



# Travel Related Risk Behaviors and Antibiotic Use among Older Travelers



Varea H. Costello DO; LT, MC, USN<sup>1</sup>; David Tribble, MD, DrPH<sup>2</sup>, Christa Eickhoff MD<sup>1</sup>, D Hamilton Tilley MD; CDR, MC, USN<sup>3</sup>, Gregory Utz MD<sup>2,3,4</sup>, Kalyani Telu<sup>2,4</sup>, Anuradha Ganesan MD<sup>2,4,5</sup>, Jamie Fraser<sup>2,4</sup>, Tahaniyat Lalani MBBS MHS<sup>1,2,4</sup>

Naval Medical Center Portsmouth, VA<sup>1</sup>, Infectious Disease Clinical Research Program, Department of Preventive Medicine & Biostatistics, Uniformed Services University of the Health Sciences, Bethesda, MD<sup>2</sup>, Naval Medical Center San Diego, CA<sup>3</sup>, Henry M. Jackson Foundation for the Advancement of Military Medicine, Inc., Bethesda, MD<sup>4</sup>, Walter Reed National Military Medical Center, Bethesda, MD<sup>5</sup>

## Introduction

- International travel is popular among older adults (>=60 years) and expected to increase over the next decade.
- Aging is associated with immunosenescence and subsequent vulnerability to viral and bacterial infections<sup>1</sup>.
- Due to these age-related physiological changes, guidelines have been published specifically addressing pre-travel care for older travelers<sup>2</sup>.
- Few studies have compared the risk behaviors and rate of illnesses between older and younger travelers.
- We utilized the TravMil study, a prospective, observational cohort of US Department of Defense (DoD) beneficiaries traveling outside the continental US for <6.5 months, to evaluate the differences in travel characteristics, exposures, illnesses, and antibiotic use in older (>= 60 years) and younger (18-59 years) travelers.

## Methods

- TravMil is a prospective cohort study of US DoD active duty personnel and beneficiaries traveling outside the continental US for <6.5 months between 2010 and 2018.
- Active duty personnel traveling for pre-deployment or other military travel and travelers with itineraries limited to Western or Northern Europe, Canada, or New Zealand were excluded.
- Enrollees completed a pre-travel survey recording their demographics and travel characteristics.
- A post-travel survey was completed within 2 months of return and collected information regarding risk behaviors, illnesses and non-specific symptoms during travel.
- Definitions:
  - Loose stools: loose or liquid stools not meeting criteria for travelers' diarrhea.
  - Travelers diarrhea (TD): ≥ 3 loose stools or 2 loose stools with nausea, vomiting, abdominal pain, fever, or bloody stool in 24-hour period.
  - Influenza like illness (ILI): subjective fever with either sore throat or cough.
  - Febrile illness (FI): subjective fever not associated with diarrhea or flu-like illness.
- Severity: For ILI and FI, symptoms were graded as mild (present, normal level of activity), moderate (decreased level of activity), severe (inability to participate in activity). Moderate/severe TD was defined as watery diarrhea with fevers, impacted daily function, or dysentery.
- Malaria noncompliance: missing ≥ 2 weekly or ≥ 3 daily doses of antimalarial medications in a row.
- Pearson  $\chi^2$  or Fisher's exact test were performed for univariate analysis of categorical variables and Mann-Whitney U was performed for continuous variables.

## Results

Table 1. Demographics

	>=60 years (N=744)	18-59 years (n=702)	Overall (n=1446)	p - value
Age – (Median IQR)	68 (65 – 72)	48 (33 – 53)	60 (48 – 68)	
Gender				< 0.0001
Male	385 (51.7%)	276 (39.3%)	661 (45.7%)	
Female	359 (48.3%)	426 (60.7%)	785 (54.3%)	
Duration of Travel - Median (IQR)	18 (13-27)	16 (9-23)	16 (11-25)	<0.0001
Region of Travel				<0.0001
Africa	196 (26.3%)	199 (28.4%)	395 (27.3%)	
South America, Central America, Caribbean	180 (24.2%)	225 (32.1%)	405 (28.0%)	
Southeast Asia, East and North Asia, Oceania	197 (26.5%)	185 (26.4%)	382 (26.4%)	
Southcentral and West Asia	61 (8.2%)	54 (7.7%)	115 (8.0%)	
Europe	26 (3.5%)	2 (0.3%)	28 (1.9%)	
Multiple Destinations	84 (11.3%)	37 (5.3%)	121 (8.4%)	
High Risk Accommodation*	273 (36.7%)	355 (50.6%)	628 (43.4%)	<0.0001
%VFR*	104 (13.9%)	162 (23.1%)	266 (18.4%)	

\*Defined as hotel without AC, camping, private residence, dormitory  
%Percentage visiting friends and relatives

Table 2. Reported Illnesses

	>=60 years (n=744)	18-59 years (n=702)	p - value
Loose Stools	24 (3.23%)	15 (2.14%)	0.201
Duration of Illness – Median (IQR)	1 day (1-3)	1 day (1-3)	0.475
Traveler's Diarrhea	135 (18.2%)	167 (23.8%)	0.008
Mild	75 (55.6%)	77 (46.1%)	0.131
Moderate and Severe	59 (43.7%)	88 (52.7%)	
Duration of Illness – Median (IQR)	2 days (1-3)	2 days (1-4)	0.004
Influenza Like Illness	101 (13.6%)	91 (13.0%)	0.732
Mild	76 (75.3%)	48 (52.8%)	0.001
Moderate and Severe	25 (24.8%)	43 (47.2%)	
Duration of Illness – Median (IQR)	4 days (3-7)	3 days (2-5)	0.024
Febrile Illness	22 (3.0%)	29 (4.1%)	0.226
Mild	11 (50%)	8 (28.6%)	0.101
Moderate and Severe	11 (50%)	21 (72.4%)	
Duration of Illness – Median (IQR)	4 days (2-8)	3 days (1-5)	0.194
Sought health care	23 (3.1%)	28 (4.0%)	0.355

Table 3. Antibiotic Use

	Age >= 60 years	Age < 60 years	p - value
Loose Stools	13/24 (54.17%)	5/15 (33.3%)	0.204
Travelers Diarrhea			
Mild	53/75 (70.7%)	49/77 (63.7%)	0.356
Moderate and Severe	47/59 (79.7%)	60/88 (68.2%)	0.125
Influenza Like Illness	64/101 (63%)	53/91 (58%)	0.467
Febrile Illness	7/22 (31.3%)	10/29 (34.5%)	0.842
Cumulative number of patients who used antibiotics for any reason	185/755 (24.7%)	178/719 (24.5%)	0.952

Figure 1. Exposures During Travel\*

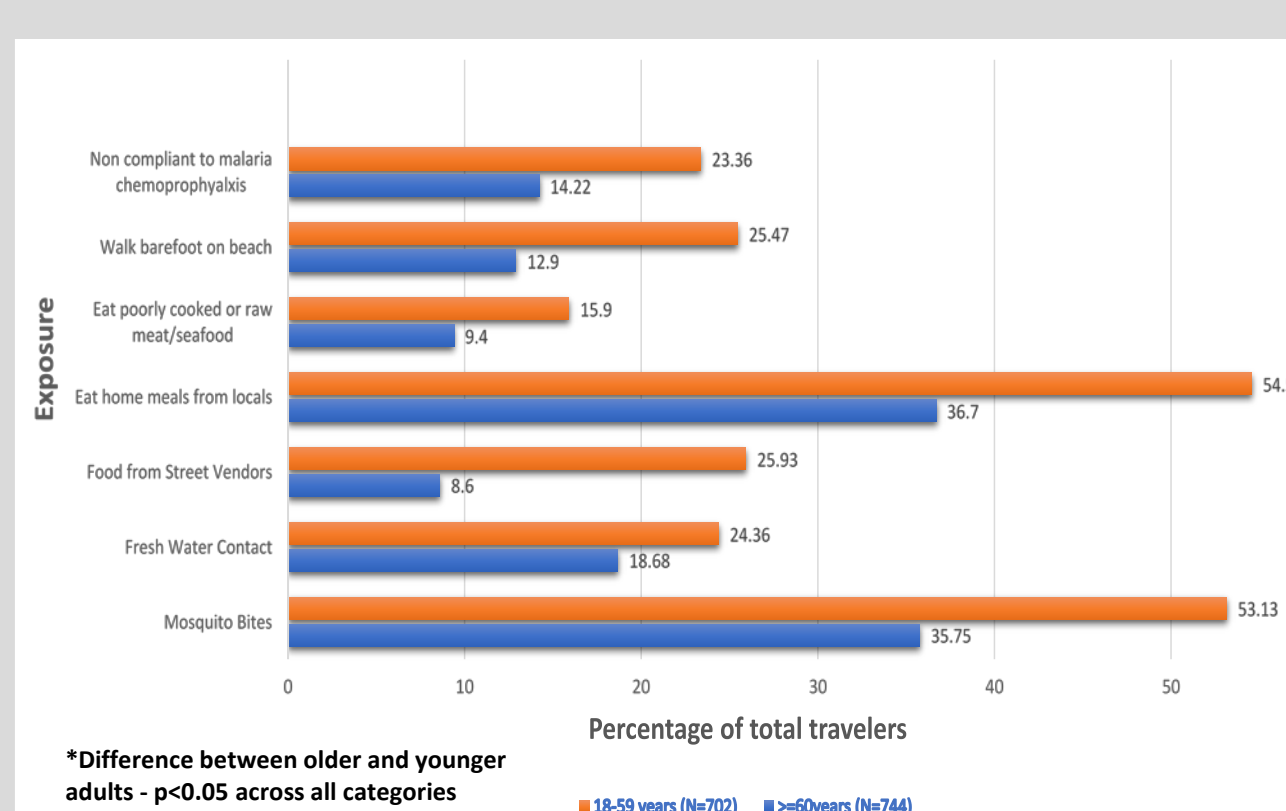
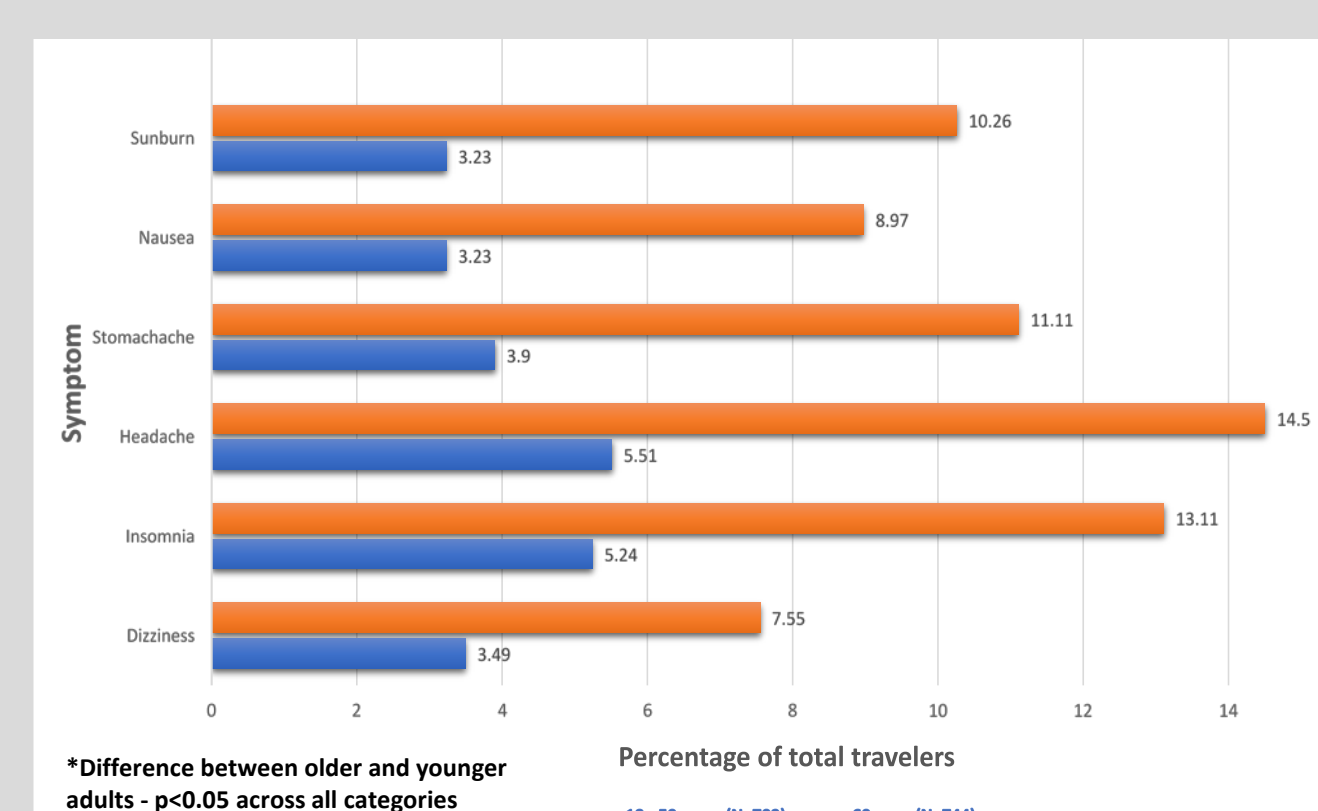


Figure 2. Non-Specific Symptoms During Travel\*



## Results

- A total of 1468 travelers were analyzed (Table 1): 744 were >=60 years and 702 were between 18-59 years.
- Reported Illnesses (Table 2):
  - TD was reported more frequently in younger travelers.
  - A greater proportion of older travelers reported loose stools, mild symptoms associated with TD and ILI compared to younger travelers.
- A quarter of older adults and young travelers reported using antibiotics.
- Inappropriate use of antibiotics for mild TD, loose stool and self-limited ILIs was common in both age groups (Table 3).
- Exposures (Figure 1): Younger travelers were more likely to engage in high risk behaviors during travel.
- Reported Symptoms (Figure 2): Older travelers were less likely to experience non-specific symptoms during travel.

## Discussion

- Most infections experienced by older travelers were mild and self-limited.
- Older travelers were less likely to engage in high risk behaviors during travel although a difference in disease incidence was not observed.
- A quarter of older and young travelers took antibiotics.
- Approximately two-thirds of older adults and 50% of younger travelers used antibiotics inappropriately for mild diarrhea or self-limited ILI<sup>3</sup>.
- Antimicrobial stewardship efforts should include travel medicine clinics.
- Appropriate indications for antibiotic use should be reinforced to international travelers especially in older adults who may be prone to side effects and drug interactions.

## References

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