Travel associated health risks

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Potential links of Interests

• In the past 3 years, I (or my department) have received honoraria from pharmaceutical companies (BMS, Baxter) for lectures on STDs as well as for participation in vaccine advisory boards (HPV, TBE)

• I am the Editor in Chief of the Journal of Travel Medicine (IF = 1.74)
Estimation du risque en médecine des voyages

• Un point commun épidémiologique : la fenêtre réduite d’exposition au risque = le voyage

• Un manque commun méthodologique : l’absence de dénominateur = le nombre de voyageurs pour une destination donnée

• Un bénéfice en terme d’ évaluation des maladies tropicales en dehors de leur contexte tropical
Estimation of Travel associated Health risks

- Case reports
- Case series
- Cross-sectional design
- Cohort study
- Notifiable disease
- Sentinel Networks
- Case – control studies
- Randomized trial

Cohort study: the Gold Standard

- > 10,000 Worldwide Swiss travellers
- Questionnaire study; Swissair; 74% answered
- Health problems: 15%; Medical consultation: 8%; Unable to work: 3% (median duration: 15 days)
- Estimation of monthly incidence of many Travel associated diseases (TrD, malaria, respiratory tract infections...) based on 10 confirmed cases of hepatitis (A or B), 8 confirmed cases of malaria

Steffen R et al. J Infect Dis 1987; 156: 84-91
### Consequences of travel associated health problems

(Steffen R et al. J Infect Dis 1987; 156: 84-91)

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Probability (per 100,000 per month)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illness</td>
<td>15/100/month</td>
</tr>
<tr>
<td>Medical consultation</td>
<td>8/100/month</td>
</tr>
<tr>
<td>Unable to work</td>
<td>3/100/month</td>
</tr>
<tr>
<td>Hospitalisation</td>
<td>0.5/100/month</td>
</tr>
<tr>
<td>Aero medical evacuation</td>
<td>1/1,000/month</td>
</tr>
<tr>
<td>Death (humanitarian)</td>
<td>1/10,000/month</td>
</tr>
<tr>
<td>Death (usual traveller)</td>
<td>1/100,000/month</td>
</tr>
<tr>
<td>Travel associated Health risks</td>
<td></td>
</tr>
<tr>
<td>--------------------------------</td>
<td></td>
</tr>
<tr>
<td>• Mortality</td>
<td>Cross-sectional</td>
</tr>
<tr>
<td>• Morbidity</td>
<td>Cohort</td>
</tr>
<tr>
<td></td>
<td>Notifiable diseases</td>
</tr>
<tr>
<td></td>
<td>Sentinel Networks</td>
</tr>
</tbody>
</table>
Deaths in 17,353 worldwide returning travellers

« Diagnoses contributing to death included severe malaria, pulmonary embolism, pneumonia and pyogenic abscess »

NB: one case of legionellosis/ 17,353 travellers included

Freedman DO et al. NEJM 2006; 354: 119-130
12 (0.3 \%) death in 6957 febrile worldwide returning travelers

<table>
<thead>
<tr>
<th>Condition</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malaria</td>
<td>4</td>
</tr>
<tr>
<td>ARDS</td>
<td>2</td>
</tr>
<tr>
<td>Pulmonary embolism</td>
<td>1</td>
</tr>
<tr>
<td>Unspecified</td>
<td>1</td>
</tr>
<tr>
<td>Sepsis</td>
<td>1</td>
</tr>
<tr>
<td>Angiostrongyloidiasis</td>
<td>1</td>
</tr>
<tr>
<td>Acute HIV/EBV</td>
<td>1/1</td>
</tr>
</tbody>
</table>

### Etiologies of death in 2,463 American travellers (1975, 1984)

<table>
<thead>
<tr>
<th>Cause</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiovascular</td>
<td>1231</td>
<td>49%</td>
</tr>
<tr>
<td><strong>Accidents</strong></td>
<td>601</td>
<td>24%</td>
</tr>
<tr>
<td>Infectious diseases*</td>
<td>25</td>
<td>1%</td>
</tr>
<tr>
<td>Unknown</td>
<td>606</td>
<td>25%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>2463</td>
<td>100%</td>
</tr>
</tbody>
</table>

- *excluding pneumonia*

## Etiologies for accidental deaths in 601 American travellers (1975, 1984)

<table>
<thead>
<tr>
<th>Etiology</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Car accident</td>
<td>163</td>
<td>26%</td>
</tr>
<tr>
<td>Drowning</td>
<td>96</td>
<td>16%</td>
</tr>
<tr>
<td>Plane accident</td>
<td>43</td>
<td>7%</td>
</tr>
<tr>
<td>Homicide</td>
<td>52</td>
<td>8%</td>
</tr>
<tr>
<td>Intoxication</td>
<td>39</td>
<td>6%</td>
</tr>
<tr>
<td>Suicide</td>
<td>20</td>
<td>3%</td>
</tr>
<tr>
<td>Burns</td>
<td>21</td>
<td>3%</td>
</tr>
<tr>
<td>Electrocution</td>
<td>3</td>
<td>0.5%</td>
</tr>
<tr>
<td>Various</td>
<td>164</td>
<td>27%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>601</td>
<td>100%</td>
</tr>
</tbody>
</table>

Fatalities among French abroad 2000 – 2004

- Traffic accidents: 28.1%
- Unknown illness: 18.4%
- Cardiovascular disease: 19.0%
- Infection: 1.4%
- Suicide, homicide: 3.2%
- Accidents: Drowning, mountain: 18.3%

Jeannel D et al. BEH 2006/no 23-24/p166-8
66 deaths PCV during service between Jul 84–Dec 03
71,198 PCV (55.8% female)
Death rate: 54.3/100,000
Total unintentional injuries 45/66 (68%)

- Motor vehicle accidents 22/66 (33%)
  - Motorcycle 2/22 (9%)
  - Auto 11/22 (50%)
  - Truck 2/22 (9%)
  - Public transport 7/22 (32%)
- Drowning 6/66 (9%)
- Plane 4/66 (6%)
- Bicycle accident 2/66 (3%)

Total unintentional injuries 45/66 (68%)

- Game park accident 1/66 (2)
- Carbon monoxide poisoning 1/66 (2)
- Accidental fall 3/66 (5)
- Accidental asphyxiation 2/66 (3)
- Bee sting 1/66 (2)
- Accidental gun shot 1/66 (2)
- Cranial fractures 1/66 (2)
- Alcohol/drug-related 1/66 (2)

Homicides among PCV: 11/66 (16.7%)

- 6 women, 5 men,
- Homicide death rate higher among males than females (9.10 and 9.01 per 100,000 PCV-year) not SS (IRR = 0.828; 95% CI = 0.248 – 2.770).
- Occurrence of homicides: 6 in Africa, 1 in Eastern Europe, 2 in Asia, 2 in Latin America.
- 6 mentioned robbery as possible motive.


- Unintentional injuries: 1,128 (63%) including 569 (50%) motor vehicle crashes.
- Homicide: 407 (23%)
- Suicide: 204 (11%)
- PCV have a higher proportion of deaths from unintentional injury and lower proportions from homicide and suicide. The proportion of unintentional injury deaths related to motor vehicles remained relatively similar.

<table>
<thead>
<tr>
<th>Pathologie</th>
<th>Nombre</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traumatologie</td>
<td>957</td>
<td>29</td>
</tr>
<tr>
<td>Cardiologie</td>
<td>673</td>
<td>20</td>
</tr>
<tr>
<td>Neurologie</td>
<td>404</td>
<td>12</td>
</tr>
<tr>
<td>Psychiatrie</td>
<td>248</td>
<td>8</td>
</tr>
<tr>
<td>Gastro-Entérologie</td>
<td>209</td>
<td>6</td>
</tr>
<tr>
<td>Pneumologie</td>
<td>207</td>
<td>6</td>
</tr>
<tr>
<td>Cancérologie</td>
<td>129</td>
<td>4</td>
</tr>
<tr>
<td>Urologie</td>
<td>78</td>
<td>2</td>
</tr>
<tr>
<td>Infectiologie</td>
<td>75</td>
<td>2</td>
</tr>
<tr>
<td>Rhumatologie</td>
<td>67</td>
<td>2</td>
</tr>
<tr>
<td>Gynécologie</td>
<td>66</td>
<td>2</td>
</tr>
<tr>
<td>Divers</td>
<td>177</td>
<td>5</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>3 290</td>
<td>100</td>
</tr>
</tbody>
</table>
Libération
3 Mai 2000
« Les otages de Jolo »
Figure 1-4 Vacances à risque selon le ministère des Affaires étrangères à la fin de l'année 2001.
Ne te presse pas cher Chauffeur,
tu n’aboutira pas si tu meurts.
Travel associated Health risks

- Mortality
- Morbidity

During Travel

Cohort study
Cross-sectional
Notifiable diseases
Sentinel Networks
Incidence rate of health problems/month travel in Developing Countries

- Diarrhoea: 20-60%
- Malaria (West Africa, no prophylaxis: 3.5%)
  - Dengue & Influenza: 1%
- Animal bite and tuberculosis infection: 0.5%
- Malaria (Tropical Africa): 0.2%
- Hepatitis A: 3/10,000
- Typhoid (SE Asia, Africa): 2/10,000
- Tick born encephalitis (rural Austria): 1/10,000
  - Hepatitis B: 5/100,000
  - HIV Infection: 2/100,000
  - Japanese encephalitis: 1/1,000,000
  - Meningococcal infection: < 1/1,000,000

## Health problems in travellers

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Origin</th>
<th>Travellers</th>
<th>Sick</th>
<th>Consulted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steffen</td>
<td>1987</td>
<td>Swiss</td>
<td>&gt;10,500 OU 7767</td>
<td>15%</td>
<td>8%</td>
</tr>
<tr>
<td>Ahlm</td>
<td>1994</td>
<td>Sweden</td>
<td>442</td>
<td>49%</td>
<td>11%</td>
</tr>
<tr>
<td>Hill</td>
<td>2000</td>
<td>USA</td>
<td>784</td>
<td>64%</td>
<td>8%</td>
</tr>
<tr>
<td>Winer</td>
<td>2002</td>
<td>Israel</td>
<td>200</td>
<td>70%</td>
<td>32% / 19%</td>
</tr>
<tr>
<td>Rack</td>
<td>2005</td>
<td>Germany</td>
<td>658</td>
<td>42%</td>
<td></td>
</tr>
</tbody>
</table>
Health problems in 784 American Travelers (1)

Hill DR; J Travel Med 2000;7:259-266

Cohort study

N = 784 travellers
Age: 44 years
Duration travel: 19 days
Holidays: 74 %

N = 501 (64 %) sick
N = 59 (8 %) Consulted
Incidence malaria: 3.8%
Health problems in 784 American Travelers (2)

Hill DR; J Travel Med 2000;7:259-266

Cohort study

N = 501 (64 %)

1. Diarrhea (34 %)
2. Resp problems (26 %)
3. Skin diseases (8 %)
4. Altitude sickness (6 %)
5. Motion sickness (5 %)
6. Injuries and accidents (5 %)
7. Fever of unknown origin (3 %)
Health problems in 784 American Travelers (3) – Risk factors

- **Young age** (43 y vs 46 y; p = 0.023)
- **Female Sex** (68 % vs 58 %; p = 0.008)
- **Duration of travel** (26 d vs 12 d; p = 0.001)
  - every day of travel increase by 3,1-3,7 % the incidence
  - 60% prevalence if duration < 30 days vs 80 % if duration > 30 days
- **Destination** : India (79 % ; p < 0,001)

(Hill DR ; J Travel Med 2000;7:259-268)
Dermatoses in 63 (8%) American travellers (n = 784)

- Insect bites : 14
- Sun burn : 10
- Tinea : 7
- Contact dermatitis : 7
- Infectious cellulitis : 4

(Hill DR ; J Travel Med 2000;7:259-266)
Injuries/accidents in 35 (4 %) American travellers (n = 784)

- minor injuries : 11
- minor trauma : 10
- car accident : 4
- homicide, aggression : 4
- drownning : 2

(Hill DR ; J Travel Med 2000;7:259-266)
Travellers with illness were:

- Younger (< 0.05)
- Traveling longer (< 0.01)
- Under basic conditions (< 0.01)
- In poor hygiene countries (OR = 1.6; 1.3-2.2)
- No influence of sex, travel experience

<table>
<thead>
<tr>
<th></th>
<th>Children (157)</th>
<th>Adults (157)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age (y)</strong></td>
<td>7 (0.2-16)</td>
<td>39 (23-69)</td>
</tr>
<tr>
<td><strong>Sex M/F</strong></td>
<td>86/71</td>
<td>39/118</td>
</tr>
<tr>
<td><strong>Disease</strong></td>
<td>16.9 %</td>
<td>15.1 %</td>
</tr>
<tr>
<td><strong>Diarrhea</strong></td>
<td>7.1%</td>
<td>6.8%</td>
</tr>
<tr>
<td><strong>GI problem</strong></td>
<td>4.9%</td>
<td>4.3%</td>
</tr>
<tr>
<td><strong>Fever</strong></td>
<td>3.8%</td>
<td>1.5%</td>
</tr>
<tr>
<td><strong>Dermatosis</strong></td>
<td>1.5%</td>
<td>1.2%</td>
</tr>
</tbody>
</table>


Cohort study
Occurrence of illness in adults and children after departure to tropics

157 travelers in each group
FU = 4 weeks after return
Median time disease: 7d (c)/8d (a)

96 (61%) children/157 episodes
88 (56%) adults/ 140 episodes
½ episodes occurred < 8 d

<table>
<thead>
<tr>
<th>Health Pbs in PCV in Africa</th>
<th>Incidence (100 PCV-year)</th>
<th>Cohort studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diarrhea</td>
<td>94.5</td>
<td>27-221</td>
</tr>
<tr>
<td>Resp infections</td>
<td>41.8</td>
<td>3-84</td>
</tr>
<tr>
<td>Skin diseases</td>
<td>31.1</td>
<td>2.2-89</td>
</tr>
<tr>
<td>Dental problems</td>
<td>20</td>
<td>2.2-49</td>
</tr>
<tr>
<td>Psychiatric</td>
<td>28</td>
<td>2.5699</td>
</tr>
<tr>
<td>Fever</td>
<td>22</td>
<td>3.4-77</td>
</tr>
<tr>
<td>Malaria</td>
<td>10.4</td>
<td>0-40</td>
</tr>
<tr>
<td>STI</td>
<td>3.5</td>
<td>0-15</td>
</tr>
<tr>
<td>Transport accident</td>
<td>1.9</td>
<td>0-8</td>
</tr>
<tr>
<td>Helminthiasis</td>
<td>1.7</td>
<td>0-15</td>
</tr>
</tbody>
</table>
« on site studies »: result varies according to the site
### On site studies: beach resorts

<table>
<thead>
<tr>
<th>Condition</th>
<th>Fidji* (%)</th>
<th>Maldives** (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Otitis externa</td>
<td>10%</td>
<td>24%</td>
</tr>
<tr>
<td>Injuries (coral, shellfish...)</td>
<td>10%</td>
<td>14%</td>
</tr>
<tr>
<td>Sun related</td>
<td>10%</td>
<td>13%</td>
</tr>
<tr>
<td>Cutaneous Infections</td>
<td>13%</td>
<td></td>
</tr>
<tr>
<td>Diarrhea</td>
<td>20%</td>
<td></td>
</tr>
</tbody>
</table>

## On Site Studies: mountain

<table>
<thead>
<tr>
<th></th>
<th>Népal*</th>
<th>Népal**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients ill (n=)</td>
<td>19616</td>
<td>838</td>
</tr>
<tr>
<td>Diarrhea</td>
<td>31 %</td>
<td>29 %</td>
</tr>
<tr>
<td>Respiratory Infect</td>
<td>21 %</td>
<td>17 %</td>
</tr>
<tr>
<td>Skin diseases</td>
<td></td>
<td></td>
</tr>
<tr>
<td>. Bacterial</td>
<td>10 %</td>
<td>12 %</td>
</tr>
<tr>
<td>. Fungal</td>
<td></td>
<td>4,3 %</td>
</tr>
<tr>
<td>. Scabies</td>
<td></td>
<td>1,8 %</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 %</td>
</tr>
</tbody>
</table>

** Caumes E et al;Travel Med Int 1991;9:72-76
### Health problems in French Travelers in Nepal: 1984 vs 2001


<table>
<thead>
<tr>
<th>Problems</th>
<th>2001 (276 pts)</th>
<th>1984 (860 pts)</th>
<th>P =</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diarrhea</td>
<td>27%</td>
<td>29%</td>
<td>0.4</td>
</tr>
<tr>
<td>Altitude</td>
<td>16%</td>
<td>0</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>LRespTI</td>
<td>11%</td>
<td>5%</td>
<td>0.001</td>
</tr>
<tr>
<td>Dermatoses</td>
<td>9%</td>
<td>14%</td>
<td>0.04</td>
</tr>
<tr>
<td>Fever</td>
<td>9%</td>
<td>8%</td>
<td>0.8</td>
</tr>
<tr>
<td>Trauma</td>
<td>6%</td>
<td>3%</td>
<td>0.01</td>
</tr>
<tr>
<td>URespTI</td>
<td>6%</td>
<td>12%</td>
<td>0.006</td>
</tr>
<tr>
<td>Psychiatric</td>
<td>6%</td>
<td>1%</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>STD</td>
<td>0</td>
<td>4%</td>
<td>0.001</td>
</tr>
</tbody>
</table>
After Travel
Travel associated Health risks

- Mortality
- Morbidity

After Travel

Cohort study
Cross-sectional
Notifiable diseases
Sentinel Networks
Medical consultations after travel

7767 Swiss\(^{(1)}\) 8%
2109 Italian\(^{(2)}\) 11%
779 American\(^{(3)}\) 12%
200 Israel\(^{(4)}\) 19%

(1) Steffen et al; J Inf Dis 1987;156:84-91
(2) Bruni et al; J Travel Med 1997;4:61-64
(3) Hill D; J Travel Med 2000;7:259-266
Health problems in 202/779 (26 %) American travellers after returning home

1. Diarrhea 103 (13 %)
2. Respiratory infection 75 (10%)
3. Skin disease 23 (3 %)
4. Fever 12 (2 %)
5. Others 22 (3 %)

Hill DR ; J Travel Med 2000;7:259-266
93 medical consultations (12% of travellers; half of hill travellers)

1. Diarrhea: 29 (31 % consultations)
2. Respiratory Infection: 22 (24%)
3. Fever (malaria, rickettsioses, dengue, undetermined): 12 (13 %)
4. Skin disease: 10 (11 %)
5. Hospitalisation: 4 (4 %)

Hill DR ; J Travel Med 2000;7:259-266
Illness in 42,173 travelers, GeoSentinel 2007-2011

Only 40% reported pretravel medical visit
28 deaths, Life threatening dis: P. falciparum, meliodosis, African trypanosomiasis

637 Health impairments diagnosed in 622 travellers returning (mean: 27 d) from the tropics (Africa: 57%), Nov 2004-May 2005

1. Skin disorders (n= 149; 23.4%)
2. GI disorders (n= 122; 19.1%)
3. Respiratory disorders (n=73; 11.5%)
4. Malaria (n= 56; 8.8%)
5. Schistosomiasis (n=46; 7.2%)
6. Viral Hepatitis (n= 26; 4.1%)

## Australia: 917 travelers vs 189 immigrants/refugees

<table>
<thead>
<tr>
<th></th>
<th>Travelers (917)</th>
<th>Immigrants/refugees (189)</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malaria</td>
<td>174 (19 %)</td>
<td>6 (3 %)</td>
<td>7.1 (3.0-18.2)</td>
</tr>
<tr>
<td>Gastroenteritis</td>
<td>136 (15 %)</td>
<td>4 (2 %)</td>
<td>8.1 (2.8-25.9)</td>
</tr>
<tr>
<td>URTI</td>
<td>61 (7 %)</td>
<td>4 (2 %)</td>
<td>3.3 (1.1-10.8)</td>
</tr>
<tr>
<td>Illness unknown</td>
<td>53 (6 %)</td>
<td>1 (&lt; 1 %)</td>
<td>11.5 (1.7-226)</td>
</tr>
<tr>
<td>Tuberculosis</td>
<td>42 (5 %)</td>
<td>94 (50 %)</td>
<td>0.05 (0.0-0.1)</td>
</tr>
<tr>
<td>Schistosomiasis</td>
<td>35 (4 %)</td>
<td>24 (12 %)</td>
<td>0.3 (0.2-0.5)</td>
</tr>
<tr>
<td>Helminth</td>
<td>30 (3 %)</td>
<td>8 (9 %)</td>
<td>0.3 (0.2-0.6)</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>29 (3 %)</td>
<td>1 (&lt; 1 %)</td>
<td>6.1 (0.9-122)</td>
</tr>
</tbody>
</table>

Travel associated Health risks

- Mortality
- Morbidity

During vs After Travel

Cohort study
Cross-sectional
Notifiable diseases
Sentinel Networks
358 travelers return from Senegal, post travel questionnaire (1-12/2008)

- M: 48%, Fe: 52%; median age : 43.3 y (19–79 y)
- French origin : 88.8%; Travel for tourism : 76.7%
- Median travel duration : 8 days (3–92 d)
- 313 (87.4%) presented at least one health problem during trip; 8 (2.2%) consulted during travel, 25 (7%) consulted after travel, 1 hospitalized
- Dermatological pbs : 74.9% (arthropod bites : 62.3% and sunburns : 35.7%).
- GI problems : 48.9% (diarrhea 45%).

Dia A et al. J Travel Med 2010; 17: 296–302
358 travelers return from Senegal, post travel questionnaire (1-12/2008)

- **Other dermatological disorder**: SSTI (8), rash (5), photosensitivity (3), myiasis (2), animal-related injury (2), pruritis (1);
- **Other GI disorder**: vomiting (27), abdominal pain (6), constipation (1), GO reflux (1);
- **Respiratory**: cough (26), ENT disease (14);
- **Neuro/psychological disorder**: anxiety (4), head aches (4), vertigo (3), insomnia (2), depression (1), stress (1);
- **Other**: heat stress (9), dehydration (5), lower limb venous problem (6), trauma/injury (4), vaginitis (2), chronic illness decompensation (2), UTI (1), conjunctivitis (1) tachycardia (1), and joint pain (1).

Dia A et al. J Travel Med 2010; 17: 296–302
Sentinel Surveillance Data, Marseille

55 patients (03/2003 – 12/2008)

- M/F ratio: 1.4; median age: 39 y (4–71); French: 76.4%;
- Tourism: 54%; VFRs: 21%, business: 16%
- Median travel duration: 8 days (2–382 d)
- Median time between the end of the trip and the clinic visit: 10 days (0–1.018 d).
- Pre-travel encounter: 29%
- Seen as in patients: 34%

Dia A et al. J Travel Med 2010; 17: 296–302
Sentinel Surveillance Data, Marseille 55 patients (03/2003 – 12/2008)

- **Febrile systemic illness**: 47.3% = malaria (13), salmonella (4), viral syndrome (2), dengue (1); relapsing fever (1), Q fever (1), and unspecified (6);
- **Dermatoses**: 30.1% = myiasis (5), HrCLM (3), animal-related injury (3), SSTI (2), LCL (1), filariasis (1), rash (1);
- **GI disorders**: 20% = diarrhea (7), *Entamoeba histolytica* liver abscess (1), hookworm (1), acute hepatitis A (1), and acute hepatitis unspecified (1).

Dia A et al. J Travel Med 2010; 17: 296–302
Illness in French Travelers to Senegal: Prospective Cohort Follow-up vs Sentinel Surveillance

- Ill Travelers in the Sentinel Surveillance were more likely to:
  - be born in Senegal ($p = 0.01$),
  - be younger ($p = 0.01$),
  - Travel for VFRs ($p = 0.05$), for business ($p = 0.02$)
  - Travel for longer duration ($p < 10^{-4}$)
  - be hospitalized ($p < 10^{-4}$)

- Severe febrile illness cases, notably malaria and salmonella, were detected only through the surveillance system, not in the cohort follow-up.

Dia A et al. J Travel Med 2010; 17: 296–302
Illness in French Travelers to Senegal: Prospective Cohort Follow-up vs Sentinel Surveillance

During 2008, the Sentinel Surveillance system captured 3 cases of travel-related illnesses (3/353 = 1%) involving individuals from the cohort survey with diarrhea: 

*Entamoeba histolytica* myiasis,
animal-related injury.

Dia A et al. J Travel Med 2010; 17: 296–302
STI as a travel souvenir
STD are a common (underestimated) cause of health impairment in travellers

731 British travellers (1) 5.7 %
622 French travellers (2) 3.7 % (6th)
121 Swiss VFRs (3) 1.6%
217 Swiss travellers (3) 0.3%
17353 WW travellers (4) 0.8 %
7886 Swiss travellers (5) 0.6 % genital discharge (7th)

0.1 % genital ulcer (11 th)

(1) Hawkes S et al. AIDS 1994;8:247-252
974 STI/STD (0.9%) in 112,180 ill travellers, GeoSentinel 1996-2010

<table>
<thead>
<tr>
<th>Traveller category</th>
<th>After travel</th>
<th>During travel</th>
<th>Immigration</th>
</tr>
</thead>
<tbody>
<tr>
<td>N with STD/STI</td>
<td>424</td>
<td>389</td>
<td>161</td>
</tr>
<tr>
<td>Proportionate morbidity</td>
<td>0.6%</td>
<td>1.02%</td>
<td>1.6%</td>
</tr>
<tr>
<td>Nº1 is…</td>
<td>NG &amp; unSpe Ur. (30%)</td>
<td>NG &amp; unSpe Ur. (21%)</td>
<td>Syphilis (67%)</td>
</tr>
<tr>
<td>Nº2 is…</td>
<td>Acute HIV (27%)</td>
<td>Epididymitis (15%)</td>
<td></td>
</tr>
</tbody>
</table>

424 STI/STDs (0.6%) in 64,335 ill travellers seen after travel, 1996-2010

- The mean/median duration between return and consultation for STD is unknown with the exception of...

- « The 63% of all travellers with acute HIV infection who had travelled during the past 6 months » in whom « the median time between return and diagnosis of HIV infection was 28 days (IQR 10-59) »

61 patients with an STI presumably acquired during travel (1990s)

- HPV primary infection (32%)
- Non gonococcal urethritis (31%)
- Gonococcal infection (8.2%)
- Trichomoniasis (6.5%)
- HSV infection (6.5%)

Mean of 3 months between return and consultation

49 French returning travelers (22 F, 37 M) with STD, 11/2002-10/2003

- Gonococcal urethritis (n=18, 4 with resistance to FQ)(men only, p<0.001)
- HSV 2 infection (n=12)(oral et genital)
- Urethritis of unknown etiology (n=9)
- Chlamydia trachomatis infection (n=4)
- Syphilis, primary (n=4)(MSM)
- HIV primary infection (n=2)(1F,1M).

[Vaginal candidiasis (n=10)]

Mean of 9 d between return and consult

Etude idéale en médecine des voyages

- Cohorte prospective; multicentrique
- Recrutement par agences de voyages ou compagnies aériennes
- Pré et post travel questionnaires
- Démarche diagnostique pré établie pour la prise en charge des patients pendant et au retour de voyages
- Cout, faisabilité plus problématiques

Conclusion: épidémiologie des maladies en voyage

• Mortalité: part des maladies infectieuses négligeable, sous réserve du respect des règles de prophylaxie

• Morbidité: maladies infectieuses cosmopolites, non exotiques, sous réserve du respect des règles de prophylaxie
• Steffen R, Rickenbach M, Wilhelm U, Helminger A, Schar M. Health problems after travel to developing countries. J Infect Dis 1987; 156: 84-91


• Aïssata Dia et al. Illness in French Travelers to Senegal: Prospective Cohort Follow-up and Sentinel Surveillance Data. J Travel Med 2010; 17: 296–302
Osaka, Japan