COMPARATIVE ANALYSIS OF COMMUNICABLE DISEASES IN NORTH AFRICAN COUNTRIES

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General introduction and context

North Africa passed by a total medical transitional period, marked by a progressive increase in the degenerative and chronic diseases to the detriment of communicable diseases and those of the perinatal period.

The delayed model (or "contemporary"): characterized by the existence of an overlapping of the phases of transition.

Marked by the emergence of non-communicable diseases and the persistence of communicable diseases.
North African countries are facing a dual burden of diseases because of decreasing rates of communicable diseases and increasing rates of non-communicable diseases.
The size of the 2010 population in NA countries range from 10 (Tunisia) to 35 million (Algeria) as compared to the most populous country Egypt with 84 million
Dominance of young people

The proportion of population in the 15-24 age group is higher in all NA countries compared to the G6 average of 12%

Note that the red bars (age group below 15 years) and grey bars (15-24 years) account for more than 50% of the population in all NA countries

http://www.credit-suisse.com/researchandanalytics, 2011
Although the evolution of life expectancy at birth in NA countries has increased from 47 in 1962 to 72 years in 2008, which corresponds to a gain of more than 20 years in the space of 40 years. Life expectancy at birth is much lower than the G6 average of 80.6 years.

In 2010, all NA countries had a mean life expectancy at birth greater than 70 years.

Life expectancy in Libya and Tunisia is three years higher than in Egypt and Morocco.
Life expectancy at birth for women is higher than that of men, with a sexe gap varying between 2 to 5 years.

The same is true for life expectancy at birth by place of residence where there is a significant widening of the gap in favor of urban areas (2.9 years in 1967 against more than 6 years in 1999).
Death rates among adults have declined between 1990 & 2008 in all countries except Mauritania.
Egypt has the highest under 5 mortality: 41 deaths under 5 per 1000 live births. These rates are alarming when compared to those in G6 countries.

Although in Morocco under 5 mortality has seen a significant reduction between 1962 & 2003 from 118 to 36 deaths /1000 live births, this level remains high compared to the performance achieved by Tunisia which records a rate of 22 and Libya (20)
Between 1990-2001, mortality under 5 years of age was reduced by 2.2 to over 4.3 percentage point in all NA countries.
Although in Morocco maternal mortality decreased between 1972 and 2010 from 631 to about 227 deaths/100,000 births, this rate remains high relative to the level reached in Tunisia (100) or Libya (97) and also as compared to Western countries where it rarely exceeds 20 per 100,000 births.

Maternal mortality rates show a significant inequalities in the distribution by area of residence, since it can reach 267/100,000 births in rural areas.
Death rates by broad cause group and broad age group

In the Middle East and North Africa (NA):

CD remain the leading cause of child deaths (Group I include: IPD, maternal and nutritional conditions)

In contrast, NCD causes are responsible for more than half of deaths in adults ages 15 and over

People age 60 or older are most likely to die of a noncommunicable disease
CD are responsible for about one-third of the global disease burden:

- **21% in Egypt**
- **24% in Libya**
- **34% in Tunisia**
- **39% in Morocco**
- **43% in Algeria**
Major causes of mortality in NA countries

1- Cardiovascular diseases: 20 to 42%
2- Malignant tumors: 8 to 15%
3- Respiratory diseases: 5 to 11.4%
4- Endocrine diseases: 5 to 9.7%
The leading communicable diseases in NA countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Cause n° 1</th>
<th>Cause n° 2</th>
<th>Cause n° 3</th>
<th>Cause n° 4</th>
<th>Cause n° 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Egypt</td>
<td>Influenza &amp; Pneumonia (9) 15</td>
<td>Hepatitis B (18) 6,5</td>
<td>Diarrhoeal (21) 4</td>
<td>Tuberculosis (24) 3</td>
<td>Hepatitis C (26) 3</td>
</tr>
<tr>
<td>Algeria</td>
<td>Influenza &amp; Pneumonia (1) 57</td>
<td>Diarrhoeal (4) 27</td>
<td>Tuberculosis (22) 4</td>
<td>Meningitis (24) 3,7</td>
<td>HIV/AIDS (41) 2</td>
</tr>
<tr>
<td>Lybia</td>
<td>Influenza &amp; Pneumonia (5) 16</td>
<td>Tuberculosis (21) 3,7</td>
<td>Diarrhoeal (29) 2,6</td>
<td>Hepatitis B (32) 2,5</td>
<td>Hepatitis C (42) 1</td>
</tr>
<tr>
<td>Tunisia</td>
<td>Influenza &amp; Pneumonia (2) 48</td>
<td>Hepatitis B (12) 7,5</td>
<td>Diarrhoeal (22) 4,4</td>
<td>Meningitis (25) 4</td>
<td>Hepatitis C (27) 3,7</td>
</tr>
<tr>
<td>Morocco</td>
<td>Influenza &amp; Pneumonia (4) 25,5</td>
<td>Diarrhoeal (7) 15,5</td>
<td>Tuberculosis (14) 9</td>
<td>HIV/AIDS (24) 4</td>
<td>Meningitis (43) 1</td>
</tr>
<tr>
<td>Mauritania</td>
<td>Influenza &amp; Pneumonia (1) 126</td>
<td>Diarrhoeal (2) 91,5</td>
<td>Tuberculosis (3) 85</td>
<td>Malaria (7) 36</td>
<td>HIV/AIDS (9) 27</td>
</tr>
<tr>
<td>Niger</td>
<td>Influenza &amp; Pneumonia (1) 201</td>
<td>Malaria (2) 170</td>
<td>Diarrhoeal (3) 164</td>
<td>Tuberculosis (7) 33,5</td>
<td>HIV/AIDS (8) 29</td>
</tr>
<tr>
<td>Mali</td>
<td>Influenza &amp; Pneumonia (1) 195</td>
<td>Diarrhoeal (2) 182</td>
<td>Malaria (3) 121</td>
<td>Tuberculosis (4)</td>
<td>HIV/AIDS (8) 33,5</td>
</tr>
</tbody>
</table>

Pneumonia and lower respiratory diseases is the largest group, followed by diarrhea, Hepatitis B, TB and HCV.
The geographic disparities in the toll from IPD are most evident for children.

In more developed regions, IPDs cause just 5% of deaths of children under age 5. This contrasts sharply with the percentages in the Eastern Mediterranean region, where more than one-half of child deaths are attributed to infectious diseases.

Among child deaths attributed to infectious diseases, more than 20% are attributed to pneumonia and diarrhoeal diseases caused by *Streptococcus pneumoniae*, *Haemophilus influenzae* type B (Hib), and *rotavirus*, despite the existence of potent and safe vaccines.
Diarrhoea accounts for 16 and 15% of under 5 death in Morocco & Algeria as compared to 6 and 5% in Libya and Tunisia and 3% in Egypt.

Pneumonia accounts for 19-20% of under five mortality in Morocco and Algeria. In Tunisia, the equivalent figure is 10, 11 in Libya and 9 in Egypt.

No case of death due to measles was observed in NA - success of large scale vaccination campaigns.
Immunization is one of the most effective, cost effective and safe public health intervention for reducing under-five mortality.

The last few years have witnessed remarkable improvement in routine vaccination coverage in several countries of the region.

It is also interesting to note that the gap between U & R areas is small, since rural areas achieved high vaccination rates.

William Foege, The power of immunization, 2000
One year-old immunized in 2008 with

The immunization coverage is above 85% for both OPV, DTP and HBV

OPV3: poliovaccine
DPT3: diphtheria-pertussis-tetanus vaccine
HBV3: hepatitis B vaccine
TB vaccination coverage is 58% in Tunisia while Morocco, Egypt and Libya achieved the target of 90% coverage for BCG.

For measles vaccine, 69% of one year old were vaccinated in Tunisia as compared to 80% and more in the other countries of the region.
Target diseases of vaccination

NA countries have experienced notable success in reducing morbidity and mortality due to WHO immunization programs:

- No cases of diphtheria and polio have been reported in 2010 in all NA countries

For Poliomyelitis:
• In Morocco no cases of polio have been reported since 1989
• In Tunisia no cases of poliomyelitis have been reported since January 1997
• In Algeria the last case of polio was reported in 2001
• There have been no poliomyelitis case in the Libyan Arab Jamahiriya since the first half of 1991
• In Egypt the last case of polio was reported in 2004

Although the Immunization Programs brought down significantly the incidence of major diseases targeted by vaccination, cases of tetanus, measles and rubella are however reported from the entire NA area with local variations.
The incidence of pertussis has declined and is no longer a public health problem.

The target of measles elimination by 2010 was not achieved since some countries are still experiencing measles outbreaks, such as Morocco and Egypt, even in children apparently properly vaccinated.
Additional vaccines have been introduced recently in Morocco, among them:

Rotavirus vaccine to protect children against the rotavirus, which causes severe diarrhea

Pneumococcal vaccine
Parasitic Diseases
(Paludisme, leishmaniasis, hydatidosis)
Malaria is not a major public health problem in North Africa. Sub-Saharan Africa by far has the highest risk of Malaria.
### Number of Malaria reported cases and mortality rate, 2010

<table>
<thead>
<tr>
<th>Country</th>
<th>Number of reported cases</th>
<th>Mortality rate / 100 000 population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morocco</td>
<td>145*</td>
<td>0</td>
</tr>
<tr>
<td>Tunisia</td>
<td>142*</td>
<td>0.1</td>
</tr>
<tr>
<td>Algeria</td>
<td>27*</td>
<td>0</td>
</tr>
<tr>
<td>Libya</td>
<td>27*</td>
<td>0</td>
</tr>
<tr>
<td>Egypt</td>
<td>94*</td>
<td>0.2</td>
</tr>
<tr>
<td>Mauritania</td>
<td>167705</td>
<td>36</td>
</tr>
<tr>
<td>Niger</td>
<td>309675</td>
<td>184</td>
</tr>
<tr>
<td>Mali</td>
<td>1633423</td>
<td>131</td>
</tr>
</tbody>
</table>

*: imported cases

Mauritania, Niger and Mali have a high number of Malaria cases.

No indigenous cases of malaria have been officially reported from Morocco, Algeria, Tunisia, Egypt and Libya, where the reported cases are only imported cases.

National control efforts have also resulted in a reduction in mortality rates due to malaria in NA countries.
The global malaria eradication campaign, launched by WHO in 1955, was successful in eliminating the disease in some countries.

In recent years, 4 countries have been certified by the WHO Director-General as having eliminated malaria:

United Arab Emirates (2007)

Morocco (2010)

Turkmenistan (2010)

Armenia (2011)

• So far, only Morocco and the United Arab Emirates in the EMRO region obtained such certification.
Leishmaniasis
**Geographical distribution of cutaneous leishmaniasis**

L. one of the highly neglected diseases, is currently a significant health problem in NA countries. NA countries harbour around 15% of the global L burden, which is almost exclusively attributable to CL & notably, Algeria is one of the countries that constitute 90% of CL cases worldwide.

CL caused by *L. major* is distributed in a belt from Marrakech and Casablanca in Morocco through Algiers in Algeria, Tripoli in Libya to Cairo, Alexandria and to the Sinai in Egypt.

On the other hand, CL due to *L. tropica* is also distributed in a similar belt across NA from the Canary Islands to Egypt.

*World Health Organisation, October 2010*
Both CL and VL have been reported in Morocco.

Zoonotic CL due to *L. major* occurs in the south and south-east. Outbreaks seem to move in waves from west to east over several years.

Anthroponotic CL due to *L. tropica* occurs in the centre of the country, on the Atlantic slopes of the Atlas Mountains.

Occasional cases of CL occur in the north of the country, caused by *L. infantum*, with the domestic dog as reservoir host.

The northern coastal regions of Morocco are endemic for human and canine VL.

CL and VL overlap in many provinces of central Morocco.
As in other NA countries where L is prevalent, both VL and CL have been reported in Algeria. 

The Grande Kabylie region of Algeria appears to be the most important focus of VL in NA. 

Two forms of CL are endemic in Algeria. Zoonotic CL (dominant one) caused by *L. major* is widespread in the steppe regions of the northern Sahara while sporadic CL caused by *L. infantum* occurs in the north along the coastline.
Three forms of CL exist in Tunisia:

- ZCL; epidemic in the centre and the southwest;
- Sporadic CL; found in the north; and
- Chronic CL (CCL), originally described in the southeast

The number of L cases in Tunisia is increasing mostly because of human activities such as environment modifications and urbanization.
The cases of VL in Libya that have been reported for over 80 years were all from the northern coastal areas near Tripoli and the Green Mountain area.

ZCL is widespread in the north-western region of Libya.
Visceral leishmaniasis is less prevalent in NA countries but more severe systemic disease.
Hydatidosis

(Data are based on studies reporting the annual surgical incidence of hydatidose in humans)

<table>
<thead>
<tr>
<th>Country</th>
<th>Endemicity</th>
<th>Author</th>
<th>Incidence/100,000 inhabitants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tunisia</td>
<td>endemic or hyperendemic</td>
<td>Hsairi M, 1997</td>
<td>15</td>
</tr>
<tr>
<td>Morocco</td>
<td>endemic to hyperendemic</td>
<td>Ministry of health, 2007</td>
<td>4.55</td>
</tr>
<tr>
<td>Algeria</td>
<td>endemic or hyperendemic</td>
<td>Shambesh 1997</td>
<td>3.6 to 4.6</td>
</tr>
<tr>
<td>Libya</td>
<td>endemic or hyperendemic</td>
<td>Tashani et al. 2002</td>
<td>4.2</td>
</tr>
<tr>
<td>Egypt</td>
<td>low endemicity</td>
<td>Kandeel et al. 2004</td>
<td>1.34 to 2.6</td>
</tr>
</tbody>
</table>

Endemic to hyperendemic occurrence of hydatidosis has been reported in NA countries
Number of reported cases and annual incidence of hydatidosis in Morocco, 2003-2010

1400 to 1700 cases of hydatidosis are reported annually in Morocco
Annual incidence of 4.5 to 5.6 per 100,000 inhabitants

Dr. Benmamoun, Ministry of Health, DELM, Morocco
Zoonotic Diseases
Rabies is a serious public health concern in NA causing a heavy social and economic burden and its reintroduction represents a threat to Western European countries presently free of rabies.
Challenge: place rabies on the DALY scale

Rabies has the 4th place on the DALY scale

Knobel et al., Bulletin WHO, 83: 360-368, 2005
Annual deaths from human rabies

Global annual total rabies deaths ~56,000
Many human rabies cases are regularly reported in NA, with an annual incidence varying from 0.1 in Egypt to 0.02 in Tunisia. There is an average of 22 cases/year of human fatalities associated with rabies.

- Rabies post-exposure prophylaxis accessibility is subject to large disparities;
  - the highest rates (3.3 persons receiving rabies PEP/1,000 population) are reported in Tunisia.

Data sources include WHO Rabnet database (www.who.int/globalatlas/default.asp) and RABMEDCONTROL (www.rabmedcontrol.org)
Dogs is the main reservoir and transmitter of Rabies in NA countries

Children are the major victims of canine rabies
Rabies in NA countries

In Morocco, rabies cases occur mainly in rural areas in Kenitra, Casablanca, and El Jadida.

In Algeria, human deaths from rabies occur mostly in the coastal and northern part of the country.

In Tunisia, human cases are localized in the northern (Bizerte and Béja), central and eastern rural (Siliana, Kairouan, Kasserine, Sidi Bouzid, and Gafsa), and southern coastal (Gabes and Medenine) parts of the country.

Rabies in dogs is still prevalent in Algeria, Morocco, and Tunisia because of ineffective implementation of rabies control and vaccination programs for these reservoir animals.

From Libya, no information about rabies in humans or animals has been available for many years.

Rabies is endemic to NA: accurate data on incidence are scarce, and better surveillance is needed.
Leptospirosis is regarded as focally enzootic throughout NA

The highest median annual incidence occurs in the African Region (65.5/100,000 population), whereas data on human leptospirosis in NA countries are virtually non-existent

<table>
<thead>
<tr>
<th>WHO region</th>
<th>Nº. of datasets</th>
<th>Median incidence per 100,000 persons (range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>4</td>
<td>95.5 (62.8-160.2)</td>
</tr>
<tr>
<td>Eastern Mediterranean</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>Europe</td>
<td>21</td>
<td>0.5 (0.1-15.8)</td>
</tr>
<tr>
<td>Americas</td>
<td>26</td>
<td>12.5 (0.1-306.2)</td>
</tr>
<tr>
<td>South-East Asia</td>
<td>5</td>
<td>4.8 (0.3-7.3)</td>
</tr>
<tr>
<td>Western Pacific</td>
<td>13</td>
<td>66.4 (1.1-975.0)</td>
</tr>
<tr>
<td>World</td>
<td>69</td>
<td>5.1 (0.1-975.0)</td>
</tr>
</tbody>
</table>

Very little is currently known regarding the true incidence of Leptospirosis in NA countries.

The OIE reports acknowledge the presence of the disease in Morocco with low endemicity (between 24 to 91 cases of leptospirosis are reported annually).

Dr. Benmamoun, Ministry of Health, DELM, Morocco
Brucellosis is a global zoonotic disease, endemic in NA countries and along the Moroccan/Algerian border.
Incidence of Brucellosis

Limited data exist about Libya and Morocco, while the incidence in Tunisia and Egypt may be an underestimate of the actual situation.

Notably, Algeria has the tenth highest annual brucellosis incidence worldwide (84.3).

In the rest of NA countries the incidence varies from 35.5 in Tunisia to 2.95 in Egypt (with a mean of 61 cases reported annually during the period 1988–2003).

A study conducted in the Yafran municipality in Libya reported an overall prevalence of Brucella seropositivity of 40% (MO. Ahemed)

<table>
<thead>
<tr>
<th>Country and reference</th>
<th>Incidence (annual cases per million of population)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Europe</strong></td>
<td></td>
</tr>
<tr>
<td>Albania</td>
<td>63.6</td>
</tr>
<tr>
<td>Bosnia and Herzegovina</td>
<td>20.8</td>
</tr>
<tr>
<td>Denmark</td>
<td>0.7</td>
</tr>
<tr>
<td>France</td>
<td>0.5</td>
</tr>
<tr>
<td>Former Yugoslav Republic of Macedonia</td>
<td>148</td>
</tr>
<tr>
<td>Georgia</td>
<td>27.6</td>
</tr>
<tr>
<td>Germany</td>
<td>0.3</td>
</tr>
<tr>
<td>Greece</td>
<td>20.9</td>
</tr>
<tr>
<td>Ireland</td>
<td>1.3</td>
</tr>
<tr>
<td>Italy</td>
<td>9</td>
</tr>
<tr>
<td>Netherlands</td>
<td>0.5</td>
</tr>
<tr>
<td>Norway</td>
<td>0.7</td>
</tr>
<tr>
<td>Portugal</td>
<td>13.9</td>
</tr>
<tr>
<td>Russia</td>
<td>4.1</td>
</tr>
<tr>
<td>Serbia and Montenegro</td>
<td>8.4</td>
</tr>
<tr>
<td>Spain</td>
<td>15.1</td>
</tr>
<tr>
<td>Sweden</td>
<td>0.3</td>
</tr>
<tr>
<td>Switzerland</td>
<td>1.5</td>
</tr>
<tr>
<td>UK</td>
<td>0.3</td>
</tr>
<tr>
<td><strong>Africa</strong></td>
<td></td>
</tr>
<tr>
<td>Algeria</td>
<td>84.3, Endemic, no specific data available</td>
</tr>
<tr>
<td>Cameroon</td>
<td>2.95</td>
</tr>
<tr>
<td>Egypt</td>
<td>5.48</td>
</tr>
<tr>
<td>Eritrea</td>
<td>Endemic, no specific data available</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>2</td>
</tr>
<tr>
<td>Mali</td>
<td>4.9</td>
</tr>
<tr>
<td>Namibia</td>
<td>35.4</td>
</tr>
<tr>
<td>Tunisia</td>
<td>0.9</td>
</tr>
<tr>
<td><strong>North America</strong></td>
<td></td>
</tr>
<tr>
<td>Canada</td>
<td>0.09</td>
</tr>
<tr>
<td>USA</td>
<td>0.4</td>
</tr>
<tr>
<td>Mexico</td>
<td>28.7</td>
</tr>
<tr>
<td><strong>Central and South America</strong></td>
<td>8.4</td>
</tr>
<tr>
<td>Argentina</td>
<td>8.4</td>
</tr>
<tr>
<td>Chile</td>
<td>0.6</td>
</tr>
<tr>
<td>Colombia</td>
<td>1.85</td>
</tr>
<tr>
<td>Guatemala</td>
<td>15.7</td>
</tr>
<tr>
<td>Panama</td>
<td>10.1</td>
</tr>
<tr>
<td>Peru</td>
<td>34.9</td>
</tr>
</tbody>
</table>
The number of cases reported annually in Morocco during the period 2002-2011 vary between 0 to 27 cases, with an increase in the number of reported cases, particularly in 2007, 2009 and 2010.

Dr. Benmamoun, Ministry of Health, DELM, Morocco
Schistosomiasis is now a major public health problem only in Egypt, although active control programs throughout the country for the past two decades have reduced infection rates, schistosomiasis remains a major public health problem, particularly in areas of increased irrigation and new agricultural cultivation.

The other countries in the region have eradicated the disease, and many more are working toward it.
Rickettsioses in NA countries

In NA data on the epidemiology of R are available only from fragmentary studies

The seroprevalence of R. conorii among blood donros is 1% in Egypt and vary from 5 to 8% in Tunisia, Algeria, Morocco and Mauritania

Although though to have disappeared in NA, R. typhi (TG) is still present. R. typhi antibodies are present in 0,5 to 4% of the general population. Among Egyptian garbage and rodent control workers the seroprevalence is 19%

Moreover, reemerging threat of epidemic typhus should be considered, after the two cases recently diagnosed in the highlands of Algeria

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**TABLE 1. Current epidemiological data on rickettsioses in North Africa**

<table>
<thead>
<tr>
<th></th>
<th>Mauritania</th>
<th>Morocco</th>
<th>Algeria</th>
<th>Tunisia</th>
<th>Libya</th>
<th>Egypt</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SFGR</strong></td>
<td>No data</td>
<td>R. conorii</td>
<td>R. conorii</td>
<td>R. conorii</td>
<td>no data</td>
<td>R. conorii undetermined SFGR</td>
</tr>
<tr>
<td>Among ticks</td>
<td></td>
<td>R. aeshilimanni</td>
<td>R. massilliae</td>
<td>R. aeshilimannii</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sero prevalence</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R. conorii</td>
<td>13.5%</td>
<td>6%</td>
<td>6% (50%)*</td>
<td>8% (40%)*</td>
<td>no data</td>
<td>1% (10%*+)</td>
</tr>
<tr>
<td>R. aethiopsii</td>
<td>19.6%</td>
<td>3%</td>
<td>0.5%</td>
<td>3.6% (20–60%+)</td>
<td>-</td>
<td>19% (40%*+)</td>
</tr>
<tr>
<td>R. prowazekii</td>
<td>1.7%</td>
<td>2%</td>
<td></td>
<td>2%</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>SFG rickettsioses</td>
<td>MSF</td>
<td>MSF</td>
<td>MSF</td>
<td>MSF</td>
<td>MSF</td>
<td>MSF</td>
</tr>
<tr>
<td>R. aeshilimannii</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>TG rickettsioses</td>
<td>no data</td>
<td>no data</td>
<td>R. typhi</td>
<td>R. typhi</td>
<td>no data</td>
<td>R. typhi</td>
</tr>
</tbody>
</table>

SFGR : Spotted fever group rickettsioses; MSF : Mediterranean spotted fever; TG: Typhus group.  
* Among patients with fever and rash; + acute fever with undetermined etiology; *+ among garbage workers; ** serological evidence.
In Morocco 4 to 30 cases of R are reported annually

Notifiable disease / underreporting / ignorance of the disease
With 700 cases, Egypt records the highest number of reported cases of Leprosy in the region, followed by Niger and Mali. In Morocco the equivalent figure is 41, 7 in Libya and less than one case in Tunisia and Algeria.

The risk of plague and Yellow fever in NA countries should be considered very low, since no case has been reported in the region.
TUBERCULOSIS
Tuberculosis control remains one of the most important public health challenges in the NA Region. In 2008, a total of 397,726 tuberculosis cases were notified in the Region, compared to 383,364 in 2007.

In comparison with the other NA countries, Morocco and Algeria has a high incidence rate of TB i.e. rates between 50-100 per 100,000 population.
Globally as incidence rates (---) falls slowly, notifications (____) are increasing particularly since 2000 in the Eastern Mediterranean region, indicating improving rates of case detection.

Mortality rates are also falling in the region.
Between 1990 & 2007, the trend in TB incidence showed either:
- a declining trend (Morocco, Libya, Egypt) or
- a stable trend (Tunisia)
Incidence of all forms of tuberculosis in NA Countries, 2010

Morocco has the highest TB incidence in the region (92/100 000 population) followed by Algeria (59) and Libya (40).

Tunisia and Egypt has an incidence rate below 25 cases per 100 000 population.
Among NA countries Morocco and Algeria have the highest number of new TB cases reported each year: 27,143 in Morocco and 21,839 in Algeria. The number of new TB cases in Egypt is 8,885. Tunisia and Libya record about 2,000 cases in 2010.

Source: www.who.int/tb/data
Morocco is a country with high TB incidence compared to other NA countries, is related to socio-economic conditions in some segment of the Moroccan population.

Tuberculosis is particularly frequent in the most urbanised and heavily populated areas of Morocco, for example, 20% of the new cases are recorded in Casablanca, where there can be over 180 new cases per 100,000 per year in some areas.
Although TB is no longer a major killer in most developed countries, it remains the world’s deadliest curable infectious disease. The number of TB deaths per thousands vary between 1.9 in Morocco to 0.19 in Tunisia.

Source: www.who.int/tb/data
The age and sex distribution of case notification show that TB is a young adult's disease for both sexes: about 70% of the cases occur in young and middle-aged people (15-45 age) who are at the peak of their economic productivity.

The average age in recorded cases is about 30.
Libya, Mali and Algeria reported low proportions of MDR-TB among new cases, ranging from 0 in Algeria to 7 in Libya and Mali. Egypt and Morocco reported a higher number of resistance, while Tunisia reported 36 cases MDR-TB among new cases.
Treatment outcomes (percent cured) of new smear-positive TB cases in NA Countries, 2008

Six national TB programmes in the region achieved a treatment success rate of at least 69 as compared to 52% in Libya
HIV/AIDS
HIV prevalence among the general population of NA countries is very low, generally around 0.2%, and among the lowest rates of all regions.
An estimated 460,000 people were living with HIV at the end of 2009, up from 180,000 in 2001.

The number of people newly infected has also increased over the last decade. There were 75,000 in 2009, more than twice the number in 2001 (36,000).

AIDS-related deaths have nearly tripled: from 8,300 in 2001 to 24,000 at the end of 2009.
In Morocco, 26,000 people were living with HIV in 2009 compared to 14,000 in 2001.

In Algeria, 18,000 were living with HIV, 11,000 in Egypt, and 2,400 in Tunisia.
Increasing HIV infection are found in all NA countries especially in younger age groups. The percent of under age 30 infected patients vary between 50 to 61%, suggesting an accelerating epidemic in the region.

This increased vulnerability of young people to HIV in the region is due primarily to their risk behaviours.
HIV prevalence among key populations (%) in NA countries

Female sex workers, men having sex with other men, and injecting drug users

HIV prevalence among IDUs ranges between 3% in Tunisia and 22% in Libya

HIV prevalence among FSWs ranges between 0-4%

Male same-sex sexual contact is an important mode of transmission in Egypt (5.7% in Cairo & 5.9% in Alexandria), and Tunisia (5%)
Morocco and Tunisia has the best antiretroviral therapy coverage, with 31 & 29%, respectively as compared to only 9% in Egypt
Cases of meningococcal diseases reported in NA, 1986-1996

The situation of meningococcal meningitis in the Eastern Mediterranean Region varies considerably from one country to the other. The disease is endemic in many countries, particularly in Egypt, Morocco and Tunisia.

Following the return of pilgrims in August 1987, many countries in the Region faced an unusual spread of meningococcal infection.
Cases of meningococcal diseases reported in NA, 2010

- Morocco: 913 cases
- Egypt: 56 cases
- Algeria: 31 cases
- Tunisia: 22 cases
- Libya: 12 cases
Viral Hepatitis
Viral hepatitis represent an important health problem in NA countries, although emerging natural history and epidemiological informations reveal differences in the overall epidemiology, risk factors and modes of transmission of hepatitis A, B, C, D & E.

The prevalence of HE & C varies accross NA countries. HE is endemic in Egypt as compared to other NA countries. The prevalence of HCV in Egypt is among the highest reported in the world.

These differences in the incidences & prevalences of viral hepatitis accross NA is attributed to variations in health care, sanitation standars, risk factors & immunizations strategies.
HAV represents a public health problem in NA countries, which are considered an area with high HAV prevalence, although recently, a shift from high to intermediate HAV endemicity patterns is observed in countries with transitional economies such as Egypt, Tunisia and Morocco.
HAV infections in NA has been characterized with a lifetime risk of infection greater than 90%.

Most infections occur in early age with a high prevalence in rural vs urban areas.

Kamal, et al, Medit J Hemat Infect Dis 2010; 2(1); 2010

<table>
<thead>
<tr>
<th>Country</th>
<th>Seroprevalence</th>
<th>Additional Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Egypt</td>
<td>100%</td>
<td>Rural areas</td>
</tr>
<tr>
<td>Libya</td>
<td>100%</td>
<td>By age 7 years</td>
</tr>
<tr>
<td>Algeria</td>
<td>96%</td>
<td></td>
</tr>
<tr>
<td>Tunisia</td>
<td>84% - 92%</td>
<td>Variation with age &amp; Rural/Urban area</td>
</tr>
<tr>
<td>Morocco</td>
<td>45%-70%</td>
<td>Childrens &lt; 6 years/childrens 7-14 years</td>
</tr>
</tbody>
</table>
Recent surveys suggest a shift in the HBV endemicity patterns in most NA countries from high to a lower intermediate HbsAg endemicity across all age-groups. Prevalence decreased from 1990 to 2005, particularly among males up to 34 years. This decline in HBV infection prevalence is related to expanded immunization.
In 1985, a study in Egypt reported an overall prevalence rate of HbsAg of 10.1%. 20 years later a study showed a decline in the seroprevalence of HbsAg to 1.3%.

The overall seroprevalence of HBV in Tunisia is 5.3%, 1.66 in Morocco and Algeria and 2.2 in Libya.

Kamal, et al, Medit J Hemat Infect Dis 2010; 2(1); 2010

<table>
<thead>
<tr>
<th>Country</th>
<th>Seroprevalence (Year)</th>
<th>Reference Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morocco</td>
<td>1.66 (2010)</td>
<td></td>
</tr>
<tr>
<td>Tunisia</td>
<td>6.3-7.8 (1997)</td>
<td>5.3 (2010)</td>
</tr>
<tr>
<td>Algeria</td>
<td>2.17 (1998)</td>
<td>1.6 (2006)</td>
</tr>
<tr>
<td>Libya</td>
<td></td>
<td>2.2 (2006)</td>
</tr>
<tr>
<td>Egypt</td>
<td>10.1 (1985)</td>
<td>1.3 (2009)</td>
</tr>
</tbody>
</table>
In Tunisia endemicity is higher in southern Tunisia.

In Egypt, higher rates of HbsAg prevalence are observed in upper Egypt compared to lower Egypt.

Prevalence of HbsAg gradually increases significantly with age for both sexes.

A significantly higher prevalence of HBV infections is observed in males (2.16) compared to females (0.90).
HBV is divided into eight genotypes (A-H). The genotypes have a distinct geographical distribution and are used in tracing the evolution and transmission of the virus.

HBV genotype D is the most prevalent HBV genotype in NA countries:
- Morocco: 97.5%
- Algeria: 93%
- Tunisia: 80%
- Egypt: 37%

Different genotypes have been associated with varied outcomes and responsiveness to therapy.

### Identified characteristics of HBV D genotype

<table>
<thead>
<tr>
<th>Region</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>Lower response rate to interferon alpha than those infected with A or B</td>
</tr>
<tr>
<td>USA</td>
<td>Better virologic response with adefovir in lamivudine-resistant cases</td>
</tr>
<tr>
<td>Western Europe</td>
<td>Higher level of childhood viremia</td>
</tr>
<tr>
<td>Middle East</td>
<td>HBeAg production may be of reduced duration</td>
</tr>
<tr>
<td>Mediterranean</td>
<td>More likely to maintain replicative state even after HBeAg seroconversion (higher prevalence of aHBe+ chronic state)</td>
</tr>
<tr>
<td>India</td>
<td>Higher viral load than in B or C infection</td>
</tr>
<tr>
<td></td>
<td>Higher HBeAg-positive rate and a faster progression to liver fibrosis and HCC than in A or B infection</td>
</tr>
</tbody>
</table>
Compared to other hepatitis viruses, HCV shows vast variations across NA.

Geographically, HCV prevalence rates decrease along the Mediterranean coast from the East towards the West.
Egypt has the highest HCV prevalence in the world (18% among rural residents) while the prevalence of HCV in Morocco, Tunisia and Algeria do not exceed 1%.

The risk factors for HCV transmission that specifically sets Egypt apart from other countries is mass-treatment campaigns by parenteral antischistosomosal therapy, discontinued in the 1980s.
HCV genotypes distribution in NA countries

HCV genotypes distribution also differ from a prevalence of:

- HCV G4 genotype in Egypt,
- genotypes 1 and 4 in Libya and
- predominance of genotype, 1a or 1b in western areas such as Tunisia, Algeria & Morocco

Although Morocco belongs to the African continent, the circulating HCV strains are similar to those observed in Europe.
NA countries are considered regions of high prevalence of HDV infections:

- Tunisia: 44%
- Egypt: 20%
- Morocco: very low
The evolution of most endemic diseases or public health problems over the past decade shows the following situation:

- A trend toward reduction or eradication of a number of diseases, especially:
  - Target diseases of vaccination (polio, diphtheria, measles, pertussis, tetanus, …)
  - Diseases subject of health programs:
    - Water-borne diseases, typhoid in mind,
    - Trachoma,
    - Schistosomiasis,
    - Leprosy
    - Malaria …..

WHO immunizations programs have nearly eliminated some vaccine-preventable diseases: polio and diphtheria.

Analysis of changes in the incidence of diseases which are the subject of control programs shows a decrease in morbidity associated with schistosomiasis and malaria. Although these analysis still arise the problem of imported malaria. Continued intervention measures are required to prevent re-emergence and re-establishment of transmission.
A trend toward persistence or stagnation, or even the resurgence of certain diseases, in particular:

- TB
- Acute respiratory infections,
- Meningitis,
- Viral hepatitis (B and C)
- STI AIDS
- The food poisoning ...

These diseases continue to pose threats.

Childhood diseases such as Pneumonia and Diarrhea still cause a substantial portion of under five mortality in the region.

Newer communicable diseases such as HIV/AIDS are emerging; while in some areas, tuberculosis is re-emerging.

Although HIV prevalence rates are low in NA countries, the risks for further spread exist. Unless effective preventive measures are implemented, the disease could have significant social and economic consequences.

Tuberculosis, including multidrug resistant varieties, is more problematic.

Reemerging diseases in the region include also all types of hepatitis, with Egypt reporting the highest prevalence worldwide of the C variety.

There is a situation for leishmaniasis endemic for visceral and major outbreaks for cutaneous forms. Leishmaniasis is expected to increase due to global and ruralization of suburban space. The zoonotic cutaneous leishmaniasis would pose more problems in the future unless significant control measures are taken.
THANK YOU