

MALARIA

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1. Global Burden of Malaria (Slide 2)

- Globally in 2022, there were an estimated 249 million malaria cases and 608,000 malaria deaths across 85 countries.
- The WHO African Region carries a disproportionately high share of the global malaria burden.
- In 2022, the African Region was home to 94% of malaria cases (233 million) and 95% of malaria deaths (580,000).

Region	Cases (2022)	Deaths (2022)
Global Total	249 million	608,000
WHO African Region	233 million (94%)	580,000 (95%)
Rest of the World	16 million (6%)	28,000 (5%)

2. What is Malaria? (Slide 3)

- Malaria is an acute febrile illness caused by Plasmodium parasites, which are spread to people through the bites of infected female Anopheles mosquitoes.
- There are 5 parasite species that cause malaria in humans, but 2 of these species pose the greatest threat: *P. falciparum* and *P. vivax*.

The Two Most Dangerous Species

Species	Key Characteristic	Geographic Distribution
<i>P. falciparum</i>	Deadliest malaria parasite	Most prevalent on the African continent
<i>P. vivax</i>	Second most dangerous	Dominant in most countries outside sub-Saharan Africa

3. Symptoms (Slide 4)

- The first symptoms are fever, headache, and chills.
- These symptoms usually appear 10-15 days after the infective mosquito bite.
- Initial symptoms may be mild and difficult to recognize as malaria.
- **Critical:** Left untreated, *P. falciparum* malaria can progress to severe illness and death within a period of only 24 hours.

4. Biological Risk Factors (Slide 5)

- Not all people in malaria-endemic areas are at the same risk of becoming sick or dying from malaria.
- Acquired immunity is an important biological factor.
- After repeated attacks of malaria, a significant degree of immunity is gradually acquired.
- This partial immunity reduces the risk that malaria infection will cause severe disease.

Malaria Non-Immunes

- Malaria non-immunes are those who have had minimal or no previous exposure to malaria infection.
- The risk of severe disease and potentially death is HIGH among non-immunes or those with low immunity to malaria parasites.

5. High-Risk Populations (Slide 6)

The following are high-risk populations through biological risk factors:

Population Group	Reason for High Risk
Children under 5 years of age	Immature/underdeveloped immune systems
Pregnant women	Pregnancy significantly weakens immunity to malaria
Non-immune migrants, mobile populations and travellers	No prior exposure to malaria = no acquired immunity

6. Socioeconomic and Cultural Risk Factors (Slide 7)

Multiple socioeconomic and cultural factors increase malaria risk:

Category	Sub-factors
Poverty	Physical barriers, Accessibility barriers <i>ما بقدر ولا وصلوا / ما فندهم شايك / عشان نجيبهم من الجوع / المستشفى</i> <i>الدنن منو تروح المستشفى</i>
Social Exclusion	Gender barriers, Human rights barriers <i>لديين / مكانا متجاسنه ونيرة</i>
Literacy Barriers	Inability to understand health messages or instructions <i>Maybe stops treatment before course end.</i>
Financial Barriers	Cannot afford treatment or prevention tools
Cultural Norms	Practices that may prevent use of health services
Psycho-social Barriers	Stigma, fear, mistrust of health systems
Complex Emergencies	Conflict zones, natural disasters, displacement <i>→ makes person more prone to malaria infection</i>

Poor Students Love Free Cold Cheesy Pizza ← *Mnemonic*

7. Underserved Populations at Higher Risk (Slide 8)

The following underserved groups face disproportionately higher malaria risk:

- Populations living in remote areas facing geographical barriers to services
- Women and children from poor settings
- Indigenous populations *السكان الأصليين*
- Prisoners *السجناء*
- Undocumented workers
- Ethnic minorities
- Migrant workers *النازحين*
- Refugees and internally displaced populations

8. Prevention (Slide 9)

- Over the last 2 decades, expanded access to malaria prevention interventions and strategies has had a major impact in reducing the global burden of malaria.
- The two main pillars of prevention are: **effective vector control** and **the use of preventive antimalarial drugs.**

9. Vector Control (Slide 10)

- Vector control is a vital component of malaria control and elimination strategies.
- It is highly effective in preventing infection and reducing disease transmission.

The 2 Core Interventions

Intervention	Abbreviation	Description
Insecticide-Treated Nets	ITNs	Bed nets treated with insecticide that kill or repel mosquitoes
Indoor Residual Spraying	IRS	Spraying insecticide on interior walls of homes to kill mosquitoes

- **Key Threat:** Progress in global malaria control is threatened by emerging resistance to insecticides among Anopheles mosquitoes.

10. Preventive Chemotherapies (Slide 11)

- Preventive chemotherapy is the use of medicines, either alone or in combination, to prevent malaria infections and their consequences.

Types of Preventive Chemotherapy

Type	Full Name	Target Group
Chemoprophylaxis	Chemoprophylaxis	Travelers / non-immune individuals
IPTi	Intermittent Preventive Treatment of Infants	Infants in endemic areas
IPTp	Intermittent Preventive Treatment in Pregnancy	Pregnant women
SMC	Seasonal Malaria Chemoprevention	Children during high-transmission seasons
MDA	Mass Drug Administration	Entire at-risk populations

11. Vaccine (Slide 12)

- Since **October 2021**, WHO recommends broad use of the approved malaria vaccine among children living in regions with moderate to high *P. falciparum* malaria transmission.
- The vaccine has been shown to significantly reduce malaria, and deadly severe malaria, among young children.

Aspect	Detail
WHO Recommendation Since	October 2021
Target Population	Children in moderate to high <i>P. falciparum</i> transmission areas
Effect	Significantly reduces malaria cases AND deadly severe malaria

12. Case Management - Diagnosis (Slide 13)

- Early diagnosis and treatment of malaria reduces disease, prevents deaths and contributes to reducing transmission.
- All suspected cases of malaria must be confirmed using parasite-based diagnostic testing.

Diagnostic Methods

Method	Description
Microscopy	Examination of blood smear under a microscope to detect parasites
Rapid Diagnostic Test (RDT)	Quick test that detects malaria antigens in blood

13. Case Management - Treatment (Slide 14)

- The best available treatment, particularly for *P. falciparum* malaria, is **Artemisinin-Based Combination Therapy (ACT)**.
- The primary objective of treatment is to ensure the rapid and full elimination of Plasmodium parasites to prevent an uncomplicated case of malaria from progressing to severe disease or death.

Aspect	Detail
Best Treatment	Artemisinin-Based Combination Therapy (ACT)
Especially For	<i>P. falciparum</i> malaria
Primary Objective	Rapid and full elimination of Plasmodium parasites
	Prevent progression from uncomplicated malaria to severe disease or death

14. Antimalarial Drug Resistance - Definition (Slide 15)

- Over the last decade, antimalarial drug resistance has emerged as a major threat to global malaria control efforts, particularly in Africa.

Definition

Antimalarial drug resistance is the ability of a parasite strain to survive and/or to multiply despite the administration and absorption of medicine given in doses equal to or higher than those usually recommended.

15. Antimalarial Drug Resistance - Contributing Factors (Slide 16)

The following factors facilitate the emergence of resistance to existing antimalarial drugs:

#	Factor	Explanation
1	Parasite mutation rate	Higher mutation rates increase chance of resistance development
2	Overall parasite load	Higher parasite numbers increase probability of resistant mutants
3	Strength of drug selected	Stronger selection <u>pressure accelerates resistance</u>
4	Treatment compliance	Incomplete courses allow parasites to survive
5	Poor adherence to treatment guidelines	Incorrect treatment protocols reduce effectiveness
6	Improper dosing	Under-dosing allows parasite survival and adaptation
7	Poor pharmacokinetic properties	Drugs that are poorly absorbed or metabolized → which results in low dose
8	Fake/counterfeit drugs	Lead to inadequate drug exposure on parasites
9	Poor-quality antimalarials	Substandard medicines aid and enhance resistance

Parasite Related

Patient & Doctor Related

Drug related

16. Malaria Elimination (Slide 17)

Definition

Malaria elimination is defined as the interruption of local transmission of a specified malaria parasite species in a defined geographical area as a result of deliberate activities. Continued measures to prevent re-establishment of transmission are required.

WHO Certification Criteria

- Countries must achieve at least 3 consecutive years of zero indigenous malaria cases to be eligible to apply for WHO certification of malaria elimination.

17. Surveillance (Slide 18)

Definition

Malaria surveillance is the continuous and systematic collection, analysis and interpretation of malaria-related data, and the use of that data in the planning, implementation and evaluation of public health practice.

Three Key Components of Surveillance

Component	Description
Collection	Continuous and systematic gathering of malaria-related data
Analysis & Interpretation	Processing and making sense of the collected data → turn into information
Use in Public Health	Planning, implementing and evaluating public health interventions

18. Global Targets by 2030 (Slide 19)

The WHO Global Technical Strategy for Malaria 2016-2030 sets the following targets:

Target	Goal by 2030
Reduce malaria case incidence	At least 90%
Reduce malaria mortality rates	At least 90%
Eliminate malaria in countries	At least 35 countries
Prevent resurgence [Prevent re-establishment]	In all malaria-free countries

Global technical strategy

19. GTS Milestones & Tracking (Slide 20)

Goals, Milestones and Targets for the Global Technical Strategy for Malaria 2016-2030:

Goal	2020 Milestone	2020 Actual Achievement	Status	2025 Target	2030 Target
1. Reduce malaria mortality rates (vs 2015)	At least 40%	18% reduction achieved	22% OFF TRACK	At least 75%	At least 90%
2. Reduce malaria case incidence (vs 2015)	At least 40%	3% reduction achieved	37% OFF TRACK	At least 75%	At least 90%
3. Eliminate malaria from endemic countries (2015)	At least 10 countries	On track كل الطرق الصيغ	ON TRACK	At least 20 countries	At least 35 countries
4. Prevent re-establishment in malaria-free countries	Re-establishment prevented	On track	ON TRACK	Re-establishment prevented	Re-establishment prevented

- EXAM NOTE:** Goals 1 and 2 (mortality and case incidence reduction) were significantly OFF TRACK by 2020. Goals 3 and 4 (elimination and prevention of resurgence) were ON TRACK.

Quick Reference Summary for Exam

Topic	Key Point to Remember
Disease cause	Plasmodium parasite transmitted by infected female Anopheles mosquito
Deadliest species	P. falciparum (most prevalent in Africa)
Outside Africa dominant species	P. vivax
Number of species causing malaria	5 total, 2 of greatest threat
First symptoms appear	10-15 days after infective mosquito bite
First symptoms	Fever, headache, chills
Death without treatment (P. falciparum)	Can occur within 24 hours
2022 global cases	249 million
2022 global deaths	608,000
African region burden - cases	94% = 233 million
African region burden - deaths	95% = 580,000
Core vector control tools	ITNs (insecticide-treated nets) + IRS (indoor residual spraying)
Best treatment	Artemisinin-Based Combination Therapy (ACT)
Vaccine recommendation since	October 2021 for children in moderate to high transmission regions.
Elimination certification requirement	3 consecutive years of zero indigenous cases
2030 reduction target (cases & deaths)	At least 90%
2030 elimination target	At least 35 countries
High-risk biological groups	Children under 5, pregnant women, non-immune travellers/migrants
Drug resistance threat	Emerged over last decade, major threat in Africa
Number of drug resistance factors	9 key factors listed in Slide 16