**Economics of Malaria Prevention in United States Travelers to West Africa: Technical Appendix and Supplemental Material**

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**Key points:** Costs and benefits of malaria prevention provided during domestic pre-travel health consultations. Healthcare payers always, and travelers often, save money when travelers adhere to malaria recommendations and prophylactic regimens in West Africa, especially for longer durations of travel.

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**Component Parts of Model Equation**

**Model Equation**

Final outcome measures from the healthcare payer’s (payer) and traveler’s perspectives were net costs or savings using this equation:

Net costs or savings per traveler (expected value) =

Reduced risk of malaria resulting from pre-travel health consultation **+** chemoprophylaxis adherence

**X**

Cost of malaria treatment **–** [Cost of pre-travel health consultation **+** chemoprophylaxis]

1. **Identification of Travelers to West Africa in the Global TravEpiNet (GTEN) Consortium data**

We only included travelers visiting GTEN practices who planned to visit one or more countries in West Africa. Excluding travelers visiting areas outside West Africa enabled estimates of the probability of contracting malaria for the traveler during their stays in West Africa. Further, only travelers to only West Africa were included because the GTEN data collection tool collects only total planned trip duration, and we were unable to divide the length of stay in each country if the traveler visited more than one. For example, a traveler who planned to visit Nigeria and Ghana, which are both in West Africa, was included in the analysis, whereas a traveler to Nigeria and India was not because the travel to India could not be separated from the travel to Nigeria.

Travelers were grouped further based on their purposes of travel. In the pre-travel health consultation, travelers were asked to self-report their purpose(s) of travel from the following list (multiple choices were allowed): leisure, business, returning to region of origin of self or family to visit friends and relatives (VFR), adoption, providing medical care, receiving medical care, research/education, nonmedical service work, missionary work, military service, adventuring, attending large gathering or event, or other activities.[8](#_ENREF_8) For this analysis, we considered the following groups of travelers:

1. Travelers to West Africa who reported only one of the following three purposes
   1. Business
   2. Leisure
   3. VFR
2. All travelers to West Africa, regardless of their listed purpose(s) of travel.

We call this group “All Purposes” in Tables 4, 5, A1, A2, A3, A5, and Figures2 and 3.

Business, leisure, and VFR travelers were chosen specifically because they represented the most common purposes of travel and these groups had observable differences that affected the estimation of net costs/savings, specifically different median planned trip durations and types of malaria chemoprophylaxis prescribed (Table A1). The median planned trip duration was used to adjust the probability of contracting malaria; business travelers took shorter trips (median 9 days), while VFR travelers took longer trips (median 30 days).

Further, many (65%) VFR travelers were prescribed mefloquine, while most business travelers (85%) were prescribed atovaquone/proguanil. Doxycycline was the least used malaria chemoprophylaxis. Travelers who were prescribed another chemoprophylaxis or more than one drug (about 3 % of travelers to West Africa) were omitted to calculate the frequency.

1. **Direct Costs for Pre-travel Health Consultations**

**2.1 Travel Clinic Visit**

From the healthcare payer’s perspective, the weighted average cost of travel clinic visits for pre-travel consultations was estimated at $148 based on the use of Current Procedural Terminology (CPT) codes in common use by the GTEN practices and the range of allowable billing charges associated with those CPT codes.[14](#_ENREF_14) We estimated that 14.8% of the entire pre-travel health consultation (see next subsection for derivation of the rate) was specific to malaria prevention, so the prorated cost specifically for malaria prevention was estimated at $22 (=0.148 x $148) (Table A2).

From the traveler’s perspective, co-payment for the pre-travel health consultation was set at $30. The prorated malaria prevention-specific co-payment was estimated to be $4 (=0.148 x $30) (Table A3).

**2.2 Derivation of the Proportion of Malaria Prevention (14.8%) Relative to Total Time of Pre-Travel Health Consultation**

The weighted average time of a pre-travel health consultation was estimated at 32 minutes based on the use of CPT codes in GTEN practices and corresponding physician time.[14](#_ENREF_14)

The 32 minutes were divided equally:

* The first 10.7 minutes to review the traveler’s medical history and itinerary
* The second 10.7 minutes to review topics related to vaccination.
* The third 10.7 minutes to discuss chemoprophylaxis and behavior/activity modification during trip

On average, the clinician’s discussed 7 items related to behavior/activity modification with the traveler, such as food and water precautions and injury prevention, and provided 2 prescriptions, such as malaria chemoprophylaxis and an antibiotic for diarrhea. Only 2 of the 9 topics covered in these exams were considered directly related to malaria prevention:

* Malaria chemoprophylaxis (e.g., drug regimen, adherence, adverse events)
* Behavior modification, including wearing protective clothing, the use of bed nets, and the prevention of insect bites by using insect repellents.

On this basis, we assumed that 2/9=0.22 of the first 10.7-minute review of general information was related to malaria prevention (e.g., travel destination found in malaria-endemic area). Therefore, total time related to malaria prevention was estimated at 4.7 minutes (=21.4 x 0.22; or 14.8% (=4.7/32) of the total 32-minute pre-travel health consultation.

**2.3 Costs of Malaria Chemoprophylaxis**

From the payer’s perspective, weighted average costs of malaria chemoprophylaxis for each group, categorized by purpose of travel, was estimated in two steps:

1. Median trip duration and the following adult dose regimens[1](#_ENREF_1)
   * Atovaquone/proguanil, 250mg atovaquone and 100mg proguanil hydrochloride, 1 tablet orally, daily, for 2 days before, through 7 days after travel
   * Doxycycline, 100mg orally, daily, for 2 days before, through 4 weeks after travel
   * Mefloquine, 228mg base (250mg salt) orally, once a week, for 2 weeks before, through 4 weeks after travel

For example, the median planned trip duration for leisure travelers was 14 days, so the cost of chemoprophylaxis for each drug was calculated as:

* + Atovaquone/proguanil: $7.87 x (2+14+7) = $181.01
  + Doxycycline: $1.08 x (2+14+28) = $47.52
  + Mefloquine: $13.17 x (2+2+4) = $105.36

1. We then calculated the weighted average cost by using the frequency of prescription (Table A1) as a weight. For example, for leisure traveler, weighted average cost of malaria chemoprophylaxis was $161 (=$181.01 x 0.758 + $47.52 x 0.03 + $105.36 x 0.212) (Table A2).

For the traveler’s perspective, the cost of malaria chemoprophylaxis was set at $25 co-payment for prescription (Table A3) for all groups regardless of purpose of travel.

**2.4 Treatment Costs for an Adverse Event Associated with Malaria Chemoprophylaxis**

The costs to treat an adverse event associated with malaria chemoprophylaxis were estimated based on the assumption, provided by expert opinion, that a traveler would need one physician office visit (CPT 99201 level 1) and a prescription for a drug against vomiting and nausea (prochlorperazine 10mg, 3times a day for 4 days).

From the payer’s perspective, the sum of costs for a physician visit and prescription drugs were then $92 (= $80.5 + $11.5, Table 3). The cost was further adjusted by the weighted average probability of prophylaxis-related adverse event requiring medical attention (e.g., $92 x 0.078 = $7.15 for leisure travelers) (Table A2).

From the traveler’s perspective, the costs were calculated as the sum of co-payment for physician visit and cost of prescription drug which was $31.50 (=$20 + $11.50, Table 3). Because the estimated drug cost was lower than the prescription co-payment ($25), we used the cost of drug for the calculation. The result was further adjusted by the weighted average probability of adverse events (e.g., $31.5 x 0.078 = $2.46) (Table A3).

1. **Estimation of Traveler’s Compensation (Wage plus Non-Wage Benefits)**

In order to obtain a representative estimate of hourly compensation (i.e., wage plus non-wage benefits) for U.S. travelers, we used data from two secondary sources. One was the survey report of travelers’ occupation obtained by the Office of Travel and Tourism Industries (OTTI), Department of Commerce.[25](#_ENREF_25) The other was Occupational Employment Statistics (OES) for national average hourly wage data obtained by Bureau of Labor Statistics, Department of Labor.[26](#_ENREF_26)

Occupational categories in the OTTI report that contained more than 10 percent of travelers were included in our calculations, i.e., Professional/Technical (39%), Manager/Executive (22%), Retired (11%), and Student (10%).[25](#_ENREF_25) These percentages were used as weights for estimating a representative weighted average wage for U.S. international travelers.

We used OES data for average wages for the first two OTTI occupational categories of Professional/Technical and Manager/Executive (Table A4). For retired and student travelers wages, we used a value of $6.90, the average of federal minimum wages of $6.55 before July 2009 and $7.25 after July 2009. The final estimate of weighted average hourly wages was $22.86 (= $30.97 x 0.39 + $42.41 x 0.22 + $6.90 x 0.11 + $6.90 x 0.1).

Employee compensation was adjusted to include non-wage benefits by adding 30.3% [28](#_ENREF_28) for a total hourly compensation of $32.79 (=$22.86/(1-0.303)).

1. **Indirect Costs for Pre-travel Health Consultations**

Indirect costs for the pre-travel health consultations were estimated as lost compensation for time off work due to travel clinic physician office visits in the case of treatment for an adverse event. We assumed that time off work was 120 minutes for a travel clinic visit and 60 minutes for a physician office visit. With the estimated hourly compensation rate of $32.79, costs from lost work hours were estimated at $65.57 for a travel clinic visit and $32.79 for a physician office visit (Table 2).

Time off for the travel clinic visit was further prorated by 14.8% to account for malaria prevention, thus $65.57 x 0.148 = $9.71 (Table A3). Time off for a physician visit for an adverse event was adjusted by the weighted average probability of chemoprophylaxis-related adverse events, for example, $32.79 x 0.078 = $2.56 for leisure travelers (Table A3).

1. **Direct Malaria Treatment Costs from the Healthcare Payer’s Perspective (Table 3)**

**5.1 Physician Office Visits**

We estimated the costs of physician office visits based on the range of allowable billing charges associated with the following CPT codes[14](#_ENREF_14):

* Initial visit:$292 (range: $247 - $337) for CPT99205, office or other outpatient services, new patient level 5
* Each additional visit:$69.50 (range: $59 - $80) for CPT99212, office or other outpatient services, established patient level 2

From the traveler’s perspective, co-payment was set at $20 for every physician office visit.

**5.1.1 Ambulatory Care**

The cost of a physician visit for an ambulatory care was estimated by summing the individual charges of three visits (initial admission, diagnosis based on laboratory tests, and follow-up). The cost for physician visits from the payer’s perspective was calculated as $292 + ($69.5 x 2) = $431.

From the traveler’s perspective, the cost was calculated as $20 x 3 = $60.

**5.1.2 Hospitalized Care**

The cost of physician visits for a hospitalized case was estimated by summing the individual costs of two visits (initial admission and follow-up). The cost for physician visits from the payer’s perspective was calculated as $292 + $69.50 = $361.50.

The cost was calculated as $20 x 2 = $40 for the traveler’s perspective.

**5.2 Laboratory Tests**

**5.2.1 Ambulatory Care**

From the payer’s perspective, laboratory test costs were estimated using the the ranges of allowable billing charges by CPT:

* CPT87207 (Blood film) for malaria: $52.50 (range: $46 - $59)

From the traveler’s perspective, the test cost was assumed to be covered by his/her health insurance.

**5.2.2 Hospitalized Care**

For both study perspectives, the laboratory test costs were included in hospitalization costs.

**5.3 Prescription Drugs**

**5.3.1 Ambulatory Care**

We estimated a weighted average drug cost for malaria treatment prescribed for ambulatory patients using drugs normally recommended for uncomplicated malaria with *P*. *malariae*, *P*. *ovale*, and *P*. vivax. [17](#_ENREF_17) The price weights were the frequency of the types of malaria cases among U.S. travelers to West Africa.[7](#_ENREF_7) The figure used was $41.75 (range: $32-$51.5).

From the traveler’s perspective, these drug costs were assumed to be covered by traveler’s health insurance, and the traveler pays the co-payment of the prescription of $25.

**5.3.2 Hospitalized Care**

For both study perspectives, the costs of prescription drugs for treatment were included in hospitalization costs.

**5.4 Hospitalization Costs and Inpatient Physician Services**

From the payer’s perspective, the cost of hospitalization was obtained from Nationwide Inpatient Sample (NIS).[16](#_ENREF_16) Data for malaria (*P*. *falciparum*) were extracted from the NIS database by using the International Classification of Diseases, Ninth Revision (ICD-9) code of 084.0. The mean hospitalization cost was $29,320 with the range of $8,545 (5 percentile) and $33,906 (95 percentile). *P*. *falciparum* was selected because it is the most common type of malaria among U.S. travelers returning from West Africa.[7](#_ENREF_7) Because the hospitalization cost data in NIS do not include inpatient physician service charges[29](#_ENREF_29), these were assumed to be 20% of hospitalization costs.[18](#_ENREF_18)

From the traveler’s perspective, we assumed that hospitalization costs were covered by health insurance; thus the traveler paid the co-payment of $250 for hospital room and board. Inpatient physician services were also covered by the health insurance, and a traveler paid 20% coinsurance of inpatient physician service charges.

1. **Indirect Costs for Malaria Treatment**

Time off work was evaluated at an estimated hourly compensation of $32.79 for the following: three visits for an ambulatory case and two visits for hospitalization. Hours of lost work days were estimated based on 8-hour work day.

* Physician office visits for both ambulatory and hospitalized cases
  + Ambulatory case: (90/60 x $32.79) + (60/60 x 2 x $32.79) = $114
  + Hospitalized case: (90/60 x $32.79) + (60/60 x $32.79) = $82
* Medical care at hospital and recuperation
  + Ambulatory - 5 days : (5 x 8) x $32.79 = $1311
  + Hospitalization - 10 days (includes in patient and home recovery) : (10 x 8) x $32.79 = $2622

1. **Weighted Average Costs for Malaria Treatment from the perspectives of Healthcare Payer and Traveler**

Based on the itemized costs explained in the previous sections in the Appendix, from the payer’s perspective, a weighted average (direct medical) costs for malaria treatment was estimated as

0.71 x [($292 + $69.5) + $29320 + 0.2 x $29320]+

Hospitalized care

(1-0.71) x [($292 + $69.5x2) + $52.5 + $41.75] ≈ $25250.

Ambulatory care

From the traveler’s perspective, it was

0.71 x [$20 x 2 + $250 + 0.2 x (0.2 x $29320) + $32.79x(10x8) + $32.79x(1.5+1)] +

Hospitalized care

(1-0.71) x [$20x3 + $25 + $32.79x(5x8) + $32.79x(1.5+1x2)] ≈ $3387.

Ambulatory care

1. **Estimation of Break-even Risk of Contracting Malaria in West Africa**

The break-even risk point is defined as the point at which net saving/cost is equal to zero:

[($ of malaria treatment without pre-travel) – ($ of malaria treatment with pre-travel)] – ($ of pre-travel) = 0

where “$” denotes costs and “pre-travel” denotes pre-travel health consultations.

Given the assumption of complete adherence to malaria chemoprophylaxis regimens, the equation can be rewritten as

($ of malaria treatment) x (risk of contracting malaria without chemoprophylaxis) – ($ of malaria treatment) x (risk of contracting malaria without chemoprophylaxis) x (1 – Efficacy of prophylaxis) = ($ of pre-travel)

Factoring out the common components in the left side of the equation, we have

($ of malaria treatment) x (risk of contracting malaria without chemoprophylaxis) x (Efficacy of prophylaxis) = ($ of pre-travel)

Solving the equation for the risk of contracting malaria, we get

(Break-even risk of contracting malaria without chemoprophylaxis) =

($ of pre-travel) / [($ of malaria treatment) x (Efficacy of prophylaxis)]

**Table A1. Median Planned Length of Travel and Frequency of Malaria Chemoprophylaxis Prescribed among Travelers to West Africa in the GTEN Data Seta**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Purpose of Travelb** | | | |
|  | **Business** | **Leisure** | **All purposes** | **VFRb** |
| Median planned length of travel | 9 days | 14 days | 21 days | 30 days |
| Prescription frequencyc | | | | |
| Atovaquone/proguanil | 85.2% | 75.8% | 59.2% | 28.6% |
| Doxycycline | 6.6% | 3.0% | 6.1% | 6.5% |
| Mefloquine | 8.2% | 21.2% | 34.7% | 64.9% |

a West Africa included Benin, Burkina Faso, Cape Verde, Côte d’Ivoire, The Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, São Tomé and Príncipe, Senegal, Sierra Leone, and Togo.[1](#_ENREF_1) Travelers to West Africa were identified as those travelers who planned to visit one or more countries only in West Africa (Appendix Section 1).

b For their pre-travel health consultations, travelers were asked to report their purpose(s) of travel from the following (multiple choices were allowed): leisure, business, returning to region of origin of self or family to visit friends and relatives (VFR), adoption, providing medical care, receiving medical care, research/education, nonmedical service work, missionary work, military service, adventuring, attending a large gathering or event, or other activities. For this analysis, travelers who reported only one of the three purposes (i.e., business, leisure, or VFR) were selected. All purposes denote all travelers to West Africa.

c The frequencies were calculated among travelers who were prescribed one of the above three chemoprophylaxis options. Travelers who were prescribed another chemoprophylaxis or more than one chemoprophylaxis consisted about 3% of travelers to West Africa and were omitted to calculate the frequency in the table.

**Table A2. From Healthcare Payer Perspective: Direct Costs of Pre-travel Health Consultation, Malaria Chemoprophylaxis, and Treatment of Adverse Events associated with Malaria Chemoprophylaxis for Travelers to West Africaa**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Purpose of travelb and median planned length of travelc | | | |
|  | Business | Leisure | All purposes | VFRb |
|  | 9 days | 14 days | 21 days | 30 days |
| Weighted average probability of chemoprophylaxis-related adverse events requiring medical attentiond | 0.072 | 0.078 | 0.086 | 0.100 |
| Explanation of Results: 1) Cost of travel clinic visit for pre-travel consultation from Table 2; 2) Prorated cost of travel clinic visit for pre-travel clinic visit related to malaria prevention (i.e., 0.148 x $148.52); 3) Weighted average cost of malaria chemoprophylaxis based on the median planned length of travel from Tables 2 and A1; 4) Cost of physician visit and drug for treatment of an adverse event associated with malaria chemoprophylaxis from Table 2; 5) Risk adjusted cost of an adverse event (e.g., 0.072 x $92); 6) Total cost of pre-travel consultation, chemoprophylaxis, and treatment of an adverse event (the sum of #2, #3, and #5) | | | | |
| 1. Cost of travel clinic visit for pre-travel consultation, $ | 148.52 | | | |
| 2) Prorated cost of travel clinic visit for pre-travel consultation related to malaria prevention, $e | 22.00 | | | |
| 3) Weighted average cost of malaria chemoprophylaxis for the median planned length of travel, $d,f | 132.80 | 160.61 | 177.66 | 175.84 |
| 4) Cost of physician visit and drug for treatment of an adverse event associated with malaria chemoprophylaxis (cost of an adverse event), $ | 92.00 | | | |
| 5) Risk-adjusted cost of an adverse event, $ | 6.62 | 7.15 | 7.93 | 9.18 |
| **6) Total cost of pre-travel health consultation, chemoprophylaxis, and treatment of an adverse event, $** | **161.42** | **189.76** | **207.59** | **207.03** |

a Costs were in 2009 dollars. West Africa included Benin, Burkina Faso, Cape Verde, Côte d’Ivoire, The Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, São Tomé and Príncipe, Senegal, Sierra Leone, and Togo.[1](#_ENREF_1) Travelers to West Africa were identified as those travelers who planned to visit one or more countries only in West Africa (Appendix Section 1).

b For their pre-travel health consultations, travelers were asked to report their purpose(s) of travel from the following (multiple choices were allowed): leisure, business, returning to region of origin of self or family to visit friends and relatives (VFR), adoption, providing medical care, receiving medical care, research/education, nonmedical service work, missionary work, military service, adventuring, attending large gathering or event, or other activities. For this analysis, travelers who reported only one of the three purposes (i.e., business, leisure, and VFR) were selected. All purposes denote all travelers to West Africa.

c The median planned length of travel for each category of the purposes of travel was calculated among travelers to West Africa (Table A1).

d The frequency of chemoprophylaxis prescription (Table A1) was used as weights.

e14.8% of time for pre-travel health consultations was estimated to be associated with malaria prevention, i.e., protocol of chemoprophylaxis and advice regarding activities/behaviors during travel, for example, wearing proper clothing.

f The costs were calculated based on the following adult dose regimens: 1) Atovaquone/proguanil, daily, begin 2 days before travel until 7 days after travel; 2) Doxycycline, daily, begin 2 days before travel until 4 weeks after travel; and 3) Mefloquine, once a week, begin 2 weeks before travel until 4 weeks after travel.[1](#_ENREF_1)

**Table A3. From Traveler’s Perspective: Direct and Indirect Costs of Pre-travel Health Consultation, Malaria Chemoprophylaxis, and Treatment of an Adverse Event associated with Malaria Chemoprophylaxis for Travelers to West Africaa**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Purpose of travelb and median planned length of travelc | | | |
|  | Business | Leisure | All purposes | VFRb |
|  | 9 days | 14 days | 21 days | 30 days |
| Weighted average probability of prophylaxis-related adverse events requiring medical attentiond | 0.072 | 0.078 | 0.086 | 0.100 |
| For explanations 1) through 5), see Table A2.6) Costs of lost work hours to visit a travel clinic from Table 2; 7) Prorated cost of lost work hours due to travel clinic visit related to malaria prevention (i.e., 0.148 x $65.57); 8) Costs of lost work hours to visit a physician office associated with treatment of an adverse event from Table 2; 9) Risk adjusted costs of lost work hours for physician visit due to an adverse event (e.g., 0.072 x $32.79); and 10) Total cost of pre-travel consultation, chemoprophylaxis, and treatment of an adverse event (the sum of #2, #3, #5, #7, and #9). | | | | |
| **Direct costs** |  | | | |
| 1) Cost (co-payment) of travel clinic visit for pre-travel consultation, $ | 30.00 | | | |
| 2) Prorated cost of travel clinic visit for pre-travel consultation related to malaria prevention, $e | 4.44 | | | |
| 3) Cost (co-payment) of malaria chemoprophylaxis, $ | 25.00 | | | |
| 4) Cost (co-payment) of physician visit and drug for treatment of an adverse event associated with malaria chemoprophylaxis (cost of an adverse event), $ | 31.50 | | | |
| 5) Risk-adjusted costs of an adverse events, $ | 2.27 | 2.46 | 2.71 | 3.15 |
| **Indirect costs (lost wages)** |  |  |  |  |
| 6) Lost work hours for travel clinic visit, $ | 65.57 | | | |
| 7) Prorated lost work hours for travel clinic visit, $e | 9.71 | | | |
| 8) Lost work hours for physician visit – an adverse event associated with malaria chemoprophylaxis, $ | 32.79 | | | |
| 9) Risk adjusted lost work hours for physician visit due to an adverse event, $ | 2.36 | 2.56 | 2.82 | 3.28 |
| **10) Total cost of pre-travel health consultation, chemoprophylaxis, and treatment of an adverse event, $** | **43.78** | **44.15** | **44.70** | **45.58** |

a Costs were in US 2009 dollars. West Africa includes Benin, Burkina Faso, Cape Verde, Côte d’Ivoire, The Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, São Tomé and Príncipe, Senegal, Sierra Leone, and Togo. Travelers to West Africa were identified as those travelers who planned to visit one or more countries only in West Africa (Appendix Section 1).

b For their pre-travel health consultations, travelers were asked to report their purpose(s) of travel from the following (multiple choices were allowed): leisure, business, returning to region of origin of self or family to visit friends and relatives (VFR), adoption, providing medical care, receiving medical care, research/education, nonmedical service work, missionary work, military service, adventuring, attending large gathering or event, or other activities. For this analysis, travelers who reported only one of the three purposes (i.e., business, leisure, and VFR) were selected. All purposes denote all travelers to West Africa.

c The median planned length of travel for each category of the purposes of travel was calculated among travelers to West Africa (Table A1).

d The frequency of chemoprophylaxis prescription (Table A1) was used as weights.

e14.8% of time for pre-travel health consultations was estimated to be associated with malaria prevention, i.e., protocol of chemoprophylaxis and advice regarding activities/behaviors during travel, for example, wearing proper clothing.

**Table A4. Selected Occupation Categories in Office of Travel and Tourism Industries (OTTI) Survey and Their Matched Categories from Occupational Employee Statistics (OES) and Average Hourly Wage**

|  |  |  |  |
| --- | --- | --- | --- |
| **Occupation Categories in OTTI Survey**[**25**](#_ENREF_25) | **Matched Occupation Categories from OES**[**26**](#_ENREF_26) | **National Average Hourly Wage from OES**[**26**](#_ENREF_26) **(US $2009)** | **Average Hourly Wage (US $2009)** |
| Professional/ Technical | Computer and Mathematical Science Occupations | 36.68 | 30.97 |
| Architecture and Engineering Occupations | 35.38 |
| Life, Physical, and Social Science Occupations | 31.57 |
| Arts, Design, Entertainment, Sports, and Media Occupations | 24.87 |
| Healthcare Practitioner and Technical Occupations | 33.51 |
| Education, Training, and Library Occupations | 23.81 |
| Manager/Executive | Management Occupations | 49.47 | 42.41 |
| Business and Financial Operations Occupations | 31.68 |
| Legal Occupations | 46.07 |

**Table A5. One-way Sensitivity Analyses: Net Savings per Traveler per Trip to West Africa and Break-even Risk of Contracting Malaria by Altering the Type of Malaria Chemoprophylaxis (US$2009)a**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Purpose of travelb and median planned length of travelc | | | |
|  | Business | Leisure | All purposes | VFRb |
|  | 9 days | 14 days | 21 days | 30 days |
| **HEALTHCARE PAYER PERSPECTIVE** | | | | |
| **Net savings per traveler per trip to West Africad** | | | | |
| Baseline analysis (Table 5) based on weighted average of three malaria chemoprophylaxis | $13.65 | $82.32 | $199.14 | $371.64 |
| Atovaquone/proguanil only | $5.51 | $63.72 | $145.22 | $250.00 |
| Doxycycline only | $100.10 | $189.01 | $313.47 | $473.50 |
| Mefloquine only | $35.75 | $131.99 | $253.55 | $400.44 |
| **Break-even risk of contracting malariae (per 1000 with median planned length of travel)** | | | | |
| From baseline analysis based on weighted average of three malaria chemoprophylaxis | 6.7 | 7.9 | 8.6 | 8.7 |
| Atovaquone/proguanil only | 7.0 | 8.7 | 10.9 | 13.9 |
| Doxycycline only | 3.0 | 3.2 | 3.5 | 3.9 |
| Mefloquine only | 5.8 | 5.8 | 6.3 | 7.4 |
| **TRAVELER’S PERSPECTIVE** |  |  |  |  |
| **Net costs/savings per traveler per trip to West Africa** | | | | |
| Baseline analysis (Table 5) based on weighted average of three malaria chemoprophylaxis | $20.30  (Net costs) | $7.66  (Net costs) | $9.86  (Net savings) | $32.04  (Net savings) |
| Atovaquone/proguanil only | $20.10  (Net costs) | $7.02  (Net costs) | $11.30  (Net savings) | $34.86  (Net savings) |
| Doxycycline only | $20.25  (Net costs) | $7.60  (Net costs) | $10.11  (Net savings) | $32.88  (Net savings) |
| Mefloquine only | $23.00  (Net costs) | $10.09  (Net costs) | $7.98  (Net savings) | $31.22  (Net savings) |
| **Break-even risk of contracting malariae (per 1000 with median planned length of travel)** | | | | |
| Baseline analysis based on weighted average of three malaria chemoprophylaxis | 13.5 | 13.7 | 13.9 | 14.2 |
| Atovaquone/proguanil only | 13.5 | 13.5 | 13.5 | 13.5 |
| Doxycycline only | 13.7 | 13.7 | 13.7 | 13.7 |
| Mefloquine only | 14.4 | 14.4 | 14.4 | 14.4 |

NOTE: 100% adherence for malaria chemoprophylaxis regimens was assumed. Input and cost parameters were set at their baseline values, except for efficacy and costs of malaria chemoprophylaxis.

a Costs were in 2009 dollars. West Africa included Benin, Burkina Faso, Cape Verde, Côte d’Ivoire, The Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, São Tomé and Príncipe, Senegal, Sierra Leone, and Togo.[1](#_ENREF_1) Travelers to West Africa were identified as those travelers who planned to visit one or more countries only in West Africa (Appendix Section 1).

b For their pre-travel health consultations, travelers were asked to report their purpose(s) of travel from the following (multiple choices were allowed): leisure, business, returning to region of origin of self or family to visit friends and relatives (VFR), adoption, providing medical care, receiving medical care, research/education, nonmedical service work, missionary work, military service, adventuring, attending large gathering or event, or other activities. For this analysis, travelers who reported only one of the three purposes (i.e., business, leisure, and VFR) were selected. All purposes denote all travelers to West Africa.

c The median planned length of travel for each category of the purposes of travel was calculated among travelers to West Africa (Table A1).

d Values indicated a net saving to the healthcare payer.

e Break-even risk was estimated by setting net saving/cost equal to zero.

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