

Public & Global Health Spotlight

October 2023
Issue 4

Dear readers

Welcome to the latest issue of our Public & Global Health Spotlight magazine, in which we explore a range of important topics that underscore the interconnectedness of our world and the compelling role of responsible global citizenship in ensuring our common well-being.

In an increasingly interconnected world, responsible global citizenship is more important than ever. No matter where we live, our actions have an impact across borders and continents, impacting the health and well-being of people around the world.

One pressing issue that underscores this interconnectedness is climate change. As our planet warms, the boundaries of tropical diseases are expanding, blurring, and reaching new areas. Even Switzerland is not immune to this phenomenon. The arrival of the tiger mosquito on Swiss soil is just one example of how climate change can redraw the maps of disease vectors.

This issue of our magazine is designed to invite you to reflect on the role that each individual plays in addressing these global challenges in your role as a global citizen.

We hope you enjoy.

Inhalt



The Impact of Climate Change on the Spread of Malaria

Climate change has long been a hot topic, with the average temperature of the Earth gradually increasing. The discussion of climate change most often revolves around the melting polar ice caps and rising sea levels, but it is time to consider the effect of climate change on the transmission of mosquito-borne diseases.

04



Tiger Mosquitoes in Switzerland, And What This Means for Us

As a result of climate change, the ranges of certain disease-carrying insects are expanding. More than ever before, Responsible Global Citizens must also pay attention to diseases to which they have not previously been exposed and which have not previously posed a threat to them.

07



Antimalarials - Their Differences And Effectiveness

In this interview, Prof. Dr. Patricia Schlagenhauf talks about the different antimalarial drugs, their effectiveness and the most exciting results of her research.

10



How to Be a Responsible Global Citizen: A Numbered List

Traveling offers us chance to expand our horizons and better understand the world that others live in each day. However, it is important to remember that having the ability to travel is a privilege, and we should always keep in mind the impact that this privilege may have.

15

The Impact of Climate Change on the Spread of Malaria

Climate change has long been a hot topic, with the average temperature of the Earth gradually increasing. The discussion of climate change most often revolves around the melting polar ice caps and rising sea levels, but it is time to consider the effect of climate change on the transmission of mosquito-borne diseases.



Climate Change: An Overview

Climate change is considered to be any statistically significant changes in the average state of a climate and its highs/lows. For it to be significant changes, they must persist for an extended period of time, typically decades or longer.

The terms climate change and global warming are often used interchangeably. However, the term global warming suggests that climate change only results in an increase in temperature. In reality, it composes a broader range of changes, which can include increasing humidity, extreme weather events, and, of course, warmer summers.

Global warming is a very gradual process, but despite how slight the increase has been, its impact is of great significance.

Some areas which are currently affected by the Earth's rising temperature include:

- rising sea levels
- flooding
- changes in rain patterns
- changes in food production

One area which is suspected to be significantly impacted by climate change, though, is the transmission of vector-borne diseases, such as malaria.

What Is Malaria?

Malaria is a mosquito-borne disease transmitted by the female *Anopheles* mosquitos. These mosquitos prefer warm, wet and humid climates. The location most affected by malaria is Africa, accounting for 94% of all malaria cases in 2020.

However, climate change is causing more areas of the world to experience the ideal climate for malaria transmission for longer periods of time.

The Impact of Climate Change on Malaria

Many advances have been made to protect individuals in high-risk malaria regions. However, climate change is threatening these advances. Essentially, the changes in temperature, rainfall and humidity are creating an environment that mosquitos thrive in.

To put into perspective these rising temperatures, NASA has reported that nineteen of the warmest days ever recorded have occurred in the years since 2000. Additionally, 2020 and 2016 combined have been the warmest years since record-keeping began in 1880. So, when you feel as though this summer is warmer than usual, you are probably right!

Changing Geographical Areas of Risk

The rising temperatures and other changes in climate are benefiting mosquitos. Not only does this increase the cases of transmission, but it is also causing a change in geographical areas affected by malaria.

Places without malaria risk are now seeing increasing cases as their climate becomes one that is appealing to mosquitos. This is especially true in locations of higher altitudes, which are seeing increases in temperature, rainfall, and humidity.

Faster Parasite Growth Cycles

The growth cycle of the parasite causing malaria is also changing in lower altitude areas experiencing higher temperatures. Scientists are seeing that mosquitos are developing malaria faster, meaning they're able to spread it to humans faster as well.

Reemerging Malaria Cases

Some studies have reported the reemergence of malaria in locations that had previously controlled it. This is causing these populations to, once again, be vulnerable to malaria transmission.

While areas such as Africa currently see the greatest malaria risk, Europe itself once had a malaria endemic. However, it was eliminated in 1975 because of improved irrigation and drainage, better socio-economic conditions, behavioral changes, adoption of new farming methods, and access to better health care.

Recently, though, there have been some reported cases of malaria in Europe. These cases suggest a malaria reintro-

duction to this country.

In 2020, researchers at the University of Zurich compiled a systemic review on malaria incidence in Europe due to rising temperatures. The ten studies included in this review predict that the increasing temperatures will cause the Anopheles mosquitos to spread northward. Additionally, they predict that malaria's high-risk season will extend to six months.

The Indirect Impact of Climate Change

In addition to the direct way in which climate impacts malaria (through rising temperatures and rain), there is also an indirect impact. These indirect effects include the many socio-economic factors that affect malaria risk. However, these indirect factors are highly unpredictable, and are thus understudied.

One of these suspected factors is extreme weather, such as tropical cyclones, storm surges, heavy rainfall, and flooding. These extreme weather events can significantly disrupt everyday life by impacting someone's ability to access diagnostics, drugs, or vaccines. Extreme weather events could also cause roads or other transport lines to be out of service. This can then complicate the transport of these supplies, especially to those in remote rural areas. Yet another indirect effect of climate change on malaria transmission has to do with a willingness to follow preventative steps. Two of the most recommended actions include wearing long clothes (e.g., long sleeves and long pants) and sleeping under mosquito netting at night. However, rising temperatures can make these things much less appealing. For those who forego long sleeves, long pants, and mosquito netting, the risk of a bite becomes much higher.

Additionally, risk mapping uses historical patterns to determine risk and let you know when you are traveling to a location with a high malaria risk. However, it may become less effective as seasonal changes continue to deviate from historical patterns.

Final Remarks

There are many ways in which the increasing temperature can impact us, beyond making us hesitant to go outside into the higher heat. The rising temperature of the Earth is causing climate changes such as increased rainfall and high humidity, which are favorable conditions for the mosquito that transmits malaria.

The extreme weather events that occur with climate

change can also affect someone's ability to access the tools created to diagnose, treat, and prevent malaria. Additionally, climate change may lead to a reemergence of malaria in areas which had previously eradicated it, such as Europe.

The truth is that we cannot predict just how much climate change will impact malaria. Because of this uncertainty, it is important for everyone to be aware of the possible changes in malaria transmission risk areas and prepare accordingly before traveling.

References

- Climate Change and Malaria - A Complex Relationship | United Nations. (2022). Retrieved 11 July 2022, from <https://www.un.org/en/chronicle/article/climate-change-and-malaria-complex-relationship>
- Nissan, H., Ukawuba, I., & Thomson, M. (2021). Climate-proofing a malaria eradication strategy. *Malaria Journal*, 20(1). doi: 10.1186/s12936-021-03718-x
- 2020 Tied for Warmest Year on Record, NASA Analysis Shows. (2022). Retrieved 11 July 2022, from <https://www.nasa.gov/press-release/2020-tied-for-warmest-year-on-record-nasa-analysis-shows>
- Nabi, S., & Qader, S. (2009). Is Global Warming Likely to Cause an Increased Incidence of Malaria?. *Libyan Journal Of Medicine*, 4(2). doi: 10.4176/090105
- Fischer, L., Gültekin, N., Kaelin, M., Fehr, J., & Schlagenhauf, P. (2020). Rising temperature and its impact on receptivity to malaria transmission in Europe: A systematic review. *Travel Medicine And Infectious Disease*, 36, 101815. doi: 10.1016/j.tmaid.2020.101815
- The "World malaria report 2020" at a glance. (2019). Retrieved 11 July 2022, from <https://www.who.int/publications/i/item/9789240015791>

Tiger Mosquitoes in Switzerland, And What This Means for Us

Once upon a time, diseases spread through bug bites stayed within specific geographical regions, with those outside the “hot zone” safe from their transmission. In this world of the past, the only time you had to worry about contracting one of these illnesses was if you lived in or traveled to a place where it was common. This meant that those in the continental United States didn’t worry about malaria, and those in South Africa didn’t have to worry about an infection with the Japanese Encephalitis Virus.



However, this perspective we are used to is shifting due to climate change, increasing the locations where certain disease-carrying bugs live. Now, more than ever, responsible global citizens need to be mindful of the diseases they are at risk of, no matter where they are and what they used to know.

Let’s look at some of the vector-borne diseases appearing in new places and discuss what this means for society.

The Tiger Mosquito: Switzerland’s New Concern

Currently, three different invasive mosquito species, which had previously been alien to Switzerland, have been identified. These include the Asian tiger mosquito, the Korean bush mosquito, and the Japanese bush mosquito.

Of these three mosquitoes, the appearance of the tiger mosquito is the most concerning because it can transmit pathogens and diseases, such as chikungunya, dengue, and Zika virus. This can be concerning for Swiss citizens as they were previously unsusceptible to these diseases

Responsible Global Citizenship

Responsible Global Citizenship is about how decisions and actions in one part of the planet can affect people living in another, and about the fact that we all share a common humanity and have equal worth. It means being open to a positive approach to other identities and cultures and being able to recognize and challenge stereotypes.

and did need not worry about contracting them. Now, we have to be more aware.

The tiger mosquito spreads disease by acting as a carrier of the disease and spreading it through its bites. However, to spread the disease, the mosquito must first bite someone with it. While diseases such as dengue, chikungunya, and Zika virus are not common in Switzerland, here's how they might appear:

There are two key players in this scenario, an infected individual and the mosquito. The individual may become infected while visiting somewhere the diseases are more common. Then, they return home, and if the tiger mosquito bites them, the mosquito now carries the disease. If they bite someone else, the disease can spread even though it normally does not occur in this area. The more people infected, the more likely the disease will continue spreading.

Stay Aware: The Signs and Symptoms of Disease

The tiger mosquito can spread the following vector-borne diseases, which is why it is vital to know their signs and symptoms.

Chikungunya

The most common symptoms of chikungunya are joint pain and fever. However, some people may also have muscle pain, headache, rashes, or joint swelling. These symptoms generally appear 3-7 days after the infected mosquito bites you. Most people who contract this disease feel better within a week, and rest, fluids, and over-the-counter pain medication can help relieve your symptoms. Unfortunately, there is currently no vaccine to protect against chikungunya, so the most crucial element of protection is preventing mosquito bites.

Dengue

Not everyone infected with dengue gets sick. Statistics currently show that one in 4 people infected with dengue become ill, and the symptoms can be mild or severe within this group. If you have already had a dengue infection, another infection with the dengue virus can quickly become life-threatening. That's why a good mosquito repellent is essential when traveling to a dengue area to protect yourself from a primary infection.

Symptoms of dengue include:

- fever
- eye pain
- headache
- bone pain
- muscle pain
- rash
- joint pain
- nausea/vomiting

These symptoms can last 2-7 weeks before someone recovers.

However, in cases of severe dengue, it can be life-threatening within only a few hours and requires immediate hospital care. This occurs in around 1 in 20 people who get sick from dengue and can result in internal bleeding, shock, or even death.

The symptoms of severe dengue, which often begin 24-48 hours after the fever has gone away, include:

- vomiting (at least three times in 24 hours)
- belly pain
- blood in stool or vomiting blood
- bleeding from the gums or nose
- feeling irritable or restless

It is crucial to seek immediate medical attention if any of these symptoms are present. However, only supportive treatment is possible, e.g. fluid intake or administration of painkillers, since there is no effective therapy against the virus itself.

Zika Virus

Another virus the tiger mosquito carries is the Zika virus, which often comes with no or mild symptoms. However, it has been associated with pregnancy problems and birth defects if a pregnant woman becomes infected.

The Effects of Climate Change

As the world experiences climate changes and more and more countries have temperatures favorable for mosquitoes, cases of mosquitoes appearing in places they previously did not inhabit will only continue increasing.

For instance, in addition to the tiger mosquito in Switzerland, the continental United States has seen eight malaria cases since May, the first cases to appear there in 20 years. This means that those in the US, who have not had to

worry about malaria for two decades, may now need to re-educate themselves on how to protect against this disease.

Protecting Yourself from Vector-Borne Diseases

When it comes to protecting yourself and others from disease transmission, there are many steps responsible global citizens take.

They protect themselves from disease by knowing what they are susceptible to while at home or traveling and taking the necessary precautions. This limits the odds that they are bitten and lessens the chances of them spreading the disease to someone else.

They are aware of climate change and play their part in lessening their global impact and carbon footprint. As our climate warms, mosquitos have longer periods to live and breed, and their habitat can spread. A 2021 study even suggests that an extra 4.7 billion people can be at risk of malaria or dengue by 2070 due to this epidemic belt expanding. It may seem scary to have new diseases popping up in places that were previously safe, but we can all play a role by staying educated (we provide a lot of great information!), protecting ourselves from bites, and spending each day taking care of our home, Earth.

References

Asian Tiger Mosquito. (2023). <https://www.swisstph.ch/en/topics/asian-tiger-mosquito>

Chikungunya fact sheet. (2022). <https://www.who.int/news-room/fact-sheets/detail/chikungunya>

Dengue and severe dengue. (2023). <https://www.who.int/news-room/fact-sheets/detail/dengue-and-severe-dengue>

8 people have acquired malaria in the US. They're the first in 20 years. (2023). <https://www.vox.com/science/2023/6/23/23771154/malaria-transmission-florida-texas-mosquitoes-risk-prevention-anopheles>

Colón-González, F. J., Sewe, M. O., Tompkins, A. M., Sjödin, H., Casallas, A., Rocklöv, J., Caminade, C., & Lowe, R. (2021). Projecting the risk of mosquito-borne diseases in a warmer and more populated world: a multi-model, multi-scenario intercomparison modelling study. *The Lancet. Planetary health*, 5(7), e404–e414. [https://doi.org/10.1016/S2542-5196\(21\)00132-7](https://doi.org/10.1016/S2542-5196(21)00132-7)

Antimalarials - Their Differences And Effectiveness

Prof. Dr. Patricia Schlagenhauf is a Scientific Group Leader and Professor at the University of Zurich, Head of the WHO Collaborating Centre for Travellers' Health in Switzerland and is active in research and teaching. In this conversation we talk about the different antimalarial drugs, their effectiveness and the most exciting results in her research.



Prof. Dr. Patricia Schlagenhauf

University of Zürich

Who are you and what is your research focus?

Thank you for this opportunity to have an interview. My name is Patricia Schlagenhauf and I am a Professor (Travel Medicine and Malaria) at the EBPI and Head of the WHO Collaborating Centre for Travellers' Health and Director of EuroTravNet, a network of clinics throughout Europe that focus on the surveillance of travel-related infection. My research focus is quite broad and seems to be ever increasing. At the moment, I have a lot of studies going on that look at the epidemiology of infection in travellers, including a very innovative SNF-funded project called ITIT (Illness Tracking In Travellers) which uses an app to track symptoms and illness in travellers during and after their travel. This is an important "citizen science" study with the potential to revolutionize traveller health surveillance. Our project partner here is the World Health Organization. An-

other very important project is the "Mosquito on Board"-Project which looks at the potential for stowaway invasive mosquitos on aircraft coming to Europe- an important topic in the light of climate change and mosquito-borne infections in Europe including dengue and malaria. A further research focus of course is work with the GeoSentinel and EuroTravNet, international networks that focus on the surveillance of illness in travellers on a global level. Also my work with the World Health Organization in guideline development on the use of border screening to check the distribution and spread of diseases with pandemic potential is fascinating. More recently, we are also looking at tick-borne, co-infections in Switzerland. I also have a strong research collaboration with the Swiss Armed Forces and here we evaluate post COVID sequelae in young men. My first love in research is however travellers' malaria and here my research looks at the epidemiology of malaria in travellers, malaria medications including novel formulations and recently malaria medication concentrations in hair.

At which places is there a risk of malaria?

The largest and greatest risk is in sub-Saharan Africa but basically malaria is present in many tropical areas and subtropical areas throughout the world. Now, there are several different types of malaria. The most important, in terms of risk, for travellers is probably *Plasmodium falciparum* which has a high case fatality if untreated. This is the predominant species in sub-Saharan Africa. Asia has a high burden of *P. vivax* malaria. In terms of places at risk of malaria: another research focus of mine is the impact of climate change on the possibility of the renewed transmission of malaria in Europe, for example. So, the list of places where a malaria risk exists is fluid. There are a lot of changing boundaries. Last month some locally acquired malaria cases were reported from Florida, USA!

Illness Tracking in Travellers (ITIT)

The project studies infections in travelers, focusing on mosquito-borne viruses, and detect outbreaks of travel-related diseases using a mobile app and daily symptom questionnaires in conjunction with location and climate data.

Mosquitoes on Board (MoB)

The project will allow us to evaluate if airplanes flying into Zürich airport carry stowaway mosquitoes. We will examine passenger and cargo compartments for exotic mosquitoes. Selection criteria for airplane will be the destination with mosquitoes of interest and the flights that are connected to Zürich airport. Mosquito traps will be placed in the cargo compartment by trained aircraft personnel and passengers and cargo compartments will be examined after return.

What are causes, as well as symptoms and effects of malaria on the human organism?

The cause of malaria in humans is an infection by a parasite called *Plasmodium*. This parasite is transmitted by the *Anopheles* mosquito and the *Anopheles* mosquito bites the human and injects malaria "sporozoites" which is the form of infection in the mosquito that can be transmitted to humans after a mosquito bite. When the sporozoites are injected into the bloodstream of a bitten human, within about a half an hour these parasites disappear into the liver where they have a cycle, and they multiply and then they emerge in the bloodstream of the human and pose the typical early symptoms of malaria such as fever or chills. When this is not treated or when the person has no

semi-immunity these symptoms can progress, and the parasite can invade several organs and cause multiple organ damage. A very severe form of malaria is cerebral malaria, where the brain is affected. So, malaria, untreated, in non-immune humans would have quite a high case fatality rate. But usually in industrial countries, malaria infections are treated and associated with a much lower mortality.

This leads me to our next question: When is it indicated to take malaria medication?

Again, you should take antimalaria medication if you're travelling to an area of considerable or high risk. As part of my work with the Swiss working group for travellers malaria we look at assessing risk at various geographic destinations and based on a certain level of risk in the local population as well as cases in returning travellers we have delineated the malaria risk areas into high risk, meaning a chemoprophylaxis is indicated, seasonal risk where the chemoprophylaxis is only indicated for certain times of the year and then low risk or minimal risk, where just mosquito bite protection is indicated.

How effective is the protection from chemoprophylaxis? What does the effectiveness depend on?

The malaria medication for chemoprophylaxis is very, very effective. All of the studies show over 95% effectiveness. We're talking about the three priority antimalarials which are atovaquone-proguanil or Malarone, mefloquine and doxycycline. But the effectiveness does vary, it really depends on the intake of the medication. So, adherence or compliance with the medication is absolutely key for travellers. There is no point in having an expensive chemoprophylaxis in your bag if you don't take it. It won't protect you against malaria. So, intake is very important, adherence is very important and then there are some personal factors that also influence the protection. For example, studies have found that a higher dose may perhaps be needed for very obese people and they may not be protected adequately with the regular dosage of antimalarials. Other studies have shown that the absorption and the pharmacokinetics of malaria drugs very much depend on the individual and also on how you take the medication. If you take atovaquone-proguanil on an empty stomach the absorption is very poor and it is advised to take this medication with fat containing foods. But the most important thing is the adherence meaning that the traveler adheres to the schedule. Recently we published a very nice study called "HAIR" which shows the concentration

of antimalarials in the hair of returned travellers and with this technique we could show that the people were taking their anti-malaria medication and we could also show the timing of the malaria medication intake, because the hair saves the concentration of the drug at the timepoint it's taken. So, we found this very innovative and we're continuing now with this to see if we can use it for further studies.

Is malaria medication alone sufficient or does it need to be combined with other protective measures? If so, which ones?

Malaria medication is of course very important for those high-risk areas and mosquito bite protection must always be used. There is also the issue of risk perception on the part of the traveller. So even though they have been told that the malaria risk at this particular destination is high, they may also meet other travelers who say "oh, I've been here many times and I've never had malaria and I never take anything.". That also impacts the perception of the traveller. The medication of course is most useful if you use it in connection with anti-mosquito bite measures. And that is the Achilles heel of travel medicine because it is very difficult to ensure adherence with those anti-mosquito measures. So, for example we recommend that travellers apply DEET or an effective repellent on the skin. And then we recommend that they use impregnated clothing. Regarding, the repellent on the skin, we also looked at that in a study and found that less than 2% of travelers use an adequate concentration of repellent on their skin. I think everyone does slap on a little repellent but actually, if you look at the instructions, you're supposed to have a wetting of the skin on all areas that are exposed. So, you can imagine that's not done very well. And then the impregnated clothing, that's done to some extent but it's also difficult because it does have a certain scent and people on holidays don't really want to use that all the time. Also, when you wash the clothing, you lose this impregnation. So, it requires a lot of discipline to protect yourself against malaria whether it's taking the drugs, and or using the mosquito bite measures.

What are the differences between the various antimalarial medication?

The three priority antimalarials that we have for chemoprophylaxis here in Switzerland are mefloquine, atovaquone-proguanil and doxycycline. Mefloquine is taken just once a week and for that reason it was very popular. Some

studies showed that it had an excess of neuropsychiatric adverse events compared to other antimalarials, so it has fallen a little bit into the second row of choices. Atovaquone-proguanil is first choice at the moment in Switzerland. It has the advantage that you just need to take it for one week post-travel but it's a daily regimen, so people have to take it every day and it can also be quite expensive. Then you have doxycycline which can be recommended as a third line drug for high-risk areas. It has the disadvantage that it can cause photosensitivity which, as you can imagine, in tropical/subtropical areas is a distinct disadvantage. It can also cause proliferation of vaginal candida in women which is also something that isn't so great for travellers. But it is a very good drug in some circumstances, It does offer additional protection against certain forms of diarrhea and certain forms of tick-borne illnesses. Another big disadvantage of doxycycline is daily dosing and the four weeks post travel intake. So, just to get back to the adherence thing, if I quote a very old saying: "The more complex the medication/prescription, the poorer the adherence." So that's a crux with antimalarials.

What criteria do you use to decide on a medication? Are there factors, such as gender or age, that are important in the choice?

Very much so! So, the choice with malaria medication is actually quite complex! It needs really an in-depth knowledge of all those medications, their interactions, their adverse events, their price, their indications, contraindications. So, for example, some of the malaria medications are not allowed for small children, and small children are a high-risk group, so one has to be sure that you have an option that you can offer. Pregnant women, especially first trimester pregnant women, can't take all anti-malarials. You have some people who are taking co-medication that doesn't mix well with one or other of the antimalarials. And of course, you also have certain contraindications in terms of preexisting illness. And then, price is a big issue. For some VFR-families (VFR stands for "visiting friends and relatives" in the country of origin), they constitute a very high-risk group for malaria and if you are recommending chemoprophylaxis for an entire family, with a drug that is extraordinarily expensive!- that prescription simply won't be filled. So, sometimes one has to juggle price and use. With regards to gender, in my studies I have found that women tend to be more adherent with medication and also with anti-mosquito bite measures. But they also tend to report more adverse events. So perhaps there is a

need to do some research on dose tailoring for women.

What are the most common side effects?

Each antimalarial has its spectrum of known adverse events, so with atovaquone-proguanil it definitely is gastrointestinal, you have gastrointestinal problems and often it's difficult to decide if it's due to GIT-disturbance during the trip or due to the medication. Mefloquine is related to causing changes in mood, feeling a little bit down, feeling a little depressed. It's contraindicated for people with a history of depression. Mefloquine has also been associated with having very vivid dreams, which you may or may not enjoy - it's something to be aware of. And doxycycline of course then on account of its photosensitivity potential, has been associated with reddening of the skin and with candida superinfections, such as vaginitis.

Are serious interactions possible with other medications or substances, such as alcohol and harder drugs?

That's a very good one. The interactions between anti-malarials and alcohol are very important because I think a lot of people consume alcohol when they're travelling. To the best of my knowledge this interaction has only been checked with mefloquine. In a study of driving under the effect of mefloquine or alcohol and the combined effect of mefloquine and alcohol mefloquine didn't really impact on driving ability. But there are case reports of persons who have for example consumed a half bottle of whiskey on the day of their mefloquine intake and who experienced psychiatric events. Now, whether that's due to the personality and the drinking or the personality and the drinking and the mefloquine - that is hard to decipher. I don't know any studies that look at the combined use of antimalarials, marijuana or cocaine or other drugs of abuse. This would certainly be an interesting avenue to study. There are interactions between certain antimalarials and other drugs or food - for example doxycycline is a tetracycline antibiotic, it can interact with milk, for example, if you take it at the same time or if you take it at the same time as some antacids. So, there are a lot of potential interactions between the antimalarials and other medications. Mefloquine can also interact with certain drugs that are used for neuropsychiatric conditions, but because a neuropsychiatric condition per se is a contraindication for mefloquine there shouldn't be dual use.

What about taking it during pregnancy?

At the moment, there are different regulations and guidelines throughout Europe which makes it very difficult. There is one study done in travellers examining the risk of stillbirth in conjunction with the use of mefloquine. We looked at a retrospective database of women who became pregnant while taking mefloquine and we didn't find any negative impact on the fetus on the possibility of stillbirth or on further development in those who took mefloquine during the first trimester. So right now, most countries of the world would say yes, mefloquine in the first trimester is important to take if there is a high risk and it's possible. There are fewer data on atovaquone-proguanil in the first trimester. There are quite good data on the second and third trimester for almost all of those drugs. Doxycycline is not permitted in the later trimesters because it interferes with bone and teeth formation in the fetus. So here in Switzerland, if it's the first trimester high risk women who absolutely have to travel - we would recommend all pregnant women not to travel to high-risk malaria areas - the first trimester we would recommend mefloquine and then the other trimesters we would have more options.

Are there certain diseases or other factors where antimalarial drugs are not recommended?

I think the risk of malaria in a high-risk area really outweighs a lot of those contraindications. Mefloquine is absolutely contraindicated in persons with current or previous psychiatric disorders. Renal and liver conditions may contraindicate some anti-malarials. Immunosuppressed people definitely should take antimalarials because if they contract malaria they are at high risk. There should be a careful risk/benefit balance calculation for malaria drugs.

What are the most exciting results of your research?

I suppose the most exciting results date back some time now. We did the first study ever worldwide, concurrently using all antimalarials where we had a four-arm, double-blind, placebo controlled study at multiple centers throughout Europe and in Israel. I think that really was a groundbreaking study because it was free of bias, everybody was blinded to the medication they were taking. We found that the drug with the best profile with regard to safety was atovaquone-proguanil, but only narrowly ahead. And then came mefloquine and then came doxycycline. And the drug regimen with the poorest profile

was chloroquine-proguanil. Other studies have looked at malaria deaths in travellers and the risk factors involved. I'm doing a very nice study at the moment - it's not quite finished but it's using EuroTravNet data - and there I'm looking at the mosaic of malaria as it presents in Europe, looking at the impact of migration waves on imported malaria. And also, which I think is very exciting, looking at the colonial legacy of imported malaria. So, we can see, when we look at imported malaria in Belgium, imported malaria in the Netherlands, in the UK, there is a very distinct colonial pattern to this. So, I think these findings can also be used to formulate guidelines because you know then your risk communities. The HAIR study I also liked there we brought together a new method to evaluate concentrations of antimalarials in hair, which can be used I think in the future to look at adherence in studies - it's always a difficult one. I'm also very interested of course in everything that has to do with the malaria vaccine and I'm planning a study on injectable antimalarials that will have a vaccine-like effect. Another exciting prospect on the horizon is a possible study evaluating tafenoquine which is a new antimalarial that works at all stages of the parasite life cycle and I'm hoping to do something there in collaboration with other colleagues.

How do you think the field of 'malaria prevention' will change in the future?

I'm hoping there will be a vaccine for travellers. There is a vaccine at the moment for endemic area populations, but it has a very low efficacy and doesn't reach the 90+ percent efficacy that you would wish for in travellers. So, I think we will be stuck with the drugs for a long time, the chemoprophylactic drug tafenoquine will be coming soon to Europe and that will have a major impact because this is one drug that acts on all different types of malaria and on all stages of malaria. So, it's like a panacea for travellers' malaria in general. I think that will be really important. Other areas of malaria prevention that I think need a lot more research include mosquito bite prevention, not just in terms of malaria protection but also with the threat of mosquito-borne infections worldwide. So, I think new drugs, particularly tafenoquine, gender issues in chemoprophylaxis, the possibility of a vaccine for travellers' malaria and focus on anti-mosquito bite prevention, they will be the main focus areas of research for travellers' malaria in the future.

Do you see malaria becoming an issue here in Europe too in the future?

I do think there is a possibility. We have recently published a paper on this theme and we looked at the areas in Europe that are most likely to be increasingly receptive to malaria and those are situated on the Mediterranean basin, southern Europe but we also saw that Central Europe will have conditions that are conducive to malaria transmission, particularly in a six month period between April and October. Right now, I think Europe is well placed with public health measures to prevent this from happening but don't forget, Europe was endemic for malaria back in the 19th century so we have to be careful it doesn't reappear.

Thank you so much for your time today and your work here at EBPI!

Interview: Julia Saro

How to Be a Responsible Global Citizen: A Numbered List

The excitement of an upcoming trip can be all-consuming, keeping you occupied with the things you will see, the activities you will take part in, and the people you will meet.



Traveling provides us with an opportunity to tackle this idea face on, in a way that our daily life here in Switzerland may not.

The idea of Responsible Global Citizenship is about how decisions and actions in one part of the planet can affect people living in a different part. It's about how we all share a common humanity and are of equal worth. It means being open to engaging positively with other identities and cultures and being able to recognize and challenge stereotypes.

1. Keep Your Vaccinations Up to Date

Proper preparation before your trip and careful precautions during your trip can help you be a responsible world citizen. Getting all necessary vaccines before traveling is two-fold; it protects you from disease and also lessens the chance of you bringing infection to those you encounter while traveling.

Especially important to remember is that the diseases that are rare or completely eradicated in certain places, such as mumps, polio, or measles, may be a serious concern in certain areas where vaccination rates are low. Unfortunately there have already been outbreaks in the global south

caused by travelers, i. ex. a measles outbreak in Colombia caused by Swiss travelers.

By being vaccinated, you help to keep not only yourself, but also those who live in the country you are visiting, safe.

Additionally, when you are vaccinated, you lessen the chance of contracting a disease while abroad and bringing it back to your home, where you may then pass it along to others.

It is always best to visit your healthcare provider before traveling to check your vaccination status and see if any vaccinations need to be updated or administered. In addition to being up to date on the vaccinations for your home country, you should also receive any recommended vaccinations based on your travel destination.

2. Travel Consultation

For those unsure of the health concerns to be aware of before traveling, a travel consultation can help sort out these uncertainties.

When you meet with a travel consultant, they will provide a list of recommended immunizations or steps needed to protect oneself while abroad that is specific to your travel location.

The travel consultant also makes sure that you are physically fit to travel by looking at any health conditions you have and the itinerary you have planned for your trip. To give your travel consultant enough time to monitor your health risks and schedule any necessary vaccinations, try to schedule your appointment for at least four weeks before you depart.

3. Monitor Your Health Before Traveling

When you have a trip planned, the last thing you want to do is cancel it because of being sick. However, to be a responsible traveler, this is what you must do to protect the health of other travelers and those living at your destination.

Besides, not only does it keep everyone else healthy when you postpone your trip because of illness, it ensures that you can truly enjoy your trip since you won't be spending it feeling ill.

When planning your trip, opt for trip cancellation insurance so that, should you get sick, it isn't as much of a financial strain to cancel. Some airlines and hotels may even offer reimbursements for those sick with viruses such as the flu or COVID-19, so check their policies before booking.

4. Consider the Environmental Impact of Your Travel

Another factor in our health is the environment in which we live, which is why a responsible traveler will consider the environmental impact of their traveling.

For instance, try to avoid single-use plastics such as plastic straws, bags, and containers. This helps to lessen waste, which can be huge in countries that have difficulties with waste management. The more waste there is, the more likely the locals are to become sick due to poor waste management. So, minimizing waste when possible can go a long way in keeping their community healthy.

Different methods of transportation can also influence environmental impact. You may need to fly to your destination, but try to take direct flights and carry less luggage. Once at your travel destination, opt for public transportation when possible, or even try walking or cycling. All of these actions help to lessen your carbon footprint, which lowers your environmental impact and keeps the communities that you visit healthy.

5. Consider Making a Lasting Difference

When we travel, it's common to only be concerned about our health risks while there. For example, when traveling to a location with a high risk of malaria, you only need to protect yourself against mosquito bites for the duration of your trip. Once you are home, you no longer need to worry about impregnating your clothes and protecting your skin from potential bites at all hours of the day.

You're in the clear once your trip is over, but what about the people who live in these destinations permanently? What about the thousands of children exposed to malaria annually?

While traveling offers the ability to expand our horizons and better understand other cultures, the health concerns the locals deal with every single day are commonly overlooked. However, you have the opportunity to make a difference in their health by supporting the communities through non-profits.

We are working on creating a comprehensive list of vetted non-profits that you can support, but until then, you can look for a non-profit on your own that supports the travel location of your choice! Supporting a non-profit means that your help has an even greater impact, and offers a way for you to repay the community you visit by promoting their healthier future.

The International Society for Travel Medicine have created their own list for traveling responsibly, which adds other important food for thought to that which we've written here.

Referenzen

Chen, L. & Hochberg, N., (2019). The Pretravel Consultation.

<https://wwwnc.cdc.gov/travel/yellowbook/2020/preparing-international-travelers/the-pretravel-consultation>

Vaccines. (2023). <https://www.who.int/travel-advice/vaccines>

6 Tips for The Responsible World Citizen

1

Be informed.

Travel allows us to discover natural beauties, historical sites and, above all, the diversity of other societies and people. Be an informed traveler before boarding an airplane and discover what the people you'll meet at your destination can teach you.

2

Be open-minded and patient.

Experience other cultures and lifestyles.

3

Be respectful.

Local people welcome you. Show them gratitude and respect. Respect also local customs: the way you dress, behavior in religious sites, displays of affection.

4

Avoid exploitation.

As travelers we are perceived as rich. Be generous in a constructive way by promoting the local economy.

5

Protect the environment.

Avoid overuse of water, wasting food, littering and damaging sites.

6

Leave a good impression.

A positive experience with local people will pave the way for those coming after you leave.

Respect and mutual discovery will make your trip a wonderful experience and will promote your security and your health too! So enjoy yourself and have a great trip!

This List was pulled from the International Society Of Travel Medicine, www.istm.org

IMPRINT

Public & Global Health Spotlight - 4th Issue - October 2023 - www.reisemedizin.uzh.ch

Editor: Zentrum für Reisemedizin der Universität Zürich

Responsible editor: Jenny Crawford, Cécile Rasi, Sofia Ricar

Authors: Zentrum für Reisemedizin, Julia Saro --- *Design:* Mirjam Eschbach, Chili Digital AG --- *Print:* kdmz Kanton Zürich, Räffelstrasse 32, 8090 Zürich

The magazine „Public & Global Health Spotlight“ can be downloaded free of charge on: www.reisemedizin.uzh.ch/en/

Address: Universität Zürich, Zentrum für Reisemedizin, Hirschengraben 84, 8001 Zürich

Edition: 40 copies; is published several times a year. --- All rights reserved.

