

MALARIA IN THE PEACE CORPS

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**Peace
Corps**

Office of
Health Services

Introduction

- Peace Corps Volunteers Serve 27 month tours abroad
- Volunteers are integrated into rural villages with limited health care resources
- Occupational exposure to Malaria has been a challenge to Peace Corps Volunteers since the 1960s
- Prevention measures are crucial to prevent morbidity and mortality
- Antimalarial chemoprophylaxis is the cornerstone of this effort
- Peace Corps HQ employees are limited to 5 year tours

Background

Peace Corps Volunteers serve in 61 Countries:

- *Countries are added or removed periodically*
- *Some are highly endemic for malaria*
- *Some are partially endemic*
 - Belize, Colombia, Costa Rica, Ecuador, Eswatini, Guatemala, Indonesia, Mexico, Panama, Peru, Philippines
- *Some are non endemic*



Background

- Peace Corps Medical Officers (PCMO) are the primary care providers for all Peace Corps Volunteers
- Often host country or third country nationals
- On call 24 hours/7 days a week for all PCVs at their post
- May be an MD, Nurse Practitioner, or Registered Nurse
- All PCMOs meet the credentialing requirements established by PC
- Peace Corps Office of Health Services provides PCMOs continuing education, training, mentoring, consultative support and oversight

Background

- There have been 7 deaths from Malaria among PCVs since 1962
 - *2 Since 2000*
 - *Both PCVs were non-adherent to prophylaxis*
- There are between 100-200 cases of Malaria annually among PCVs
 - *126 cases in 2017*
 - *Majority suspected, not confirmed by RDT, smear or PCR*
- The majority of confirmed cases are from Africa and are *P. falciparum*
- Incidence steadily declined in 1990s and has plateaued

Current Antimalarial Policy

- All PCVs are provided bednets at post in tropical countries
- All PCVs are provided Co-Artem self treatment in their med kits
- All PCVs are provided Malaria RDT in their med kits and instruction on use
- All PCVs are provided antimalarial medication on the first day of service in malaria endemic countries

Current Antimalarial Policy

- Posts are strongly encouraged to provide screens on all housing when possible
- All PCVs are provided lectures about Malaria and the lifecycle in pre-service training
- All PCVs watch kNOwMalaria video in training, a State Department/Peace Corps joint production
- Failure to adhere to antimalarial chemoprophylaxis can be grounds for administrative separation

Previous Antimalarial Policy

- “Malaria prophylaxis is mandatory for all Peace Corps volunteers in Africa. Volunteers are **encouraged but not obliged** to use mefloquine. Three other chemoprophylactic regimens are available: 300 mg chloroquine phosphate base weekly; 300 mg chloroquine weekly with a daily dose of 200 mg proguanil; or, rarely, 300 mg chloroquine with 25 mg pyrimethamine and 500 mg sulfadoxine weekly.”¹

1 Lobel HO et al Lancet 1993; 341:848-51

Previous Antimalarial Policy 2004

- "Mefloquine is the OMS drug of choice in areas where chloroquine-resistant *P. falciparum* exists."
- "It is potentially more effective than doxycycline or Malarone due to the possible increased adherence associated with weekly dosing (Steffen, R. et al., 1990)."
- "Rare, severe, adverse reactions to mefloquine have been reported, the most common being idiosyncratic neuropsychiatric reactions (1/10,000-13,000 people) (Steffen, R. et al, 1993). If mefloquine cannot be taken due to co-existing medical conditions or mefloquine intolerance, alternative agents should be used. These include doxycycline and Malarone."
- "If a Volunteer experiences psychiatric symptoms such as acute anxiety, depression, restlessness or confusion, these may be considered prodromal to a more serious event. In these cases, PCMOs should discontinue the drug and substitute an alternative medication."
- "If a Volunteer has a previous history of depression, mefloquine should be used with caution."²

Current Antimalarial Policy

- Peace Corps Technical Guideline 840 (2014)
 - *Peer reviewed by 2 outside sources including CDC*
 - *Contains detailed descriptions of all antimalarial side effects for the PCMO*
- “Optimal malarial prophylaxis takes into consideration the most effective antimalarial agent, side effects and Volunteer adherence. There is no first-line drug in Peace Corps. All antimalarial drugs are utilized, as appropriate, in suppressing malaria. Drug options include chloroquine, mefloquine, doxycycline and atovaquone-proguanil (Malarone). Medical officers should, therefore, individualize their choice of chemoprophylactic agent for each Volunteer”
- All PCVs are provided a sheet “Antimalarial Chemoprophylaxis: Advantages and Disadvantages”
- All PCVs are provided a 10 Page Medication Information sheet about all 5 antimalarials
- The PCV then has a 1:1 meeting with their medical officer to discuss choice of prophylaxis

Current Policy Mefloquine

- If the PCV elects to use Mefloquine:
 - *Is provided the 3 page Mefloquine wallet card that includes detailed descriptions of all side effects*
 - *Is provided and signs a 1 page attestation that they have received the wallet card and that they will promptly report side effects and discuss alternatives with their PCMO.*
 - *All PCVs have 24/7 access to duty phone and text messaging to PCMO*
- 2019 update
 - *Adding both a PCMO checklist with mandatory 3 week follow up call and Roche checklist with contraindications & precautions*

Post Service Benefits

- All PCVs are eligible for Federal Employees Compensation Act (FECA) benefits for any illness or injury attributed to service
- FECA is administered by the Department of Labor
- Statute of Limitations is 3 Years after close of service or from the date they have symptoms and realize condition was attributable to service
- Peace Corps Medical Records are kept for 50 years after service
 - *Don't include detailed FECA information*
- Peace Corps Medical Records from 1969-2015 are paper-based and stored in a warehouse
 - *3-14d turn around to recover a record*

Post Service Benefits

- Dept. of Labor sends an aggregated report quarterly to Peace Corps of all claims
- The FECA report is queryable by name but not Dx (ICD-10)
 - How PCVs are coded is a challenge
 - Data from patient records not available just “claimed condition”
- FECA providers are not Peace Corps employees
 - Have to be FECA enrolled to provide an assessment and treatment plan

REVIEW OF PEACE CORPS LITERATURE AND DATA



-Emergence of Chloroquine prophylaxis failures among PCVs in Eastern & Central Zaire in 1982.

-Not seen in host country semi-immunes

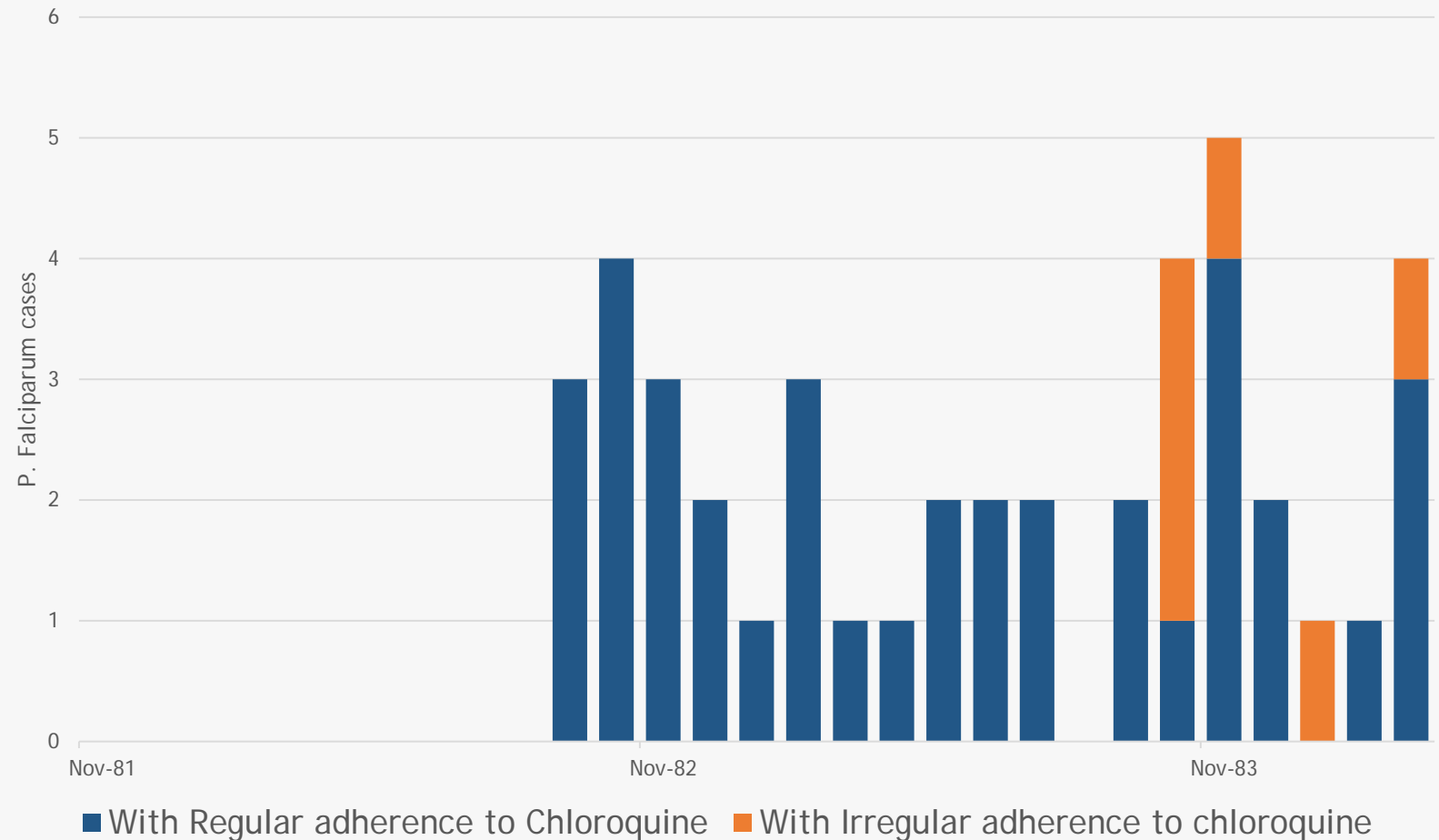
-3 PCVs had therapeutic blood level indicating adherence

-All cases responded to therapeutic chloroquine treatment

-WHO investigation no evidence in vivo or in-vitro resistance

Moran JS, Bernard KW The Spread of Chloroquine-Resistant Malaria in Africa Implications for Travelers JAMA 1989 262(2) 245-8

P. falciparum Malaria cases among PCVs in Eastern DRC 1981-4



-Spread to W Africa in late 1980s

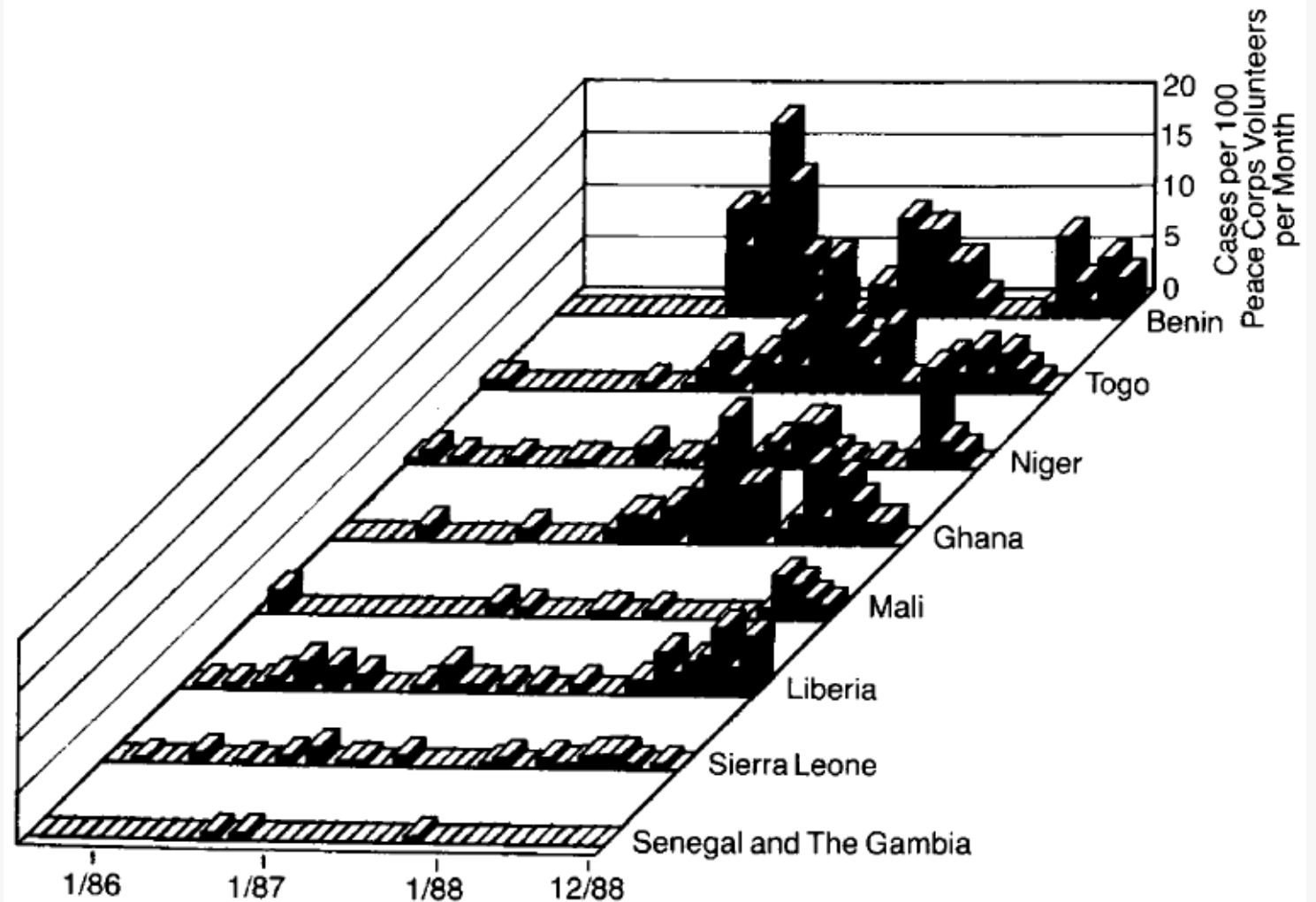
-CDC initially recommended Chloroquine
+pyrimethadine/sulfadoxine
for Chloroquine resistance
countries

-Rescinded in MMWR 1985
due to severe cutaneous
reactions for short term travel
“consider in long term travel”

-Alternate agent amodiaquine
toxic to bone marrow, not
FDA approved, Doxycycline,
‘based on limited 1970s
studies of ‘TCN’, not FDA
approved

Moran JS, Bernard KW The
Spread of Chloroquine-Resistant
Malaria in Africa
Implications for Travelers JAMA
1989 262(2) 245-8

Fig 3.—Incidence of *Plasmodium falciparum* malaria among Peace Corps volunteers in nine West African countries from September 1985 through December 1988. The z axis corresponds approximately to the country's relative longitude, with westerly countries in the foreground. All Peace Corps volunteers were advised to take chloroquine alone as prophylaxis at the beginning of the survey period. Additional chemoprophylactic drugs were recommended in Benin, Togo, Niger, Ghana, Mali, and Liberia after incidence rates increased.

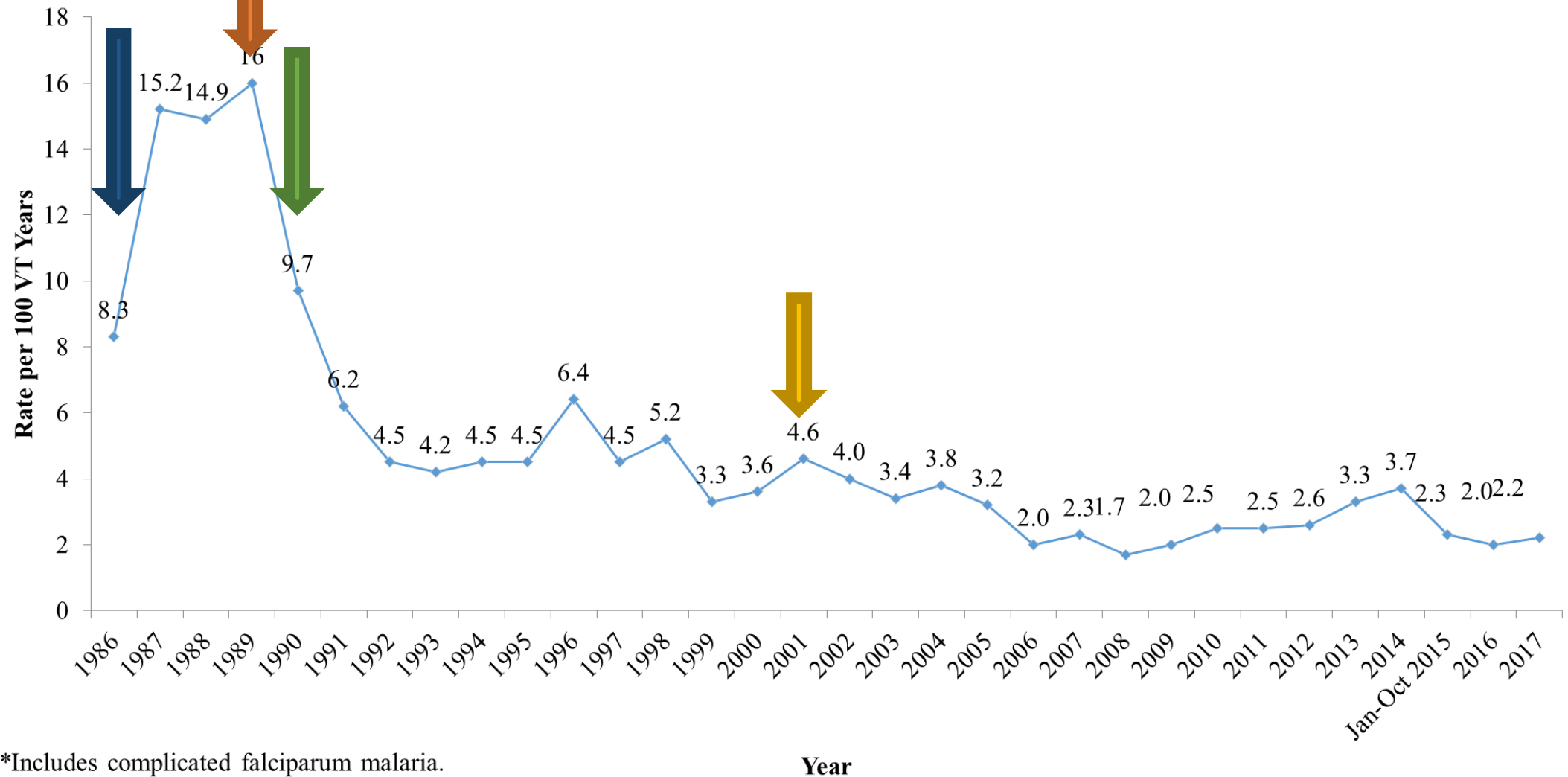


Mefloquine dosing

- Study of 1322 Volunteers in West Africa between 1989-92
- Smears and blood taken for all prophylaxis failures, as well as detailed questionnaire on adherence
- Adverse events recorded and asked at Immunoglobulin shot every 4 mos
- Mefloquine q2 wks, Mefloquine weekly, Chloroquine, CQ+ proguanil, CQ+ pyrimethamine/sulfadoxine
- Weekly mefloquine 94% more effective than chloroquine, 86% than CQ+proguanil, and 92% than q2 weekly mefloquine
- Adverse event rates similar Mefloquine and chloroquine

Lobel HO et al Long-term malaria prophylaxis with weekly mefloquine
Lancet 1993; 341:848-51

**Figure 24: Incidence of falciparum* malaria, by year — Peace Corps Volunteers/Trainees
(Africa region only), 1986-2017**



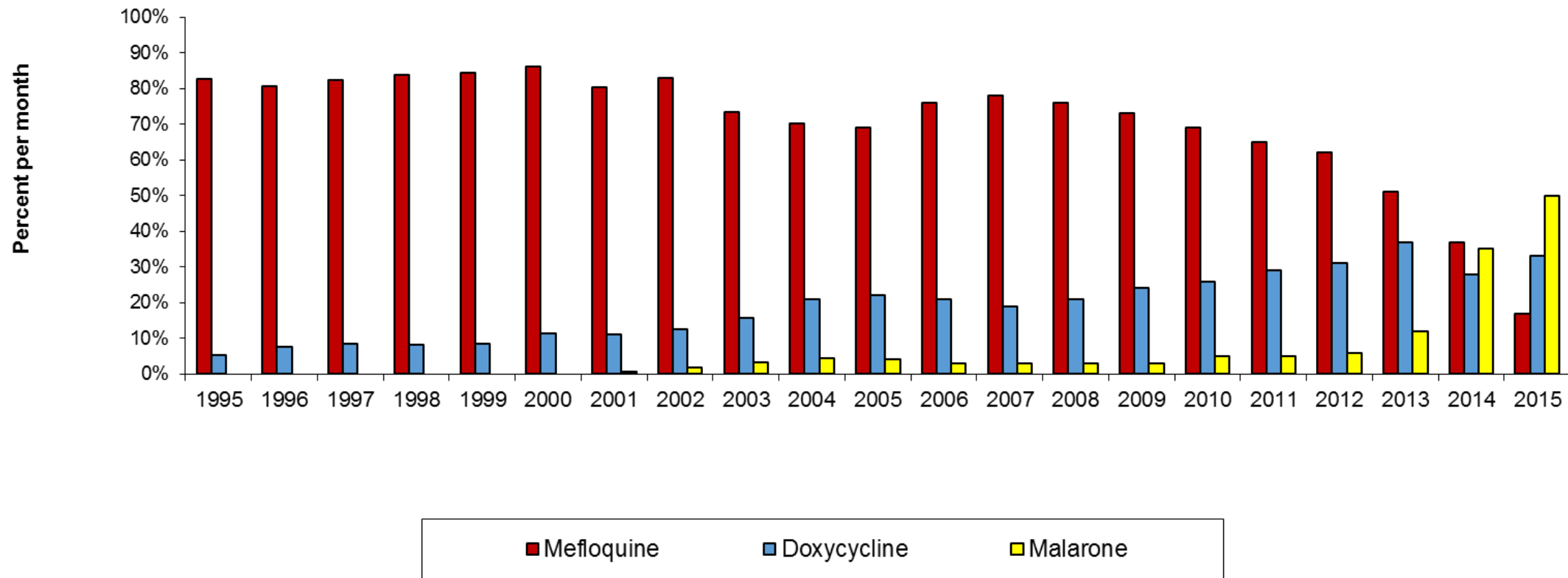
Chloroquine R spreads to
W Africa

Mefloquine FDA
available

Mefloquine
implemented by PC

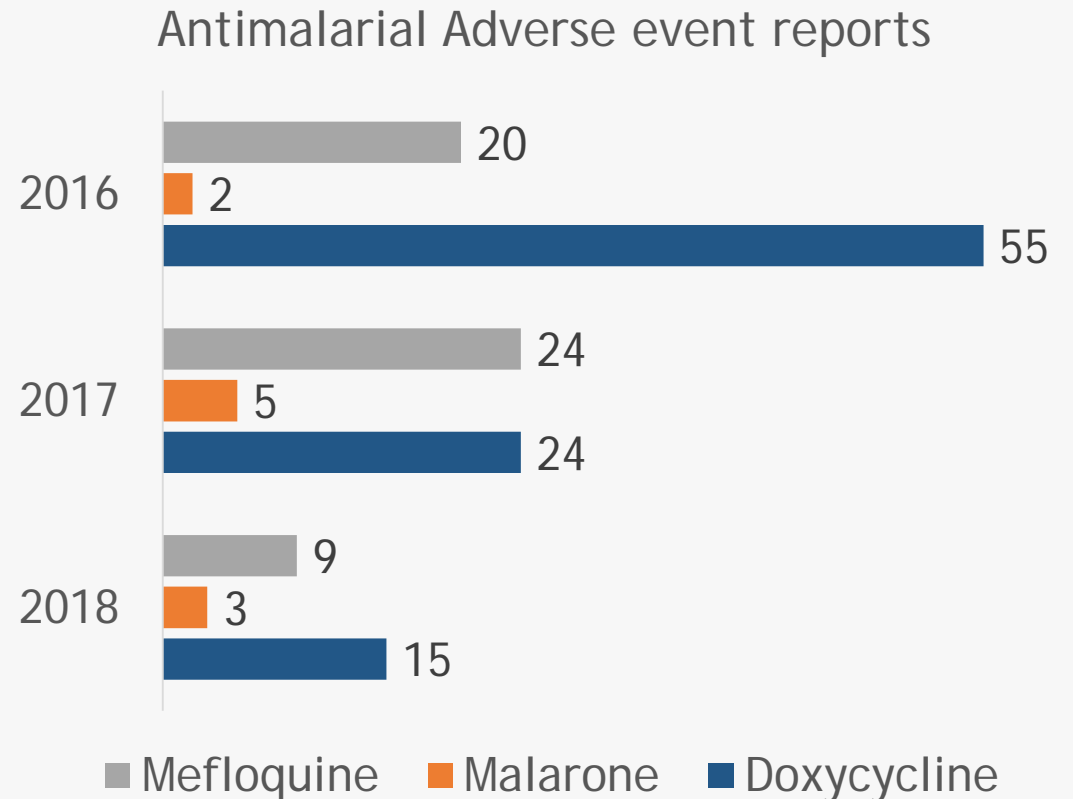
Atovaquone proguanil
implemented by PC

Percentage of Antimalarials Prescribed in Africa Region by Year 1995-2015



Adverse events of antimalarials 2016-18

- Peace Corps captures adverse events for anti-malarials in its EMR PCMEDICS
- Mefloquine: Infrequent generally mild, medication stopped in all instances
- Mefloquine: Dizziness, vertigo, anxiety, decreased visual acuity
- Mefloquine: 1 Medevac 2017 major depression, suicidal ideation, improved within days then resolved with change to malarone and with counselling. PCV returned to service to complete 27 mo tour



Mefloquine in the field

- Paper detailing health issues among 69 PCVs over 2 years in Madagascar 1999-2001
- 1 Confirmed and 10 presumed cases Malaria (16%)
- 14/69(20%) of PCVs reported mild-moderate intolerance of Mefloquine
- 11 were switched to doxycycline and 3 to Chloroquine
- 7 of PCVs on Doxycycline requested to go back on Mefloquine and successfully completed service

Leutscher PDC, Bagley SW Health-related Challenges in United States
Peace Corps Volunteers Serving for Two Years in Madagascar
J Travel Med 2003; 10: 263-267

Adverse effects of Antimalarials

- 2701 Surveys of PCVs regarding antimalarial side effects
- 62% reported some adverse event, mefloquine and doxycycline were similar % of users (69 vs 62%)
- Only 23% had to stop/change medication
- Intolerable adverse events 9% of all respondents
 - *Similar mefloquine(11%) & doxycycline(10%)*
 - *Similar sought medical care mefloquine 35% doxyxycline 31%*
 - *Hospitalizations similar mefloquine 1% doxycycline 2%*
- 43% response rate (potential bias), responses self reported, variability in definition of mild/severe

Antimalarial Adherence

- 2013 Survey by CDC of 3248 PCVs in 23 African countries
- 781 respondents from fully endemic countries (34%)
- 49% Mefloquine, 39% doxycycline, 12% Atovaquone/proguanil
- 73% took meds as directed (90% of A/P users, 84% mefloquine, 60% doxy)
- No sex differences, worst adherence in 22-25 y/o, >1 yr in country
- Nonadherence due to
 - *Forgetting(travel), fear of long term side effects, current side effects, not worried about malaria, belief could get immunity*
- 49% reported side effects (61% mefloquine, 37% doxy, 2% A/P users)

Malaria Summit

- December 2013 Summit of CDC, State Department and Peace Corps
- Review Landman Survey and DOS survey results on reasons for non-adherence
- Address changing the culture of Malaria Prevention, education for pre-deployment and in-service training, re-examine mefloquine safe usage.
- CDC Long term effects survey
- Peace Corps/DOS “kNOwMalaria video”
 - *Real stories of survivors and families of deceased victims of Malaria*
- Rework training for malaria adherence
- Redo TG814 to reflect current policy

Long Term Effects Survey

- 8,931 Returned Peace Corps Volunteers who served 1995-2014.
- 57% of the respondents took antimalarials to prevent malaria.
- Of those on malaria chemoprophylaxis, 61% reported good adherence (taking it as prescribed or most of the time).
- Compared to those who used other antimalarials, mefloquine users had the best adherence (67% vs 36% Chloroquine, 65% Doxycycline, 61% malarone)
- 19% had to change regimens, usually for side effects, doxycycline was most common replacement medication

Tan K, etal. Long term health outcomes among Returned Peace Corps Volunteers after malaria prophylaxis, 1995-2014 Travel Med Infect Dis. 2017 ;17 :50-5

Long Term Effects Survey

- Overall, people with existing psychologic conditions were less likely to be given mefloquine, (PCMOs follow recommendations to screen for pre-existing psychiatric conditions)
- GI disease 1.4x more prevalent in Chloroquine users, Insomnia 1.27x more prevalent in doxycycline users
- 1.14 to 1.19x increased likelihood of psychiatric diagnoses after Peace Corps service among mefloquine users, **when those with a past psychiatric history were excluded from the analysis, there was no difference in psychiatric outcomes.**