutes delivering cancer care have institutional registries • Take steps to improve follow up of treated patients	• Establish at least one population-based registry in an urban and another in a rural region. If population is less than 5 million, establish a national cancer registry • Publish incidence, stage, mortality and survival data	• Institute research projects based on registry data
Research	• Identify and encourage research on issues relevant to the country and to cancer control activities.	• Focus on operational research, i.e. situation analysis and pilot programmes of cancer control activities in demonstration areas	• Participate in international research projects focusing on problems specific to the Region	• Undertake as broad a pattern of cancer research as resources permit • Undertake international collaborations • Ensure that both clinical and basic research are undertaken by the provision of funding via national granting bodies

should establish policies aimed at minimizing environment-related and occupation-related cancers, such as those related to exposure to chemicals (industrial or agricultural) solvents, asbestos or air pollution. In some countries, exposure to natural radon gas in the home or workplace may be an important cause of lung cancer, but its impact is generally highly localized and often mitigated by quite simple means. More information can be obtained from the International Radon Project of WHO (www.who.int/entity/ionizing-radiation/env/radon/en/).

Tobacco control

All countries should ensure tobacco control. If they have not already done so, they should ratify the WHO Framework Convention on Tobacco Control (FCTC) and implement the strategies that are part of the convention (for more details see: http://www.who.int/tobacco/framework/en/). No tobacco control programme can be effectively implemented without an adequately funded and appropriate infrastructure. Even in ministries of health of small countries, one full-time, appropriately trained employee (more for larger countries) should be assigned to activities that aim at designing and implementing a national action plan for tobacco control. Stepwise approaches to tobacco control according to a country's level of resources are detailed in the WHO cancer control prevention module [41]. A brief outline of the most important elements is provided below.

Government involvement is essential to ensure that the necessary legislation exists and is enforced. Some of the more important measures include:

- raising taxes on all tobacco products to make them less affordable;
- banning smoking in all indoor workplaces, or public places where people are in close proximity (e.g. buses and trains);
- banning all advertising, promotion and sponsoring of tobacco products, brands and related trade;
- putting health warnings on all tobacco packaging in local languages and ensuring that product descriptions, packaging and labelling are in accordance with the provisions of the WHO FCTC;
- taking steps to ban the sale of cigarettes to minors and making cigarettes available only in packs of 20 to limit access to those less able to afford cigarettes.

Education with specific components for different age groups about the dangers of smoking is of paramount importance. Tobacco education for children should be included in school programmes before adolescence. Educational messages directed to adolescents have to be presented very carefully as adolescents naturally rebel against authority figures as a means of strengthening their feelings of independence and maturity. Some messages, such as "tobacco is bad for you" may be counterproductive, although the reverse may apply to messages that suggest that tobacco may negatively influence personal attractiveness or respect. Adequate life skills, such as assertive and refusal skills, have to be part of the education. Furthermore, convincing children to stop their parents from smoking can be an efficient way to reduce smoking prevalence among adults.

Public education through the mass media is important to raise awareness about the health impact of smoking and exposure to second-hand tobacco smoke, the addictive nature of tobacco and the availability of treatment options. Countries with very limited resources should focus educational efforts on specific target groups, i.e. health professionals, religious leaders, teachers and others with the greatest potential to influence the population. Useful information and statistics can be found on http://www.deathsfromsmoking.net. Information on tobacco cessation interventions are available at: http://www.who.int/tobacco/research/cessation/en/index.html and http://www.treatobacco.net/. Treatment of tobacco dependence can be first addressed as a pilot programme in some health care facilities and then extension has to be envisaged, including extension to the primary health care level where health-staff have to be trained to provide effective counselling and treatment. Development of accessible help-line or quit support services are also part of treatment of tobacco dependence.

In conclusion, tobacco control should be a high priority in all countries, regardless of the stage of the tobacco epidemic. Different approaches to public education may need to be taken for different ages and for males and females.

Infections causing cancer

Hepatitis B and C: Hepatitis viruses can be transmitted by sexual or blood contact. There is a vaccine against hepatitis B but not against hepatitis C. Universal infant immunization for hepatitis B should be ensured in all countries. Resources should be sought to promote comprehensive coverage and to ensure implementation of national programmes. Detailed guidelines about hepatitis B and vaccination can be found at: http://www.who.int/immunization/topics/hepatitis_b/en/index.html.

Human papillomavirus (HPV): Vaccines against HPV type 16 and 18, which may cause up to 70% of all cervical cancer were released on the market in 2007. However, the cost of these vaccines is currently high and even with a major reduction in cost, it is unlikely that HPV immunization, at least in the near future, will be a cost–effective approach for countries which have a low incidence of cervical cancer. Programme guidance to prepare for the introduction of HPV vaccines has been elaborated by WHO and UNFPA (http://www.who.int/reproductive-health/publications /cervical_cancer_gep/ index.htm; http://www.who.int/hpvcentre/en/).

Schistosomiasis: The main approaches to control of schistosomiasis are active and passive case-finding in endemic foci, treatment of cases, health education and snail control. Integration of the detection and treatment of schistosomiasis into the primary health care system increases the population coverage for case finding and treatment. Praziquantel is the only available drug for treatment. Praziquantel has been used successfully over the past 20 years to control schistosomiasis in Brazil, Cambodia, China, Egypt, Morocco and Saudi Arabia. Treatment at least three times during childhood is likely to prevent disease in adulthood. For more information on schistosomiasis control, see: http://www.who.int/topics/schistosomiasis/en/.

Helicobacter pylori: Infection by *Helicobacter pylori* usually starts in infancy or early childhood and cannot be really prevented. However, improved storage of food and good hygiene are expected to decrease the risk of infection. *Helicobacter pylori* prevalence is very high in developing countries (80% to 90%) but only a tiny fraction of infected individuals will develop cancer. Recently completed randomized trials in Colombia, China and Mexico indicate that curing *Helicobacter pylori* infection results in a modest slow down of the precancerous process but does not prevent all cancers (for review see [45,46,47]).

Epstein-Barr virus (EBV): EBV is transmitted in low-income and middle-income countries in early childhood (more often in adolescence and early adulthood in high-income countries) through contact with adult saliva. Infection cannot, at present, be prevented although attempts to develop vaccines have been made and investigations continue. As a result, EBV prevalence is very high (90% in North Africa) but only a tiny fraction of infected individuals will develop cancer. Even if identified, the role of such a vaccine in cancer prevention may depend upon both the pattern of cancer in a country or region and the cost–benefit ratio. For review of EBV infection, with emphasis on its role in cancer, see [48].

HTLV-I: HTLV-I is transmitted from mother to child via breast-feeding and can also be transmitted through sexual contact or blood. No vaccine against HTLV-I has been developed, but cancers associated with HTLV-1 are extremely rare in the Eastern Mediterranean Region. For a review of HTLV-1, see [49].

In conclusion, the determination of priorities for the control, of cancer-related infection has to be carefully made in each country as priorities may vary greatly from one country or region to another according to the prevalence of the infection in question and the incidence of cancers to which it predisposes. However, the prevention of infections causing cancer in the Region should include at least hepatitis B immunization for all infants and, in countries with a sufficiently high incidence, the control of schistosomiasis. The cost–effectiveness of HPV vaccination should be carefully studied before embarking upon a vaccination programme. The role of other infectious control measures will vary from country to country.

Healthy lifestyle

Attention to diet is an important step in cancer control. Based on available evidence, prevention of cancer by dietary means can be approached by observing the following principles:

- reduction of fat intake;
- increased intake of fibres, fruit and vegetables (recommended intake is 400 g/day of fruit and vegetables);
- maintenance of ideal body weight by a combination of moderate caloric diet and adequate exercise.

Some types of food have been shown to increase risk of some specific cancers. Consumption of large amounts of meat, especially processed meat, has been shown to increase the risk of colon cancer [50]. Meat, fish and vegetables preserved in salt or pickled increase the risk of gastric cancer and nasopharyngeal carcinoma [51,52]; rancid grease used in North African cuisine (*smen, lya*) may also increase the risk of nasopharyngeal carcinoma [53]. The growth of mould on grain, nuts and other food under particular conditions of storage produces aflatoxin, a strong carcinogen that increases the risk of liver cancer [54]. Substances added to food as preservatives or colour enhancers may also be carcinogenic (for a review see [55]). Since 1956 the FAO/WHO Food Standards Programme has set maximum levels for additives, contaminants and pesticide residues to minimize risk. These standards are compiled in the Codex Alimentarius (available from: http://www.who.int/foodsafety/codex/ en/; the codex itself may be accessed via: http://www.codexalimentarius.net/).

Some dietary supplements (e.g. vitamin C, D, E, B2, B6, B12, folate, zinc, selenium, beta-carotene, non nutrient plan constituent) or food items (e.g. fish, soya, garlic) have been claimed to decrease cancer risk. However, to date, there is no scientific evidence of a protective effect of any dietary supplements or specific food item (for a short review see [36]). Thus, promotion of such supplements is not recommended at present.

Effective ways to promote a healthy diet at the population and individual levels include:

- appropriate education on diet in schools
- public education campaigns about adult diets
- collaboration with representatives of the food industry/market (including restaurants) to ensure compliance with the nutritional programmes
- financial incentives to buy more fruit and vegetables
- clear nutritional labels on food products (although this may be of limited value in rural areas).

To increase physical activity in a population, it is necessary to adopt an integrated approach involving not only the health sector but also the education, transport, sport and recreation sectors. WHO recently published a guide for population-based approaches to increasing levels of physical activity [56]. Furthermore, the WHO global strategy on diet, physical activity and health provides a comprehensive set of policies and recommendations [57].

In conclusion, the priority given to dietary issues will vary in different parts of the Region. Where cancers can be related to specific diets, e.g., nasopharyngeal cancer, approaches will need to focus particularly on public education. Combating the obesity epidemic will vary in importance according to socioeconomic status and may entail a combination of legislative measures pertaining to food marketing and public education.

3.4 Early detection of cancer

All cancers

Early detection refers to the diagnosis of a cancer at a point in its evolution when it remains localized and small in size and has a high chance of being cured, often by a simple surgical approach. The two approaches to early detection are education to promote early diagnosis (downstaging) and screening, which needs to be integrated at appropriate levels of the health services to ensure sustainability. The term "downstaging" refers to improving the stage distribution of diagnosed cases (i.e. increasing the proportion of early stage cancers) by any of a variety of means. One is to raise awareness about the early signs and symptoms of cancer in the population at risk as well as among primary care doctors, nurses and paramedical personnel. This, of course, applies to a broad range of cancers. Early manifestations of cancer include presence of palpable lumps, sores that are difficult to heal, abnormal bleeding, persistent indigestion, chronic hoarseness of voice, change in bowel habits, etc.

Screening is the process of applying a clinical test to an asymptomatic but at-risk population in order to detect cancer before the appearance of symptoms. Screening has been shown to be efficient and cost effective in only a small number of cancers. Only cancers at accessible anatomical sites can be screened without costly imaging procedures (including radiology or endoscopy) or laboratory tests. There are two approaches to screening: the establishment of organized screening programmes and opportunistic screening. The latter mainly concern educated populations, those in direct contact with health facilities, and physicians (or specialists who see patients directly) who are aware of the need for regular screening for certain cancers. Opportunistic screening has been shown to be much less cost-effective than organized screening, but tends to work best in populations with a high degree of awareness of its value. Organized screening is more often the chosen approach in less sensitized populations, although if sufficiently widespread can also serve as an educational tool. The steps required to establish a programme directed towards

Box 3. Methodology of early detection

1. Develop a strategic plan at the level of the NCCC, health authorities or cancer centres
    - Collect relevant data regarding the target population and existing health care facilities and personnel
    - Develop a training curriculum and educational approach for primary health care personnel (training courses or workshops in appropriate locations)
    - Determine the extent to which training can be extended geographically (e.g. by training trainers)
    - Determine how the programme will be monitored (e.g. knowledge of trainees, monitoring the stage of cancer at the time of diagnosis before and after training)

    Expected result: written strategic plan
2. Educate the primary care health professionals
    - 1–4 day training sessions about the early signs of cancer
    - Training on low cost screening techniques (e.g. clinical breast examination, visual inspection of cervix and/or mouth)
    - Training on education of the population at risk

    Expected result: integration of cancer early detection into primary and secondary health care level
3. Education of the target populations
    - Education by first line clinicians and health staff through community outreach programme
    - Education through media campaigns

    Expected result: groups at risk aware of early signs and symptoms and empowered to take care of their health
4. Improved patient navigation of the health system, with more rapid diagnosis and treatment, and providing facilities for diagnosis and effective treatment

    Expected result: improved stage distributions after programme enacted

downstaging are described in Box 3. Early diagnosis is particularly relevant for cancers of the breast, cervix, rectum, mouth, skin, prostate and larynx.

Potential obstacles to early diagnosis include a paucity of access points to the health care system, stigma pertaining to cancer, ignorance, fear of being diagnosed with cancer, socioeconomic problems that may prevent symptomatic patients from seeking help, inadequate numbers of pathologists leading to delay in pathological diagnosis, and too few referral centres leading to delay in instituting care. When screening programmes entail second visits for persons who are screen-positive, many such persons may not return for further tests or treatment. A plan to tackle these obstacles and others has to be part of any downstaging or screening programme. In the Eastern Mediterranean Region five out of the six commonest cancers (breast, cervix, bladder, colon and lung) are eligible for early detection, yet the majority present at advanced stage. Lack of sufficient education of primary care physicians, inadequate diagnostic facilities, and weak referral systems are among the issues to be dealt with.

Screening or downstaging are possible and desirable for some cancers only. Approaches to early detection recommended for the most common cancers are listed in Table 10. Available evidence suggests that mass population screening can be advocated for breast cancer using mammography and cervical cancer using Pap

Table 10. Early detection activities recommended for the most common cancers

Cancer site	Downstaging		Screening	
		Early signs		Screening tests
Breast	Yes	Lump, asymmetry, nipple retraction, nipple discharge, skin change	Yes	Clinical breast examination, mammography[a]
Urinary bladder	Yes	Pain, frequent and uneasy micturition, blood in urine	No	
Lung	No	Persistent cough, haemoptysis	No	
Oral cavity	Yes	White or red lesions, growth and ulceration of the mouth	Yes	Visual inspection
Colon	Yes	Change in bowel habits, unexplained weight loss, anaemia, blood in the stools	Yes	Occult blood test[a] Colonoscopy[a]
Stomach	Yes	Gastric pain, recent onset of indigestion, weight loss	No	
Oesophagus	No	Difficulty in swallowing, pain	No	
Leukaemia and lymphomas	No	Fatigue, shortness of breath from anaemia, repeated infections, lymph node or other swellings	No	
Cervix	Yes	Post coital or intermittent vaginal bleeding, excessive vaginal discharge	Yes	Visual inspection using acetic acid, Pap smear, HPV tests[a]
Liver	No	Abdominal mass, ascites, steatorrhoea, jaundice	No	
Larynx	Yes	Persistent hoarseness of voice	No	
Ovary	No	Swollen abdomen, ascites	No	
Prostate	Yes	Difficulty (long time) in passing urine, "dribbling" and frequent nocturnal micturition	Yes	Rectal examination PSA testing[a]
Nasopharynx	Yes	Nosebleed, permanent blocked nose, deafness, upper cervical nodes	No	
Retinoblastoma	Yes	White spot in the pupil; strabismus (in a child)	No	
Testis	Yes	Swelling of one testicle (asymmetry)	No	
Skin melanoma	Yes	Brown lesion on skin that is growing with irregular borders, and areas of patchy colouration, that may itch or bleed	No	
Other skin cancers	Yes	Persistent or growing lump or sore on skin that does not heal	No	

[a] In high resource settings only

smear cytology in countries with available resources for wide coverage of the population. Early detection can only be successful when linked to effective treatment. It is unethical to initiate an early detection programme in the absence of adequate treatment facilities.

The above mentioned screening methods should be assessed in the Region to find out which are feasible, acceptable and cost-effective. Only population groups at risk should be targeted for early detection, although educational approaches via the mass media, when feasible, may represent an exception to this. For most cancers, age and sex should be the only criteria used to define groups at risk (e.g. for breast, cervix, colon and prostate), with the exception of patients with a strong family history, or known genetic or other predisposition to cancer when screening may begin at a much earlier age than for the general population.

In the Eastern Mediterranean Region countries, where the average age of cancer patients is 10 to 20 years younger than in the industrialized countries it is tempting to recommend early detection at younger ages. However, it must be kept in mind that the lower the minimum age for screening (or for education in the case of downstaging), the higher will be the number of people who must be screened to detect a single case of cancer, and the higher will be the cost. Even in affluent countries, screening at an early age is generally not considered cost-effective. In addition, it is likely (depending upon the detection method) that a significant number of pre-cancerous lesions will be detected, many of which may never develop into invasive cancer, but which, having been detected, must be treated. This means that there is likely to be a significant fraction of patients over-treated (the implications of which depend upon the cost and side-effects of the treatment to be used) as well as a significant increment in psychological stress.

It is strongly recommended, wherever possible, that an “age for early detection analysis table” is created to help to identify the appropriate age groups to target; an example is given in Table 11 for screening of breast cancer in an Egyptian district. Such tables require population-based incidence data, which are not always available, although less precise estimates may be used in the absence of a cancer registry. It should be noted that in Egypt, as in many countries of the Region, breast cancer incidence tends to decrease over the age of 60 (see column 3 of Table 11 and Figure 3), which may be relevant to the development of a screening strategy. From column 5 of Table 11, it appears that to screen women between 45 and 65 years of age is the most cost-effective approach. If resources are available screening could be extended to younger and older age groups, but in making such a decision, all factors mentioned above must be carefully considered.

As seen from Table 11, the pattern of cancer incidence in the population has also to be taken into account when considering screening; the lower the overall and age-specific incidence, the less cost–effective is screening. Assuming similar incidence, the cost–effectiveness in young women would be higher than in older women simply because young women, if their disease is detected early and treated effectively, have more years to live than the elderly. Moreover, in limited resource settings, screening may divert precious human and financial resources from interventions that may be more efficient.

Table 11. Analysis of age for screening of breast cancer in an Egyptian district

Age group	Female population in the target population	Breast cancer incidence (from population based-registry) per 100 000	Expected number of new cases of breast cancer in the population during one year per 100 000	Number of women needed to be screened to find one new case of breast cancer
	P	I		$(P \times I)$
20–24	20 775	1.4	0.3	71 429
25–29	17 952	9.8	1.8	10 204
30–34	19 185	28.9	5.5	3 460
35–39	15 588	63.6	9.9	1 572
40–44	12 631	96.7	12.2	1 034
45–49	10 885	144.9	15.8	690
50–54	8 241	171.5	14.1	583
55–59	6 092	181.2	11.0	552
60–64	5 062	144.2	7.3	693
65–69	3 324	105.0	3.5	952
> 70	1 889	94.1	1.8	1 063
Total	121 624		83.2	

In the Eastern Mediterranean Region, programmes in early detection should be considered for breast cancer, cervical cancer and oral cancer, since these are amenable to early detection and if diagnosed early can be effectively treated. However, in many countries of the Region, cervical cancer has an incidence lower than that in high-income countries in which an average of 70% of women are screened, such that, in general, it should be given a much lower priority. A short review of early detection methods and issues for these three cancers is given in subsequent chapters.

Several publications and tools have been developed to help in the design and implementation of early detection programmes, especially for cervical cancer (see Box 4). Almost all of them are available from the Association for Cervical Cancer Prevention web site (www.alliance-cxca.org/). For early detection of cancer in general, the entry point is the WHO early detection module (see Box 2). For quick reference, see also the chapters about screening of oral, colorectal, stomach, prostate, breast and cervical cancer in the World Cancer Report [58]. A great deal of research conducted with reference to screening techniques has been reported in the scientific literature and can be found through databases, such as the National Library of Medicine's Pubmed database (http://www.ncbi.nlm.nih.gov/sites/entrez). However, much of this information relates to the high-income countries. An exception is visual inspection techniques, which are often much more cost–effective and feasible in developing countries.

Similarly, there is a great deal of published information on breast cancer screening in high-income countries, but publications from low-income and middle-income countries are few (for review see [59]). It is recommended that professionals involved in breast cancer early detection follow the activities of the Breast Health Global Initiative (www.fhcrc.org/science/phs/bhgi/) which has published guidelines for international breast health and cancer control [60] (freely available from the Breast Health Global Initiative web site) and has committed to publish implementation guidelines in the near future. These guidelines, with respect to developing countries are, of necessity, largely consensus guidelines rather than evidence-based. Additional information and some inspiring experiences can found in the scientific literature [61,62,63]. For oral cancer, no guidelines for middle-income and low-income countries have been produced recently but strong evidence of the utility of screening by oral visual inspection in Kerala, India has been published [64] and useful information can be found on the IARC screening group web site (http://screening.iarc.fr/) and from the World Cancer Report [58].

Breast cancer

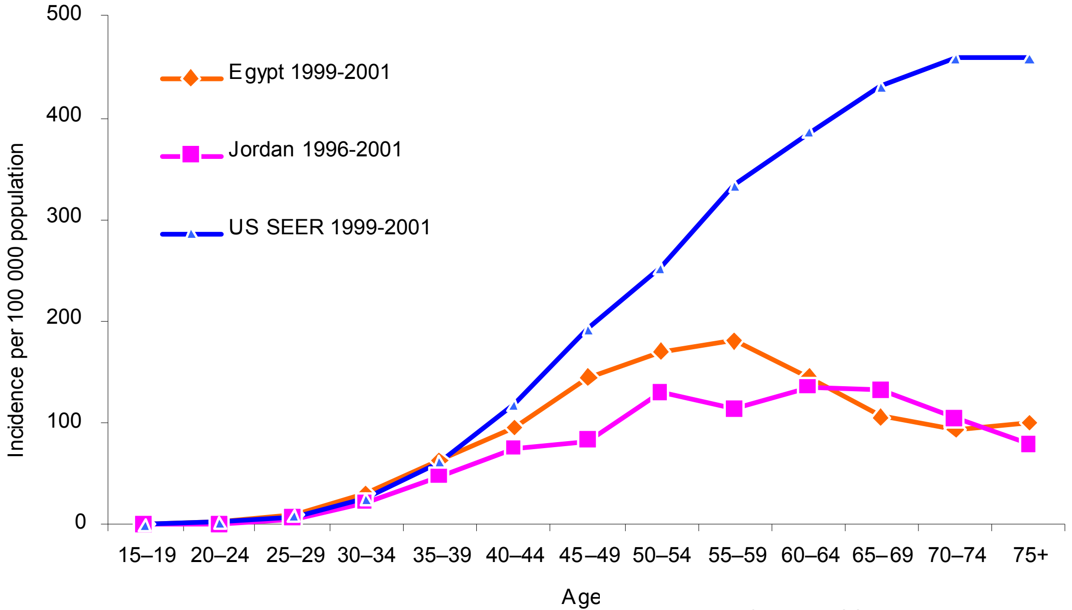
Breast cancer is by far the most common cancer in the Eastern Mediterranean Region. Breast cancer cannot be prevented very efficiently because the major risk factors for this cancer are not modifiable. The main risk factors are: female sex; age at first child; number of children; age at menarche; and menopause. Modifiable potential risk factors include diet and hormone replacement after menopause, long-term hormone replacement therapy after menopause and some types of contraceptive pills. However, breast cancer can be cured in a high proportion of patients if detected early. In the Eastern Mediterranean Region, there is an increasing trend in the incidence of breast cancer with a large proportion of patients diagnosed before age 50. Diagnosis is usually at advanced stage resulting in poor prognosis.

Education and mammography are of recognized value in diagnosing cancer earlier. However, breast cancer screening programmes based on mammography are not affordable and feasible in most of the countries of the Region given the low number of skilled radiologists and radiographers, small number of mammography machines, high cost per life-year saved, lack of organized systems for quality control, and the current levels of per capita health expenditure. Mammography is relatively not efficient for menopausal women below 50 years of age because of low sensitivity. Education and possibly physical examination may be the best solution for these countries, particularly since education about breast cancer can be associated with other health messages, thereby improving the cost benefit–ratio. Education may focus on promoting physical examination and breast self-examination. Studies in Egypt and south Asia have given valuable leads and provided evidence for the value of organized breast cancer early detection programmes [61,65]. Much can be achieved by educating health staff, increasing the awareness of the population about breast cancer symptoms and signs and by providing readily accessible diagnostic and treatment services.

Educational downstaging programmes would be unlikely to make a difference to breast cancer outcome in countries where most cancers are already detected in stage I and II and knowledge about breast cancer in the general population is high. It may, however, confer a substantial benefit in the Eastern Mediterranean Region where the majority of breast cancer cases present in stage III and IV with tumours of large size. It should be noted that in the USA, it is estimated that the considerable improvement in breast cancer survival in the past 30 years derives more from earlier detection than from improved treatment [66], although both have a role.

Contrary to what is observed in industrialized countries where incidence increases with age, in the Eastern Mediterranean Region breast cancer appears to be a disease of the younger generations with incidence rates, in some countries at least, being higher in women below 60 than in older women (see Figure 3).

Clinicians in the Eastern Mediterranean Region have commented that breast cancer appears to have increased rapidly in the past few decades. Important societal and dietary changes are taking place in the Region: age at first pregnancy has increased; the number of children born per woman has decreased while prevalence of overweight has increased tremendously; the age incidence curve of breast cancer and the position of its peak may change rapidly in the coming decades, becoming more like that observed in industrialized countries. Comparable trends have been observed in Asia. These observations are relevant to the establishment of breast cancer screening programmes. However, it is also important to recognize that in the absence of breast cancer screening, the prevalence of undetected cancer in the population is higher, such that even physical examination is likely to lead, initially, to a significant increase in detection rates which will inevitably fall over time. It is recommended that developing countries establish national early detection programmes for breast cancer. Such programmes should encourage early diagnosis particularly among women aged 40–69 years attending health care facilities for other reasons by offering them physical breast examination. Increasing public awareness about breast self-examination, and performing mammography for women with an abnormality detected in breast self-examination are important components of these programs. Mammography should not be introduced unless the resources are available to cover 70% of women above age 50.



Derived from MECC monography 2006 data

Figure 3. Age-specific incidence rates for breast cancer from Tanta population registry, Amman population registry and US SEER [28]

Cervical cancer

Cervical cancer is one of the few cancers where there is easy access to the organ and screening tests can be simple and relatively cheap. In addition, the slow progress of the disease means that there is a long period of time—10–20 years—between infection with HPV and the appearance of cancer. Screening based on the Pap test has been very successful in industrialized countries, although it seems likely that this will eventually be replaced by the more objective, sensitive and specific detection of high-risk HPV strains, for which simple reproducible tests are rapidly becoming available. Conversely, the Pap test has been proven to be limited in terms of its sensitivity and reproducibility in developing countries. In these countries, population coverage for cervical cancer screening by Pap test has remained very low because of a lack of resources and a lack of experienced cytopathologists. As the Pap test is not widely used in the Region, it would not seem appropriate to introduce it now, given the availability of the cheaper visual inspection technique, for which far less training is required and which appears, in good hands, to have similar or better sensitivity, although somewhat lower specificity [67] (see also Box 4 item 8). Visual inspection is a process of identifying cervical lesions without a need for cytology mainly through using acetic acid test which causes agglutination of cell proteins thus yielding aceto-white lesions when there is abnormal epithelium. The know-how and programmatic strategies for establishing cervical cancer screening programmes in low resource settings have been well established; guidelines for programme managers and training material are available form the ACCP web site (www.alliance-cxca.org/) and listed in Box 4.

Because of the low burden of cervical cancer in most countries of the Region (Afghanistan, Jordan, Kuwait, Iraq, Islamic Republic of Iran, Oman, Pakistan, Qatar, Saudi Arabia, Syrian Arab Republic and Yemen,) it should not be automatically assumed that screening for this disease is appropriate, since this would be more costly and very high population coverage would be required with no guarantee that rates would be significantly lowered. The low burden of cervical cancer must also be taken into consideration when considering HPV vaccination. The cost of the vaccine is currently too high for this to be a cost–effective approach to prevention in the Region, and social factors could lead to low acceptance rates, although both cost and acceptability could change significantly over time, particularly as additional vaccines

Box 4. Publication and tools for cervical cancer prevention and early detection

Manual and guidelines

1. *Comprehensive cervical cancer control: A guide to essential practice*, Geneva, World Health Organization, 2006. Full text available in English at: http://www.who.int/reproductive-health/publications/cervicalcancer_gep/index.htm accessed 22 February 2009.
2. *Planning and implementing cervical cancer prevention and control programmes: A manual for managers*. IARC screening group, 2004. Full text available in English at: http://screening.iarc.fr/doclib.php accessed 22 February 2009.
3. Herdman C, Sherris J. *Planning appropriate cervical cancer prevention programmes*. 2nd edition. Seattle, Washington, PATH, 2000. Full text available in English and French at: http://www.alliance-cxca.org/english/publications.html accessed 22 February 2009.
4. *Program capacity assessment tool: integrating cervical cancer prevention into reproductive health services*. Seattle, Washington, PATH. 2001. Reproductive Health Reports No 4. Full text available in English at: http://www.alliance-cxca.org/english/publications.html accessed 22 February 2009.
5. *Cervical cancer screening in developing countries*. Geneva, World Health Organization, 2001. Full text available in English at: http://whqlibdoc.who.int/publications/2002/9241545720.pdf accessed 22 February 2009.

Fact sheets and short documents

6. *Human papillomavirus and HPV vaccines: technical information for policy-makers and health professionals.* IARC screening group, 2007.
7. *Preparing for the introduction of HPV vaccines: policy and programme guidance for countries*, IARC screening group, 2006.
8. *10 key findings and recommendations for effective cervical cancer screening and treatment programmes*. IARC screening group, 2007.
9. *Conclusions from ACCP clinical research in developing countries. IARC screening group*, 2004.
10. *HPV testing: promise and challenges*. IARC screening group, 2003
11. *Key steps for meeting women's needs*. IARC screening group, 2002
12. *Natural history of cervical cancer: even infrequent screening of older women saves lives*, IARC screening group, 2003.
13. Castilaw D, Wittet S. Preventing cervical cancer: unprecedented opportunities for improving women's health, *Outlook.* 2007, 23(1). PATH. IARC screening group, 2007.
14. *Pap* smears*: An important but imperfect method*, IARC screening group, 2002.
15. Sanghvi H, Lacoste M, McCormick M. *Preventing cervical cancer in low-resource settings*, *Report of a conference in Bankok, Thailand, 4–7 December 2005*. Baltimore, Johns Hopkins Program for International Education in Gynecology and Obstetrics, 2006.

are developed. Research on attitudes of the public may be appropriate, although the priority of such studies may be low. More information about the vaccination issue can be obtained from items 7, 6 and 24 in Box 4.

Oral cancer

Oral cancer is the fourth ranked cancer in the Region, mainly because it is a very frequent cancer in Pakistan. It is also a relatively common cancer in Sudan and the southern part of Saudi Arabia. When patients present with locally advanced cancer, the 5-year survival rate is less than 40%, indicating that considerable improvement is likely to be achieved by early detection. Oral visual examination has been shown to be a suitable test for oral cancer screening in India, Sri Lanka and Cuba [58]. The sensitivity of visual examination varied from 58% to 94% and the specificity from 6% to 98%. The results of a recently concluded randomized oral cancer screening trial

16. *Visual screening approaches: promising alternative screening strategies*, IARC screening group, 2002.
17. *The case for investing in cervical cancer prevention. Issues in Depth 3.* Alliance for Cervical Cancer Prevention, 2004.
18. *Improving screening coverage rates of cervical cancer prevention programs: A focus on communities. Issues in Depth 4*. Alliance for Cervical Cancer Prevention, 2004.
19. *Preventing cervical cancer worldwide*. Alliance for Cervical Cancer Prevention, 2004.

Note: items 6–19 are all available full text in English, and some in French, at: http://screening.iarc.fr/doclib.php accessed 22 February 2009.

Teaching material

20. Sankaranarayanan R, Wesley S. *A practical manual on visual screening for cervical neoplasia*. IARC, 2003, full text available available in English at: http://screening.iarc.fr/viavili.php accessed 22 February 2009.
21. *Digital learning series. A training course in visual inspection with 5% acetic acid (VIA).* IARC, 2005. Available on line in English at: http://screening.iarc.fr/digitallearningserie.php
22. *Digital learning series. A training course in visual inspection with Lugol's iodine solution (VILI).* IARC, 2005. Available on line in English at: http://screening.iarc.fr/digitallearningserie.php accessed 22 February 2009
23. *How can we prevent cervical cancer? A guide for community facilitators. Alliance for Cervical Cancer Prevention, 2002. Full text available in English at: http://screening.iarc.fr/doclib.php accessed 22 February 2009.*

Web portals

24. *ACCP (Alliance for Cervical Cancer Prevention). The ACCP site gives, among things, access to:*
    - A document library including extensive literature and tools for cervical cancer prevention, early detection, treatment and palliative care
    - Presentation, movies and advocacy material for cervical cancer http://www.alliance-cxca.org/english/publications.html accessed 22 February 2009.
25. *IARC (International Agency for Research on Cancer) cancer screening group. The IARC screening site gives, among other things, access to:*
    - A document library overlapping that of ACCP
    - Web resources including cytopathology and histopathology web-links
    - Presentation, movies and advocacy material for cervical cancer

    http://screening.iarc.fr

involving 196 000 subjects in India indicated that oral visual screening and treatment can result in a 34% reduction in oral cancer mortality among users of tobacco, alcohol, or both [64,68]. Cost-effectiveness will need to be carefully studied before embarking on a screening program, but downstaging based on health education and possibly self-examination may be of potential benefit. Targeting high- risk groups, i.e. smokers and smokeless tobacco and alcohol consumers, who represent 90% of the cases, should improve the cost–benefit ratio and may be a cost-effective approach, but there is, as yet, no evidence for the efficacy of a targeted educational approach to early detection, such that a research study would be a first step to introducing such an approach into a national cancer plan.

3.5 Cancer diagnosis and treatment

Evidence base

The care of cancer patients typically begins after the recognition of a symptom or sign by the patient, much less commonly, cancer is diagnosed as a result of the detection of an abnormality on screening. Primary care providers must be taught to recognize the signs of early cancer, e.g. as part of a continuing education programme, and arrange for further testing, most usually via consultation at a designated specialized health care facility (a referral plan can be established for each district and region). Public education can be conducted in various ways, e.g. via the media or by use of posters placed in prominent places, or by constantly running videos in waiting rooms in primary health care centres.

Although some malignant diseases are already widespread by the time the first symptoms or signs appear (e.g. leukaemias), in most cases the cancer is initially localized to a tissue organ. Progressive growth, a characteristic of all cancers, leads after a variable period of time to spread to adjacent tissues and lymph nodes, and then, via bloodstream spread, to other tissues (metastasis). In almost all cancers, diagnosis is confirmed by histological or, in some circumstances, cytological examination of a tissue biopsy. This is a critical step, requiring expert pathological examination. Treatment may involve surgery, radiation therapy, chemotherapy, hormonal therapy or some combination of these. Optimal therapy is undergoing constant improvement, although often increments in improvement are small, and are becoming increasingly expensive.

The WHO guide for effective programmes includes a module on diagnosis and treatment [69]. Some organizations provide systematic summaries of published information and draw conclusions regarding the benefit of various different approaches. Others have developed clinical guidelines which state what is known and what not known, and make recommendations regarding therapy (e.g. the Cochrane Cancer Network. http://www.canet.org/). Guidelines based on available evidence have been developed for the treatment of a range of cancers (e.g. European

Society of Medical Oncologists minimal clinical guidelines http://www.eurekalert.org/pub_releases/2005-05/esfm-emc052005.php) and at irregular intervals consensus guidelines for the treatment of specific cancers are developed by the National Cancer Institute (http://www.cancer.gov/cancertopics). However, most available guidelines are designed for countries with a high level of technical expertise, and adequate staff. A few have attempted to adapt treatment guidelines to different resource levels (e.g. European Society of Medical Oncologists and the Breast Health Global Initiative).

The evidence base for resource-poor countries is meagre, and even consensus, rather than evidence-based guidelines, cannot take into consideration the variability of infrastructure for therapy that exists across the globe and within the Region. Each country will need to develop its own standardized therapy, initially based on available information, but, ideally, with outcome measures so that the success or otherwise of the therapeutic approaches can be evaluated. In each country, some oncologists should be trained in systematic review such that, over time, a set of reference reviews becomes available and provides a sounder basis for developing consensus guidelines. In some countries infrastructure for clinical trials should be developed such that countries are able to examine the pros and cons of treatment approaches adapted to the available resources and circumstances of the population, including the incidence of inter-current infections and hygienic practice.

Diagnosis and staging

The first step in cancer management, after dealing with any emergent medical or surgical problem, is to establish an accurate diagnosis. This calls for careful clinical assessment and appropriate investigations. A pathological diagnosis is made by direct visualization of the area concerned, for example, by endoscopy or an open surgical procedure, and biopsy of suspicious lesions. Tissue may be obtained using a fine needle (fine needle aspiration biopsy, in which cells are obtained for cytological examination), by a core needle biopsy (in which a small cylinder of tissue is obtained for histopathological examination), or by total (excisional) or subtotal (incisional) surgical biopsy. Needle biopsy may be guided by ultrasound or other imaging modality to ensure that the sample is obtained from the suspicious lesion. Light microscopic examination of formalin–fixed and haematoxylin and eosin stained slides, frequently accompanied by special stains or immunohistochemical studies remains, in the present era, the primary diagnostic modality.

There are few exceptions to the need for histological confirmation before management is undertaken. However, the range of diagnostic studies employed may be influenced by their availability, cost and the relevant experience of the pathologist. All countries in the Region should be able to meet the minimal requirement of basic histopathological diagnosis, and some will be able to utilize the most recent techniques (immunohistochemistry, cytogenetic or molecular pathology) for subdivision of tumours into subcategories. Nevertheless, even in limited resource settings, it is important to ensure that sufficient tissue is made available to the pathologist (e.g. an adequate number of axillary lymph nodes is sampled in patients with breast cancer) to permit optimal treatment decisions to be made.

Appropriate decisions regarding therapy, particularly when this consists of a combination of surgery, radiation therapy and chemotherapy are dependent upon an assessment of the volume and extent of disease. Depending upon the type of cancer, clinical examination, surgical assessment and imaging studies (including ultrasonography), radiology (including computerized tomography (CT) and magnetic resonance imaging (MRI)), and nuclear medicine (including the increasingly used "functional study," positron emission tomography or combined CT/PET, which are likely to be available in only the highest income settings), may all have a role, although not all will be available in countries (or specific institutions) in the Region. A frequently used staging system, the TNM (tumour, nodes, metastasis) system, includes an assessment of the size and degree of local spread of the tumour within its organ of origin, the extent of involvement and fixation of regional lymph nodes and the presence or absence of distant metastases. This information is used in determining optimal treatment, including the extent of loco-regional therapy and the role of systemic therapy (chemotherapy and/or hormonal). In highly chemosensitive tumours, precise anatomical information is much less important and staging consists, in essence, of a division of the total tumour burden into categories (usually 4). In haematological malignancies, involvement, or a high likelihood of involvement of the central nervous system is an indication for therapy specifically directed to the central nervous system.

It is recommended that diagnostic and imaging approaches are standardized within each country, consistent with the available resources and, except in the context of research, kept to the minimum required for guiding the therapeutic approach. Where resources are limited, or special tests are beyond the financial reach of patients, clinical judgement will need to be used.

Treatment

Surgery is an important part of cancer treatment. However, there are few specialist cancer surgeons in the Region, and most cancer surgery is carried out by general surgeons. As in industrialized countries, specialist surgeons such as neurosurgeons and gynaecological surgeons also play an important role, but may have no training in cancer surgery. Specialized paediatric surgeons are also few in number. Training in cancer surgery is thus a priority for most countries and regional strategies pertaining to appropriate surgical procedures in various situations, who should do them, and the need for prior consultation with oncologists may need to be established. Biopsy, for example, may often be entrusted to non-specialist surgeons (although in special circumstances, the optimal biopsy location may need to be determined by an expert), but definitive procedures only to surgeons with knowledge of cancer surgery, and preferably in consultation with radiation and medical oncologists (informally, or via a regular multidisciplinary conference). Local professional societies may also play an important role in both the provision of necessary education (via regional meetings of specialist and generalist surgeons and oncologists) and also the establishment of regional referral policies.

Radiotherapy (often in conjunction with surgery, and sometimes chemotherapy) can be curative for some cancers and provide substantial palliation for others. It has been estimated that perhaps 60% of all cancer patients benefit from radiotherapy [70]. The upgrading of radiation or radiotherapy treatment facilities and the corresponding increase in treatment capacity in the Region has been traditionally ensured by the technical cooperation of the International Atomic Energy Agency (IAEA), bilateral cooperation agencies and leading cancer centres inside and outside the Region. Continued cooperation with these organizations and partnerships with cancer centres in the industrialized countries is to be encouraged and strengthened, but in addition, increased cooperation within the Region, between high and low resource countries, could greatly benefit the latter (several publications are available online from the IAEA website: http://www.iaea.org/Publications/index.html).

Chemotherapy or other forms of systemic treatment (e.g. hormonal therapy) is a component of therapy in more than half of all cancers and may be the most important element of treatment in some (e.g. in haematological cancers, trophoblastic tumours and testicular cancer). When cancer is disseminated, chemotherapy is the only realistic approach to cure, although cure rates in such situations (with the exception of the above-mentioned cancers) are then likely to be very low, frequently zero. Chemotherapy is increasingly used to reduce the size of tumours such that surgical procedures can then be performed, often with salvage of the organ in which the cancer had occurred (breast, eye, bladder). In other circumstances, chemotherapy is given as adjuvant therapy, i.e. to prevent, if possible, the development of tumour at distant sites (presumably by destroying microscopic metastases) and thereby prolong survival and possibly cure the patient. Given the high proportion of advanced cancer in the Region, the role of chemotherapy may be more important than in industrialized countries. Newly available agents, such as monoclonal antibodies, are expensive and their use should be carefully considered in the context of likely benefit and who will pay (the State versus the individual) since financial resources could be diverted from higher priorities. Although some new agents of this kind clearly make a significant difference to survival (e.g. Herceptin), others have been shown to prolong life for a few months, sometimes at significant toxic cost, and nearly always at high financial cost. A list of essential medicines for oncology should be established in each country by the Ministry of Health and its implementation monitored. The WHO has created a list of essential medicines for cancer [71], which is periodically updated (a process that has recently been coordinated in conjunction with the International Network for Cancer Treatment and Research (INCTR)) and which provide a basis for each country to develop its own list based on economic and human resources considerations. An updated list will soon be available from the WHO web site (http://www.who.int/medicines/en/).

Because of the importance in many cancers of all three main treatment modalities (surgery, radiation therapy and systemic treatment), and because the optimum combination of these therapies requires considerable coordination, as well as consultation with pathologists and specialists in imaging (radiology, ultrasound, MRI and radionuclide imaging), multidisciplinary consultation has become a critical element in the treatment of a high fraction of patients (this may not be necessary for patients with very early stage disease, depending upon the disease). Such meetings are not routine in the Region, where patients are often referred to chemotherapists and radiation therapists after surgery has been done, and sometimes only after the development of recurrent tumour, when therapeutic options may be few. It is not always easy, in such circumstances, to have all the information required to appropriately plan further therapy. Multidisciplinary consultation before treatment initiation and at decision points in the course of treatment should be strongly encouraged.

Good therapy requires high quality support from other disciplines, as well as excellent supportive care (e.g. blood transfusion, antibiotics for febrile neutropenic patients) to deal with the complications of treatment. Furthermore, rehabilitation or management of appliances, e.g. after mutilating surgery, such as amputation, or removal of organs such as part of the bowel or the bladder, requiring “diversion” procedures and ostomies, is frequently required. It is also essential for oncologists to be familiar with the late effects of treatment. These aspects should not be overlooked and are of primary importance when a curative option is present. Social workers may play an important role in ensuring that patients receive the necessary psychological, and in some cases, financial support, while other ancillary health workers (physical therapists, ostomy nurses etc.), have an important role in teaching patients to manage disabilities resulting from cancer or its treatment, or in rehabilitation.

Professional training

In all countries it is essential to provide additional education and training to the existing health workforce, and to expand it, with due attention being paid to the problem of migration to the for-profit sector or the wealthier countries (often within the Region itself) in search of improved professional opportunities and a higher income. Training of oncologists in surgery, radiotherapy and chemotherapy should be strengthened. Development of human resources in pathology/cytology and imaging is also needed and training of medical physicists, radiotherapy technicians and nurse oncologists is essential. Sustained “twinning” or partnership programmes between developing institutions in low-income or middle-income countries in the Region and more advanced cancer centres (inside or outside the Region) in which training is associated with consultation and research, could effectively counterbalance the constant loss of trained health care personnel from the lower to higher income countries, where salaries and professional circumstances are better.

Comprehensive cancer centres

While some cancer treatment is relatively simple, it can also be highly complicated, requiring teamwork. It is important that each country in the Region has one or more specialized centres able to carry out such therapy, and also to coordinate activities with non-specialist hospitals or even primary health care providers who have a critical role in early detection and may be able to conduct some treatment (e.g. cryosurgery for pre-malignant cervical cancer) themselves, or participate in treatment when this would require long stays at the specialist centre (e.g. the delivery of simple elements of chemotherapy).

Where possible, specialist cancer centres should be comprehensive, i.e. able to provide cancer surgery, radiation therapy, medical oncology, paediatric oncology, palliative care, hospital registry, comprehensive imaging, pathology/cytology, medical records, community oncology and other supportive services. It may also have facilities for epidemiology and registration, the latter either institutional or population-based (it will, in any event, provide a high fraction of the patients in the registry). The centre should establish links with smaller hospitals and health centres, and develop, within this regional network, a referral policy. In countries where resources are significantly limited, the minimum facilities required in a cancer centre should include basic radiotherapy services, surgical oncology, cancer chemotherapy and medical records.

3.6 Palliative care

Goal of palliative care

The WHO in 2002 defined palliative care as: an approach that improves the quality of life of patients and their families facing the problem associated with life-threatening illness through the prevention and relief of suffering by means of early identification and impeccable assessment and treatment of pain and other problems, physical, psychological and spiritual. Numerous manuals and guidelines describing the best practices in palliative care have been produced, some specially targeting low-income and middle-income countries. The most recent clinical guidelines are the palliative care guidelines [72] developed by a team of international experts under the guidance of the International Network for Cancer Treatment and Research (INCTR). Guidelines were produced by WHO in the 1990s and are still valid [73,74,75] (see www.who.int/cancer/publications/en/index.html).

Priorities for development of palliative care in the Region

Because of the high fraction of patients who present with advanced disease, and the low opioid usage, suggesting that pain relief is insufficient, improvements in palliative care delivery are a high priority in the Region. From the situation analysis of palliative care in the Region three priorities for action emerged: to ensure full access to affordable inexpensive opioids for all patients in need; to develop human resources for palliative care; and to ensure that home care programmes are given a high priority. These priorities are further discussed below.

1. To ensure opioid availability

It can be difficult to balance the need to prevent the abuse of narcotic substances, such as opioids, while ensuring that adequate supplies are available for medical use, yet this is the responsibility of all governments. In the presence of necessarily strict regulations regarding narcotics, it is not infrequent for other barriers to their appropriate medical use to arise, such as attempts to minimize the amount of morphine available in the country, and lack of knowledge regarding their optimal use or fear of punishment for perceived "over-prescribing" on the part of doctors and nurses responsible for administering opioids. Yet is an internationally recognized principle that efforts to prevent drug abuse and diversion must not interfere with ensuring the availability of opioid analgesics for legitimate pain relief (for more details see [76, 77]). There are still many areas in the Region where opioids are difficult to access for legal reasons. In most countries, governments have prioritized the issue of the control of narcotics, sometimes with adverse effects on opioid availability for medical purposes. Yet when there is informed political will, existing regulatory barriers restricting opioid availability can be removed quickly and efficiently without compromising the necessarily strict regulation, as shown by inspiring experiences from India and other countries [77,78].

The Pain and Policy Studies Group (a WHO collaborating centre) (http://www.painpolicy.wisc.edu/) has developed guidelines that can be used by governments and health professionals to assess the national opioids control policies and the administration of these policies to determine whether they contain the provisions, procedures and cooperation that are necessary to ensure the availability of opioid analgesics. Countries should urgently examine their drug control policies to assess the legal and other barriers to opioid availability existing at all levels of the health care system in order to ensure at the earliest time that opioids are available for medical use by physicians and nurses trained in their use. A large proportion of patients in the Region present with advanced disease when palliative care is very important. The Regional Office can play a role in offering information about generic morphine and ensure its availability.

2. To develop human resources for palliative care

Studies performed in various developing countries have shown that the most important barriers to efficient palliative care are the lack of knowledge in correct usage, fear of punishment for inappropriate use, or concern that patients may become addicted to opioids. It is important that all physicians and nurses are educated in the basic elements of palliative care while a sufficient number of specialists able to provide advanced palliative care are available in each country. Ideally all health staff should have received a minimal training in use of opioids during their primary medical or nursing education, or, in the absence of such training, during continuing education. It is recommended that the management of cancer pain is incorporated into all nursing and medical school curricula in the Region, and that continuing education of this kind be provided to all who care, directly or indirectly, for patients with cancer.

An effective approach to the provision of training in palliative care is for local authorities to designate one or more institutions as training centres for palliative care. Such institutions will include among their staff physicians who have received education in advanced palliative care from existing national experts or international organizations. Training may also be sought from regional centres of excellence in palliative care (for example King Hussein Cancer Centre in Amman or King Faisal Cancer Centre in Riyadh) or from international organizations (INCTR: www.inctr.org; Hospices worldwide: www.hospiceinformation.info /hospicesworldwide.asp; IAHPC: www.hospicecare.com). Health care providers should be educated about morphine use as well as other palliative care modalities.

3. To develop home care programmes

Most patients requiring end-of-life care prefer to receive such care at home. This usually has the advantage that they are surrounded by the family members, who have an important role in care delivery. Home care also avoids the discomfort of attending the hospital outpatient department, particularly when lengthy travel is involved, or the disadvantage, with respect to access of the family, of inpatient care, but does mean that sufficient health visitors must be available, along with a means of transportation, to ensure adequate supervision of care. Both out-patient and in-patient palliative care units also have their place, particularly when care is sufficiently complex or difficult that the family, or intermittent health visitors are unable to provide adequately for the patients needs. Home care is particularly appropriate in countries where familial solidarity is still very strong. Home care has been shown to be feasible and cost-effective in many low-income and middle-income countries, including Nepal, India, Bangladesh and Albania. Inspiring models can be found in several publications [79–83].

Another advantage of home care programmes is their low cost. As an example, between 1994 and 1997 the Albanian experience provided care for 746 patients for a basic investment of US$ 30 000. The direct cost per day of assistance was US$ 2.5 to US$ 3.5; the indirect costs were less than US$ 1 per day.

For a home care programme to be successful, the following prerequisites can be identified.

- The programme must be comprehensive, i.e. it includes pain management and physical support but also psychological, social and spiritual support.
- Only dedicated nurses and physicians can ensure the provision of good home care, although paramedical personnel may well play an important role. The staff should be able to rapidly gain the confidence of and establish collaboration between families and the home care programme.
- A 24-hour a day service has to be ensured with 24 hour phone availability, otherwise families do not feel secure.
- The care-giving staff should meet regularly and receive continuing professional education as well, in the case of junior staff, as adequate supervision since much of the care is given in "professional isolation".
- The care givers themselves need to be provided with psychological support since caring for terminally ill patients can be particularly emotionally taxing.
- Patient's family and friends must be trained in necessary simple medical procedures, such as the administration of medications, dressing open sores etc.

The WHO report *A community health approach to palliative care for HIV/AIDS and cancer patients in sub-Saharan Africa* [84] describes a joint project among five African countries and the WHO to develop home care programmes. This publication aims at being used as a guide by public health programme managers within and outside Africa to conduct their own situation analysis and assessment of palliative care needs for cancer and HIV/AIDS patients. Other inspiring examples are reported country by country by the International Observatory on End of Life Care on their web-site (www.eolc-observatory.net/). Guidelines for the establishment of palliative care programmes can also be retrieved from the Jordanian national guidelines for establishing palliative care services [85] and from the WHO cancer control module on palliative care [86].

3.7 Cancer registration

Role of registries

In 1985, the role of cancer registries was defined as follows [87]:

- continued assessment of the levels of cancer in the population;
- provision of data on which estimates of the personnel, hospital and other facilities and equipment needed for the diagnosis, treatment and rehabilitation of the cancer patient can be based;
- evaluation of the effect of early diagnosis and treatment;
- identification by epidemiological and laboratory studies of the initiating and promoting agent that cause cancer; and
- evaluation of the effect of removing initiators and promoters from the environment, or of enhancing resistance to them through immunization or by use of micronutrients.

However, experience has shown that, in countries with low-level or mid-level resources, only incidence rates were reliably determined. For the most part, the lack of or low quality of data prevents fulfilment of other roles, including the determination of trends in stage distribution, survival and mortality rates. A step-wise evolution of the roles and priorities of population-based registries in countries with low-level or mid-level resources is proposed in Table 12.

Table 12. Role of population-based cancer registries for countries with low-level or mid-level resources

	Roles and duties
Core	• Provide incidence rate of the various cancers and their age distributions • Collect data on stage, including the distribution of stages • Ensure dissemination of the results and free access to data (raw or tabulated) to investigators or other professionals that are external to the registry • Ensure continuing education of cancer professionals on the role and the requirements of the registry in order to improve the quality of the source of data
Expanded	• Help clinical departments to ensure follow-up of patients and to collect follow-up information (this requires close collaboration between the registry and clinicians) • Provide survival and mortality statistics and trends over time
Desirable	• Provide data for descriptive epidemiologic studies (time trend analyses, geographical comparisons) of specific cancer or population groups • Generate hypotheses regarding the aetiology of specific cancer which can be investigated by case-control or cohort studies • Participate in the provision of public health education for cancer professionals and students

Box 5. Resources for cancer registration

Manuals and guidelines

Ferlay J. et al. *Check and conversion programmes for cancer registries.* IARC technical report No. 42 , IARC, 2005. Full text available in English at: www.iacr.com.fr/resources-frame.htm accessed 10 March 2009.

Guidelines on confidentiality for population based cancer registration. IARC internal report No. 2004/03, IARC, 2004. Full text available in English at: www.iacr.com.fr/resources-frame.htm accessed 10 March 2009.

International rules for multiple primary cancers (ICD-O-3). IARC internal report No. 2004/02, IARC, 2004. Full text available in English at: www.iacr.com.fr/resources-frame.htm accessed 10 March 2009.

Sankila R, Black R et al. *Evaluation of clinical care by cancer registries. IARC technical report No. 37*, IARC, 2003, Available in English at: http://www.who.int/bookorders/anglais accessed 10 March 2009.

Multiple primaries. IARC internal report No. 00/03. IARC, 2000. Available in English at: www.iacr.com.fr/resources-frame.htm accessed 10 March 2009.

Automated Data Collection in Cancer Registration. IARC technical report No. 32. IARC, 1998. Available in English at: http://www.who.int/bookorders/anglais accessed March 2009.

CANREG 3 manual. IARC internal report No. 98/03. IARC, 1998. Available at: www.iacr.com.fr/resources-frame.htm accessed 10 March 2009.

Cancer registration principles and methods. IARC scientific publication No. 95. IARC, 1996. Available in English at: www.iacr.com.fr/resources-frame.htm, accessed 10 March 2009, French version: http://www.who.int/bookorders.

Histological groups for comparative studies. IARC technical report No. 31. IARC, 1996. Available in English at: http://www.who.int/bookorders.

International classification of childhood cancer. IARC technical report No. 29. IARC, 1996. Available in English at: http://www.who.int/bookorders.

Manual for cancer registry personnel. IARC technical report No. 10. IARC, 1995. Available in English at: http://www.who.int/bookorders.

Comparability and quality control in cancer registration. IARC technical report No. 19. IARC, 1994. Available in English and French at: http://www.who.int/bookorders.

The role of the registry in cancer control. IARC scientific publication No. 66, 1985. Available in English at: http://www.who.int/bookorders.

WHO handbook for standardized cancer registries (hospital based). Geneva, World Health Organization, 1976. Available in English and French at: http://www.who.int/bookorders.

Cancer registration and its techniques. IARC technical report No. 21. IARC, 1978. Available in English at: http://www.who.int/bookorders

Software

CanReg4. A configurable programme to manage a population-based cancer registry. It comprises modules for data entry, quality checking, code conversions and analysis.
Freely downloadable at: http://www.iacr.com.fr/software-frame.htm, accessed 10 March 2009.

IARCcrgTools. A Windows-based package which allows registry personnel to convert and to check their data. Freely downloadable at: www.iacr. om.fr/software-frame.htm

Web portals

IARC (International Agency for Recsearch on Cancer) cancer registration group, www-dep.iarc.fr,
The IARC–DEP site gives, among other things, access to:

- The Globocan database
- The cancer in five continents database
- A glossary of statistical terms
- The information and registration form for the IARC summer course in cancer registration

IACR (International Association of Cancer registries), www.iacr.com.fr

The IACR site gives, among other things, access to:

- Some resources for cancer registries (including software)
- A list of registries worldwide and regional cancer registry associations
- A list of publications from various registries
- Some news about cancer registration courses and meetings

In the past 30 years in the Region, population-based registries have been constantly quoted as being a “central element of cancer control”. However, while cancer registries should not be under-emphasized, many valuable cancer control activities can be undertaken and their efficiency monitored in the absence of population-based registries, including early detection programmes, palliative care services, and the improvement of diagnosis and treatment. Although the incidence of various cancers in a defined population cannot be accurately determined in the absence of a population-based registry, pooled hospital registries, in countries where population based registries do not exist, provide a reasonable estimate of the frequency (and rank order) of the most common cancers, which may be sufficient to define priorities for cancer control. Sometimes a survey (retrospective data retrieval or prospective registration for a short period of time) can be organized to obtain a picture of the cancer frequencies in a given region. The Globocan database, which can be accessed free of charge (http://www-dep.iarc.fr/), provides valuable estimates of cancer incidence and mortality rates through extrapolation from a variety of data sources, including population-based registries.

Generally registry staff are trained in epidemiology, public health or statistics. Thus, they can participate in education and research relating to cancer epidemiology. Ideally, educational sessions should be organized regularly to inform others about the registry role, use and requirements; this will help to raise the quality and completeness of the registry data while, at the same time, providing an evidentiary resource for health professionals, particularly those in the public health arena.

Establishment and management of registries

The following paragraphs provide recommendations for establishment and management of population-based cancer registries. More information can be obtain from the reference manual *Cancer registration principles and methods* [88]. Additional information and resources for cancer registries are shown in Box 5.

Population: Ideally a registry should cover a population above 1 million, to ensure adequate precision of statistics, and not above 5 million in the same population, since the higher figure will provide minimal additional accuracy, yet has significant added cost, while creating additional problems with respect to maintaining the completeness and quality of the data [88]. In low-resource and middle-resource countries, one population-based cancer registry is generally sufficient to provide a satisfactory picture of cancer incidence. The establishment of a second population-based registry should be considered only when the first registry has reached a sufficiently high level of efficiency, and only if important geographical heterogeneity exists in the country in terms of ethnicity or cancer risk factors (for example infections or socioeconomic disparities). It is a waste of resources to set up a second registry in a population which is not considerably different from that covered by the first registry or which represents only a small minority of the country’s population. Since, in developing countries, variations are high between urban and rural areas, consideration should be given to the establishment of a registry in rural regions when resources permit.

It is critical that accurate and updated data concerning the general population covered by the registry are available. For meaningful interpretation of data, the registry must use the same definition of geographical area and age or ethnicity of population groups that are used in official (government gathered or approved) statistics. Registries should not be established in rapidly changing populations and in those for which frequently updated and accurate census data are not available (large capitals draining distant rural population, politically unstable regions with population displacement, etc), since the calculation of incidence rates depends upon access to accurate measures of the size of populations.

Registry committee: When planning a registry it is important to obtain the cooperation and involvement of the medical community, including pathologists, who are responsible for establishing the diagnosis, and oncologists, where additional information such as clinical stage or survival is sought. One approach is to establish a steering committee of all stakeholders, including representatives of the funding bodies, of those who will contribute data to the registry, and of the potential users of the registry data. Funding bodies can include state health authorities, cancer societies, universities, medical insurance companies and cancer centres. Cancer case data sources can include hospital administration (record departments), pathology laboratories, oncology departments, medical associations/societies and the official organization in charge of death registration. The potential users of the registry data include oncologists and epidemiologists, inside or outside the country, as well as the ministry of health.

Personnel: The number of people required to effectively maintain the registry is mainly a function of the number of cancer cases registered. It has been calculated that about 1 registry person is required for 1000 new annual cases [89]. However, personnel requirements also vary according to the nature and amount of data collected, the way data are collected (active or passive) and the range of activities undertaken by the registry.

Budget: The budget of a registry depends of the size of the area studied, the amount of data collected, the type and number of sources of data. In 1985 the budget of US registries was about US$ 100 per case collected [90]. At the other end of the scale small African registries manage to function with about US$ 10–20 per case collected. In France, it was calculated that the cost of collecting 1500 cases is the same as treating three lung cancer patients.

3.8 Research

It is often considered that research is a luxury that can be afforded only by high-income countries. In fact, the reverse is the case. Not only is research essential in low-income countries, but if efficiently conducted, such that research results can be used as evidence to determine optimal approaches to cancer control, it ensures that precious resources—human, material and financial—are not wasted. The reason for this is that many factors, including the genetics of different ethnic groups, lifestyle and exposure to various environmental factors vary enormously among countries and in different regions of countries. In low-income and middle-income countries the proportion of the population that lives in a rural setting is both higher than in the high-income countries, and also has greater significance with respect to differences in lifestyle and exposure to environmental agents, including chemicals and biological agents (compare, for example, a farmer exposed for most of his life to schistosomiasis and agricultural chemicals in Egypt, compared to a lawyer practising in the heart of Cairo). The Region includes many different ethnic groups and geographical regions, as well as countries at markedly different economic levels. Optimal cancer control strategies must take this into consideration, but also provide opportunities for mutually beneficial concerted effort.

It is important to recognize that genetic and environmental factors interact, such that the same genetic factors may predispose to cancer in one environmental setting, but not in another, while the same environmental factors may have a different impact on cancer incidence in different ethnic groups. Genetic factors may also influence treatment outcome, e.g. through their influence on drug metabolism, or the likelihood of the development of toxic effects from radiation or chemotherapy. Similarly, the number of family members living in a residence, or the density of populations may influence the likelihood and type of infections occurring in patients with low blood counts because of recent chemotherapy, thus influencing the toxicity and, potentially, survival rate of a given treatment regimen. Finally, as described above, the variations in access to care across the Region will have a major impact upon the time from first symptom to diagnosis, and patients with more limited access to care are likely to have much more extensive disease at the time of treatment than patients with good or excellent access. This will, inevitably, lead to differences in the need for various treatment modalities, as well as the success of treatment and its financial and toxic cost, but unless carefully documented (which constitutes one form of research) inefficient planning of the requirements for cancer services will result.

It is now well established that cancer results as a consequence of the presence of a set of genetic abnormalities in a particular cell clone (i.e. a single cell and its progeny). Different types of cancer, and even subtypes (e.g. histologically different types of breast cancer, or molecularly defined subtypes of a single lymphoma category) arise as a consequence of differences in the genetic abnormalities and gene expression patterns in the malignant cell clone. Since such abnormalities are more or less likely to occur as a consequence of both the genotype of the patient and his or her lifestyle and environmental exposures (infectious and chemical), it is apparent that there are likely to be differences in the "biology" of tumours involving the same tissue or organ (e.g. breast cancer, bladder cancer), such that the pattern and degree of spread (locally and distant) within a given time frame or age group, and the response to treatment may vary from one country, region or population to another.

A good example of this phenomenon is bladder cancer in Egypt, much of which relates to long-term exposure to schistosomiasis and is characterized by a high incidence of squamous cancer, versus bladder cancer in a country such as the USA, where schistosomiasis is not a factor, smoking and other chemical exposures are the major risk factors and most bladder cancer is of the transitional variety. The clinical behaviour of these diseases (including the volume and spread of cancer at diagnosis) are very different, and treatment approaches need to be explored separately. Consequently, while the basic principles of cancer diagnosis and treatment are the same throughout the world, the relative proportions of different cancers and cancer subtypes, the extent of disease and the availability and tolerance of various treatment modalities differ greatly at country and population levels. A considerable proportion of the research conducted in high-income countries—particularly those outside the Region—will therefore either be irrelevant or inapplicable to the low-income and middle-income countries. However effective and cost-effective mammography may be, for example in screening for breast cancer in north America, Europe and Australasia, the availability of mammography machines and sufficiently expert radiologists may not be sufficient to permit screening in many countries of the Region, while the cost-effectiveness and efficiency of the investigation will be influenced by the lower incidence of breast cancer in all countries of the Region, particularly in women above the age of 45–50 years which is the age at which mammographic screening is normally initiated. Moreover, the size and density of the breast in different populations will also have an impact upon the detection rate, while the greater likelihood of detecting pre-invasive cancer, such *as* intraductal carcinoma in situ, a significant percentage of which will not progress to invasive cancer, could overtax already stressed heath systems and result in a degree of unnecessary anxiety. Research in cost-benefit ratios and optimal approaches to breast cancer screening in different countries of the Region may be of particular importance given the relatively high incidence of breast cancer in the Region.

Research directed at identifying different patterns of disease and problems that may be unique to or much more important in low-income and middle-income countries, and which examine approaches to improving access to care as well as the efficacy of resource-sparing approaches to early detection and treatment, are all topics worthy of research in the Region. Opportunities for investigations into lifestyle factors that influence the incidence of cancer and the outcome of treatment abound in the Region and could have important benefits for cancer control.

The conduct of research has advantages that extend beyond the specific research projects undertaken. It helps create an appropriately skeptical attitude to received wisdom, emphasizing as it does the importance of an evidence-based approach to therapy. The collection of data alone, even in the absence of the evaluation of different methods of cancer control (e.g. the reasons for late presentation), provides information that can be employed in the development of feasible solutions pertinent to reducing cancer mortality and improving the quality of life. Such research, while inexpensive, also assists greatly in the creation of a research ethos conducive to sustained progress in reducing the incidence and mortality of cancer. While not all health professionals need be involved in research, they should at least understand the importance and methodology of research and should be informed of the results of research, such that their daily practice can, where appropriate, be adjusted accordingly. It is, therefore, recommended that all cancer control plans in the Region include the development of the necessary infrastructure for research in at least one of the major institutions, and the identification and conduct of research topics relevant to cancer control in the country.

Countries should also use or develop effective means of disseminating research results to both the public and relevant health professionals, e.g. through existing national, regional and international journals, and via websites and databases that may have regional topicality. The type of research is likely to vary according to both available resources, the varying importance of research topics in different parts of the Region, and the resources available for the conduct of research (which can require, at its most basic level, no more than a small number of individuals trained in the collection and storage of data). Countries will need to develop procedures for deciding how best to use the available resources for research in the Region and how to select the highest priority research topics. This applies even to the higher income countries, where more expensive and sophisticated research, including basic research, may appropriately be undertaken. Attention should be paid to assuring relevance and quality of research which, in the case of clinical trials may entail the establishment of monitoring visits, and in the case of basic research, external review. Finally, attention must be paid to the source of funding for research, and the priority given to research in comparison to non-research cancer control activities. While drug development is important, for example, it is not the highest priority in low-income and middle-income countries, such that the exclusive funding of research by the pharmaceutical industry (i.e. total emphasis on drug development) is not desirable.

Fostering collaboration in research, particularly within the Region, but also with countries outside the Region, will do much to speed the collection of sufficient data for meaningful analysis, while taking advantage of what different countries may have to offer. For example, sophisticated molecular studies relevant to identifying patient subgroups likely to respond differently to treatment might be conduced in countries with the required resources, while patient populations may come from several countries, some of which may be able to conduct the clinical but not the basic element of the research. Such collaborations may also be valuable with respect to research funding, and as in other areas, the lower salaries in low and middle income countries can even create an advantage to performing mutually beneficial research in such countries. Developing a bio-bank for future research should be emphasized by the countries. For low-income countries, it is recommended to collaborate with IARC in this regard.

4. Conclusion

Because of rising incidence and mortality of cancer, unmatched by adequate measures to prevent, detect early and treat cancer, deaths from cancer in the Eastern Mediterranean Region could reach 760 000 per year by the year 2020. There is thus a pressing need to elevate the current priority given to cancer as a health problem, and to implement efficient and integrated cancer control programmes in all countries.

The strategic directions and the tools proposed in this document aim at helping countries to establish and implement cancer control programmes according to their resources. Efforts have been made to make these strategic directions relevant to each country in the Region. The core strategic directions are given in Table 9 and sections 3.1–3.2 and are further detailed in sections 3.3 to 3.9. The WHO Regional Office for the Eastern Mediterranean has established an action plan to help countries to implement these strategic directions (see Annex 1). These strategic directions are complementary and in many circumstances can be integrated into existing programmes related to the control of other noncommunicable or communicable diseases, or developed simultaneously with national or regional disease control programmes in a comprehensive and sustainable manner, for example, in the context of tobacco control and the control of cancer-related infections. The main issue regarding prevention in countries of the Region concerns the fact that primary prevention will be limited to certain types of cancers, and no matter how successful, the benefits will accrue after a long period of time (15–20 years). This requires sustained commitment from governments at country level.

WHO will work with policy and decision-makers to promote investment in cancer prevention, detection, treatment and palliative care as a pressing need that is cost-effective. Advocacy from civil society and cancer professionals will also be important, and the Regional Office will play a leading role in coordinating efforts among the various organizations involved with cancer control in the Region. Although there are many challenges and broad variability for cancer control in the Region, the strength of a regional approach resides in its inherent opportunity to make maximal use of the resources present in the Region. This includes:

- the wide range of environments and populations that provide research opportunities into the causes of cancer;
- the considerable, but often different types of expertise present in countries that can benefit through concerted action; and

- the often larger number of patients with cancer in the lower resourced countries, who can contribute greatly to the more rapid evaluation of cost-effective cancer control approaches.

Where legislation is important, as in tobacco control and the availability of opioids, examples set by some countries may make it easier for others to introduce such legislation, while improved communication will result in the more rapid dissemination of ideas and approaches to overcoming existing obstacles.

There is considerable room for improvement, particularly in low resource settings. The Regional Office hopes that the strategic directions and the tools proposed in this document will support countries and create new opportunities to ensure that as rapid progress as possible is made. However, but this document represents only the beginning of an ever-expanding collaborative effort entailing joint actions on the part of governments, organizations and institutions in the Region and beyond. In the context of cancer control, the Regional Office plans to promote, through various means, improved communication, education and training, technical support, and access to organizations and institutions that can help develop improved cancer control in the Region. By 2010 cancer will be the leading cause of death in the world. It is time that cancer is given a higher priority as a global health issue, and WHO intends to play its part in ensuring that cancer control is given a higher priority in the Region.

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Annex 1

Regional cancer control: framework for country action

Country action

1. Develop national cancer control programmes or update existing programmes:

a) Organizational and legislative
   - Establish/reactivate a National Cancer Control Committee headed by a prominent high-level person and develop terms of reference. The committee should be responsible for all cancer prevention and control activities in the country. It should be directly linked to the Minister of Health.
   - Establish technical sub-committees for all aspects of cancer control, including prevention, cancer registration, surveillance, early detection and down staging, treatment, palliative care, capacity-building, research, monitoring and evaluation. These committees should be in charge of developing the national cancer control strategy and its action plan.
   - Ensure the national cancer control strategy is aligned with the WHO regional cancer control strategy
   - Adopt and implement all related global and regional resolutions[1] and initiatives, the Framework Convention on Tobacco Control; the Global Strategy on Diet, Physical Activity; and Joint Statement on Chronic Diseases by the Ministers of Health of the Eastern Mediterranean Region 2006.

b) Situation analysis
   - Assess the magnitude of the problem
   - Assess the pattern of cancer
   - Identify gaps in knowledge and obstacles, and recommend actions accordingly

c) Assess national capacity in prevention and control of cancer
   - Financial resources
   - Human resources
   - Equity in distribution of services and accessibility
   - Cancer registry, surveillance and database

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[1] www.who.int/gb WHA53.17 Prevention and control of noncommunicable diseases, WHA 58.22 cancer prevention and control
www.emro.who.int/governance/resolutions.htm EM/RC50/R.6 Promoting healthy lifestyles
EM/RC52/R.7 Noncommunicable diseases: challenges and strategic directions

- Diagnostic and treatment facilities
- Availability of medicines
- Presence and strength of nongovernmental organizations working in the field of cancer control
- Research availability and capacity

d) Advocacy and increased awareness through
  - Mass media
  - Community and religious leaders
  - Celebrities
  - Other health education activities
  - Human resources

e) Other supportive activities
  - Coordinate efforts of all stakeholders
  - Mobilize resources
  - Involve community at all stages of development
  - Establish national network for cancer control

2. Prepare for implementation

a) Identify the existing and required infrastructure and facilities

b) Develop the required human resources plan
  - Develop high level education programmes to create leaders in the different fields of specialization
  - Build the capacities of health professionals required for cancer control through regular training and training of trainers
  - Strengthen continuing medical education in cancer control
  - Strengthen the curriculums on cancer control in undergraduate and postgraduate education
  - Utilize available training resources in the Region

c) Ensure adequate assessment and proper management of equipment and technology

d) Integrate cancer prevention and control in primary health care

e) Create an efficient and effective referral system

f) Identify and obtain the required financial resources

3. Develop the required mechanisms for the implementation of the programme

4. Develop an appropriate information system for monitoring and evaluation of the programme and select appropriate indicators (See Appendix A1)

5. Promote research

    - Identify research priorities in the area of cancer control.
    - Identify centres of excellence for the purpose of research and training
    - Establish and utilize WHO collaborating centres
    - Establish research networks within and between countries
    - Mobilize financial resources for research
    - Share research findings with other countries

6. Encourage nongovernmental organizations to join the regional alliance against cancer.

The role of WHO

1. Provide technical support in the different areas of cancer prevention and control

2. Collaborate with countries in formulation of the national cancer control strategy and development of the plan of action.

3. Support regional training activities in all components of the cancer control programme.

4. Advocate for cancer control as a national priority.

5. Organize intercountry meetings to share experiences and follow-up implementation of national plans.

6. Support regional cancer research activities.

7. Collaborate with other partners involved in the field of cancer control for alignment of activities and mobilization of resources.