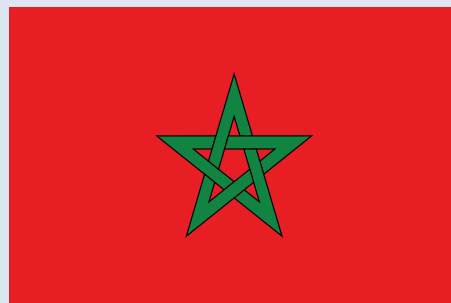
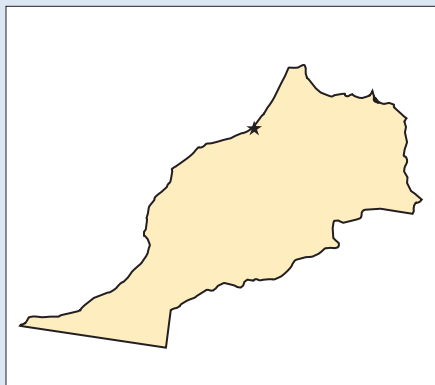


# Morocco



- **Capital:** Rabat
- **Area:** 446,550 sq km
- **Population:** 32,309,239 (July 2012 est.)
- **Age Structure:** 0-14 years: 27.8% (male 4,514,623/female 4,382,487); 15-64 years: 66.1% (male 10,335,931/female 10,785,380); 65 years and over: 6.1% (male 881,622/ female 1,068,318) (2011 est.)
- **Life Expectancy at Birth:** Total population: 76.11 years; male: 73.04 years; female: 79.32 years (2012 est.)
- **Infant Mortality Rate:** Total: 26.49 deaths/1,000 live births; male: 31.16 deaths/1,000 live births; female: 21.59 deaths/1,000 live births (2012 est.)
- **Literacy Rate:** Total population: 52.3%; male: 65.7%; female: 39.6% (2004 census)
- **GDP:** \$163 billion (2011 est.)
- **GDP per Capita:** \$5,100 (2011 est.)

## Highlights

- During the 2010–2011 Northern Hemisphere influenza season, Morocco's National Influenza Center (NIC) strengthened its capabilities by including strain sequencing and phylogenetic analysis. Morocco has also developed capacity for phenotypic analysis of drug susceptibility; this allows the NIC to participate in the World Health Organization (WHO) Global Influenza Surveillance and Response System (GISRS) surveillance of susceptibility to, and detection of, M2 and neuraminidase inhibitor resistance.
- Morocco has extended their severe acute respiratory infections (SARI) diagnostic testing to include bacterial pathogens. The bacterial department of the National Institute of Hygiene (NIH) is coordinating this activity with Morocco's 16 regional laboratories.
- An article documenting Morocco's influenza surveillance was published in 2011.

## U.S. CDC Direct Country Support

The Kingdom of Morocco's National Institute of Hygiene (NIH) is both an NIC and the recipient of a U.S. Centers for Disease Control and Prevention (CDC) cooperative agreement for influenza surveillance titled *Strengthening Influenza Surveillance Networks in Morocco*. The NIH was initially funded in 2006 to strengthen laboratory and epidemiology capacity for influenza surveillance.

The NIH has developed a web-based database to collect both epidemiologic and laboratory information related to influenza-like illness (ILI) and SARI. The NIH collaborates on influenza surveillance activities in the 16 administrative regions of Morocco with the epidemiological disease and surveillance units in the country's Ministry of Health (MOH).

## Surveillance

Morocco's MOH uses multiple surveillance systems to characterize the epidemiology of influenza, both for the observation of seasonal influenza trends, and to be prepared in the event of a pandemic. SARI is tracked through a network of 16 regional hospitals where syndromic and virologic data is collected. ILI is tracked through a network of 380 health units and a network of 110 private physicians. Sixteen of the 380 health units collect both syndromic and virologic data.

The internet database developed by NIH provides instant notification of influenza activity. Influenza data is entered into the database by the sentinel sites and the NIC.

### Surveillance Activities

- In Morocco's 2010–2011 influenza season, 779 ILI specimens were tested for influenza with a positivity rate of 37% (124 A(H1N1)pdm09, 39 A(H3N2) and 122 influenza B). Approximately 70% of these specimens were collected through the physicians' network and the remaining 30% through the health unit network.
- In the same period, 139 SARI specimens were collected through regional hospitals and tested for influenza, with a positivity rate of 17% (17 A(H1N1)pdm09 and A(H3N2) and 6 influenza B). A further 26 (19%) specimens tested positive for bacterial pathogens.

## Laboratory

Morocco's surveillance network includes one NIC and 16 regional laboratories. The NIC has the capacity to conduct real-time PCR testing, virus culturing, HAI testing, DFA testing, sequencing and phenotypic analysis of drug susceptibility. Four regional laboratories are equipped with PCR machines.

### Laboratory Activities

- CDC supports Morocco's NIC, bacterial laboratories and influenza network laboratories through the supply of laboratory consumables and standard reagents, such as immunofluorescence assay (IFA) kits, PCR reagents and bacterial tests.

## Training

Morocco's NIH hosted the following training activities in 2011:

- A two-site technical assistance and hands-on training for regional laboratory staff in SARI bacterial diagnosis.
- Supervision and monitoring visits to ensure the functioning of the sentinel surveillance system and the quality of the surveillance data.

## Publications

- Barakat A, Ihazmad H, Benkaroum S, Cherkaoui I, Benmamoun A, Youbi M, El Aouad R. (2011) Influenza Surveillance among Outpatients and Inpatients in Morocco, 1996–2009 PLoS ONE 6(9): e24579.

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