Private import of antibiotics to Norway: a qualitative study on international students coming from out of EØS

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Abstract

This study is a qualitative study investigating the private import of antibiotics by international students coming from out of EØS to Norway. **Background:** Antibiotic resistance is one of the biggest global threats and a growing challenge in today's world. To reduce the antibiotic resistance worldwide the main goal is to reduce antibiotic use. Self-antibiotic therapy is widely practiced in many low- and middle-income countries but may also affect high-income countries in some ways. It may be assumed that private antibiotic importation by migrants, as in Norway, can compromise the containment of the low prevalence of antibiotic resistance due to the diverse populations and relatively high levels of immigration. **Aim:** The aim of the study was to explore the reasons behind private importation of antibiotics by international students as well as investigating their self-medication habits and their understanding and perceptions of antibiotic resistance. Investigating the effect of Covid-19 pandemic on antibiotic importation behaviors of the students and its association with antibiotic resistance was other objectives of the study. **Design and methodology:** Due to Covid-19 pandemic and traveling limitations, participants were chosen from international students who had come to Oslo before the pandemic. 14 international students coming from out of EØS were interviewed to perform a qualitative study. Findings from the interviews were analyzed through a thematic analysis. **Results:** the most common reasons which many of the participants have referred to were that they knew access to antibiotics to be very difficult in Norway. Considering the free access to antibiotics and the habit of using abundance antibiotics in their home countries, they felt the urge to import antibiotics with them as a precaution when moving to Norway. Students with a health background used more antibiotics and intended to renew their stock when possible, while students with non-health background showed more of a tendency to adapt to the Norwegian health system, using less antibiotics and having less of a tendency to renew their stock. Antibiotic resistance was identified by most of the students as a health threat, especially in their home countries, regardless of their correct technical understanding of the phenomenon. This remained with no apparent effect on their self-medication habits though. Most of the participants shared the same points of view towards the possibility of elevated antibiotic consumption in the Covid-19 situation. they also thought of importing more antibiotics if they were supposed to move to Oslo in pandemic situation. **Conclusion:** private import of antibiotics and self-medication with antibiotics is actively practiced by international students and immigrants, though further and more comprehensive studies are needed to investigate the magnitude of the phenomenon and its relationship with the antibiotic resistance in Norway.

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CHAPTER 1: INTRODUCTION

Antibiotic resistance is one of the biggest threats and a growing challenge globally today. Improved economics and, thus, increased demand of antibiotics in low and middle-income countries (LMICs) has increased the global antibiotic use by 39 percent from 2000 to 2015 (1). To reduce the antibiotic resistance world-wide the main goal is to reduce antibiotic use (2). Self-antibiotic therapy which is widely practiced in many LIMCs (3-16), where there is often easy access to antibiotics without prescription (17-25), is one of the main reasons of growing antibiotic resistance worldwide (26-29).

High level of antibiotic use in LMICs, however, can also affect high-income countries by some means. There is evidence that people who migrate to other countries from LMICs tend to keep the habit of self-medication and many of them take antibiotics with them when they move (30-35), or buy antibiotics online (36), and perhaps keep renewing their stocks whenever they have the chance.

To investigate the impact of private importation of antibiotics on antibiotic resistance, a comprehensive study on contributing factors may provide a better perspective. In this study international students were chosen as representatives of the associated homeland populations to provide insight into habits of their compatriots. The investigation of private importation of antibiotics by international students may develop an understanding of migrant behaviors regarding antibiotic importation.

Although there are levels of antibiotic resistance found in Norway (42, 43), highly regulated antibiotic prescribing has kept the level of antibiotic resistance relatively low (43). It may be assumed that private antibiotic importation by migrants, as in Norway, can compromise the containment of the low prevalence of antibiotic resistance (42, 43) due to the diverse populations and relatively high levels of immigration (14 percent of the population) (46).

The purpose of conducting this study was to explore how and why international students import antibiotics to Norway, how they use them and their conception of antibiotic resistance which can provide a deep understanding of the current situation in the matter.

CHAPTER 2: BACKGROUND

Excessive use of antibiotics and self- medication practices are among the reasons which have been recognized for increased antibiotic resistance in the world (2). Drivers for antibiotic self-medication In LMICs are related to the factors such as the role these medications play in people's lives around the world, inappropriate prescribing practices, and free access to antibiotics without prescription. "*quick fix*" (2, p. 2) and "*infrastructure"* (2, p. 2) are some of nicely said, new terminologies which describe the position of antibiotic among the world population today. Laurie Denyer Willis and Clare Chandler refer to antibiotics as a quick fix for providing health, a quick fix for hygiene in low resource settings and a quick fix for political and economic inequality (2). Antibiotics have turned to an essential tool used by public and physicians. They can be understood as an infrastructure which, as Bowker and Star say, "*The easier they are to use, the harder they are to see*" (2, p. 2).

Unfortunately, information regarding the level of antibiotic resistance in LMICs is scanty. However, the World Health Organization's (WHO's) new Global Antimicrobial Surveillance System (GLASS), reveals widespread occurrence of antibiotic resistance across 22 countries including high-income countries (HICs) and LMICs, with *Escherichia coli*, *Klebsiella pneumoniae*, *Staphylococcus aureus*, and *Streptococcus pneumoniae*, followed by *Salmonella* spp, as most reported resistance bacteria. The range of the percentage of the resistant bacteria to at least one of the most commonly used antibiotics were zero to 82 percent between different countries. Resistance to penicillin ranged from zero to 51 percent and *E. coli* resistance to Ciprofloxacin in urinary tract infection, ranged from eight percent to 65 percent among reporting countries (44).

Although there are levels of antibiotic resistance in Norway (42, 43), well and highly regulated antibiotic prescribing practices has kept the level of resistance very low in the country (43). According to European Centre for Disease Prevention and Control (ECDC's) Summary of the latest data on antibiotic resistance in the European Union (November 2017), percentage of invasive isolates with resistance to different antibiotics found in Norway is less than five percent for *Klebsiella pneumoniae*, *Escherichia coli*, *Acinetobacter* species, *Staphylococcus aureus* and *Enterococcus faecium* (43) .

It could be assumed that the growing number of migrants entering Norway from out of EØS and the high number of international students entering Oslo from these countries each semester (Prior to the Covid-19 pandemic) on one hand and challenges to access the health care system in Norway by asylum seekers, migrants and international students on the other hand (37-41), can be a threat to the low level

of antibiotic resistance in Norway especially in Oslo. This brings an additional need for conducting an in-depth study in the context of Norway.

Evidence regarding private import of the antibiotics by means of traveling (30-35), and online purchasing (33, 36, 45) by migrants and international students can be found around the world. Importing prescription medications, including antibiotics, (without a valid prescription) by any means such as posting, carrying by passengers and ordering online is prohibited by law in Norway, stated by the Norwegian Medicines Agency (Statens legemiddelverk) (79), but the private import of antibiotics has not been investigated in Norway by neither of quantitative and qualitative methods. Whereas, it can be assumed that private antibiotic importation by migrants, in a country with diverse populations can compromise the containment of low prevalent antimicrobial resistance.

Oslo has a diverse population. According to Statistisk sentralbyrå, as of 1st of January 2018, "*there were 746,700 immigrants and 170,000 Norwegian born to immigrant parents living in Norway, accounting for the 14 percent of the population"* (46, p. 1). Among these, Oslo has the highest number of the immigrant population. "*A total of 168 700 of Oslo's inhabitants were migrants and 54100 were Norwegian-born to migrant parents as per 1 January 2018*" (46, p. 1). This was accounted for the **33.1** percent of the capital population (46). Moreover, in 2017 a total of 8,644 international students registered at Norwegian higher education institutions, which six out of 10 are from outside the European Union or European Economic Area (EØS) (47). The International students accounted for 15 percent of the total student population and 31 percent of PhD candidates in 2016 (48).

To investigate the impact of private importation of antibiotics on antibiotic resistance, a comprehensive study on different contributing factors can provide us a better perspective. Due to limitation of a master thesis regarding time and resources, international students may provide insight to the practice of private importation of antibiotics into Norway by the entire immigrant population from the same state of origin. Unanswered questions in the field include reasons of private importation of antibiotics to Norway by international students, the patterns of their antibiotic use and their conception of antibiotic resistance which can provide a deep understanding of the current situation in the matter.

Another interesting element to investigate was the effect of Covid-19 pandemic on the importation and self-medication habits of different populations. Although Covid-19 is a viral disease, not treated by antibiotics, according to data from hospitals, more than 90 percent of patients are being treated with antibiotics to cure or protect against secondary infections during respiratory illnesses or hospitalization (64, 65). A review published in May 2020 showed that 72 percent of hospitalized patients with Covid-19 received antibiotic while only 8 percent actually had bacterial or fungal co-infections (66). On the

other hand, reports from WHO shows that Azithromycin along with Hydroxychloroquine have been used with Covid-19 cases to explore possible treatments (68). Additionally, probable large number of people who take the antibiotics on their own, must be additionally considered (64, 65).

The purpose of this study was to learn about how and why international students import antibiotics to Norway, how they use them and their conception of antibiotic resistance which can provide a deep understanding of the current antibiotic resistance situation and it relation with Covid-19 pandemic.

CHAPTER 3: RESEARCH QUESTIONS AND OBJECTIVES

3-1. Research questions

- How and why do international students coming from out of EØS import antibiotics to Oslo?
- What is international student's perception of antibiotic resistance?
- Has Covid-19 crisis affected the antibiotic importation habits of international students?
- What is the relationship between antibiotic resistance and the Covid-19 pandemic?

3-2. Objectives of my study:

- To explore the reasons behind private importation of antibiotics by international students coming from out of EØS to Oslo.
- To investigate the process through which they get access to antibiotics from their home country or elsewhere.
- To identify the methods of importation.
- To identify the types of the antibiotics imported most frequently.
- To investigate the self-medication habits of international students in Oslo.
- Understanding international students' perception of antibiotic indication and of antibiotic resistance.
- Investigating the effect of Covid-19 crisis on the antibiotic importation behaviors of international students.

The aim was to identify the underlying causes and practiced routes of importation to specify the types of imported antibiotics, to choose an effective policy to control and minimize the antibiotic resistance associated with private importation and self-medication. Furthermore, it was important to evaluate the degree of knowledge toward the antibiotic indications and antimicrobial resistance and its contribution to self-medication with antibiotics to develop the best educational methods to approach the phenomenon. exploring these topics may provide in-depth information regarding the status of private importation practices within international students and in a bigger scale migrants and refugee communities.

CHAPTER 4: LITERATURE REVIEW

To do the search, a broad search of the current literature was performed in databases such as PubMed and Web of Science, as well as various institutional websites (WHO, ECDC, Norwegian Medicines Agency) and Google Scholar search engine to provide a new perspective on selected drivers of private antibiotic import by international students**.** Other databases such as Scopus and med line were also used but they either had similar results or less relevant results than Pub Med and Web of Science.

None of the found literatures directly investigated the private import of antibiotics by either immigrants, international student, or other traveler groups in any part of the world. It means that this study is the first one of its kind. As no results was found on the topic, the search was expanded to other neighboring topics such as self-medication with antibiotics by migrants and international students, access to antibiotic in different countries and access to health system in Norway for migrants and international students.

Seven articles mentioned the practice of the private import of antibiotics by different migrants and international students. However, this was briefly mentioned as the articles focused on self-medication patterns. Among these seven articles, five articles investigated the self-medication habits of migrants or international students in different countries such as Sweden and Finland (30), USA (31, 35), Australia (32), and other European countries (33), one of them investigates the understanding of antibiotics and anti-microbial resistance in ethnic communities in Australia (34) and the last one investigates Drivers of Irrational Use of Antibiotics in Europe (36).

4-1. Private import of antibiotics by Pakistani students in Sweden and Finland

Results from a master thesis done by Khan With the title, "*Self-medication with antibiotics: Practices among Pakistani students in Sweden and Finland*" at the university of Södertörnin Stockholm showed relatively high levels of self-medication (31.9 percent) with antibiotic among 213 international students in Sweden and Finland during their stay in study countries (30). Among them 27 percent of them considered to continue self-medication with antibiotics in future (30). This study also demonstrated that 111 (52.1 percent) of the whole 213 participants have practiced antibiotic self-medication in their lifetime, which shows the habit of self-medication at their home countries (309.

Almost all (98.8 percent) antibiotics used for self-medication were imported from Pakistan where antibiotics are available without prescription (30). The most common antibiotics were broad spectrum penicillin (41.2 percent), Macrolides (23.5 percent) and Quinolones (6.2 percent) (30). The most

common reasons for using antibiotics were respiratory (42.6 percent) and oro-dental (13.2 percent) problems (30).

42 percent of the participants knew that antibiotics can be harmful to them (30). In fact, the self-medication rates were not significantly lower in groups of students who knew it may be harmful or unsafe (p=0.2) (30). The most common motivation for antibiotic self-medication was reported to be the affordable healthcare consultations as well as low-cost antibiotics (23.9 percent) (30). There was also no significant difference between the country of studentship (p=0.6) (30).

In Khan's study, samples were made up of Pakistani students who were members of one of the Yahoo groups for Pakistani students, in Sweden or Finland and all the students which were not in these Yahoo groups were excluded from the study (30). As they also mentioned it in the study, this brings up the doubt if the samples are truly representative of all Pakistani students in these two countries (30). It is probable that some of the Pakistani students at the time of study were not members of these groups (30). On the other hand, among all 9333 students who were contacted in the beginning of the survey, only 213 students agreed to participate after five reminders which means the response rate has been 2.3 percent, which also raise response bias (30).

4-2. Private import of antibiotics to America by Latino immigrants

An article published by Mainous et al. in the *Journal of Emerging Infectious Diseases* in June 2005, with the title of "*Nonprescribed antimicrobial drugs in Latino community, South Carolina*" investigated the practice of antimicrobial drug importation and use of nonprescribed antimicrobial drugs by Latino community (74.8 percent from Mexico and 25.2 percent other Latin countries) in South Carolina, United States of America (USA) (31). This study showed that among 219 participants 16.4 percent had transported nonprescribed antimicrobial drugs into the United States, and 19.2 percent had acquired antimicrobial agents in the United States without a prescription (31). The rest of the antibiotics were obtained from special small stores called "*bodegas pharmacias"* which is an organized system of non-prescription antimicrobial drug distribution within the Latino community in the USA (31).

23.7 percent of the participants who brought antibiotics to USA, reported it is "*likely*" (31, p. 885) or "*very likely"* (31, p. 885) that they purchase and bring antibiotics back to USA again without visiting a doctor when they go to trips outside USA in future (31). 30.6 percent also believed that antimicrobial drugs should be available as over the counter in USA (31). The amount of self-diagnosis and self-

medication is relatively high in Latino countries, and it seems that Latino communities tend to maintain health beliefs and practices that were infused in their home countries when they move to USA (31).

The foremost reason for importing the antibiotics reported by Latino immigrants was mistrust of medications inside the United States and being more comfortable with medicines coming from one's home country (30.6 percent) (31). Other reasons included: to pay less (19.4 percent), to avoid going to doctor (16.7 percent), to avoid the language barrier (13.9 percent), to prepare for future illnesses (13.9 percent) and to treat other people's illnesses (5.6 percent) (31). The most common conditions for what they purchased the antibiotics included cough (88.9 percent), ear infections (88.9 percent), sore throat (69.4 percent), and colds (58.3 percent) (31).

The disadvantage of Mainous's study, just like Khan's study, is about samples being representative for the population. Participants were recruited from a mid-sized community while other parts of USA may have larger communities (31). On the other hand, participants were recruited from clinics, so Latinos who did not have access to formal health care system have been excluded from this study (31). In fact, these groups are even more likely to acquire and import antibiotics (31). Another unclear issue regarding this study was formal consent. Authors did not mention anywhere if participants have formally consented to take part in the study.

4-3. In-home storage and self-medication by Chinese immigrants in Australia

Jie Hu and Zhiqiang Wang investigated the "*In-home antibiotic storage among Australian Chinese migrants*" in 2014 (32). This study demonstrated that 220 (47 percent) participants of the total 469 participants stored antibiotics at home at the time of survey and 114 (24.3 percent) of them brought antibiotics into Australia in the last 12 months (32). Also, 40 percent of the participants believed that antibiotics should be available over the counter in Australia (32).

Interestingly, a large number of these people (79 percent) were aware of antibiotic side effects and 84 percent were aware of antibiotic resistance (32). In fact, the possibility of storing antibiotic at home was slightly higher among those who had knowledge about antibiotic resistance and side effects (32). The possibility was twice bigger in participants who could correctly identify amoxicillin as an antibiotic than those who were not sure whether amoxicillin was an antibiotic (32).

Hu and Wang's study also had the same limitations as two previous studies (32). The study samples might not be representative of all Chinese migrants inside Australia, because samples were recruited through social networks which include mostly young and educated people (32). Elderly Chinese which probably are not members of these networks and probably have a great tendency to store medications

inside the house were excluded from the study (32). Other limitations included "*the true understanding of what an antibiotic is*" and "*under reporting*" which also was applicable to Khan's and Mainous studies (30-32).

4-4. Private import of antibiotic by ethnic communities in Australia

Another qualitative study, by Andrea Whittaker et al. (2016) around investigating "*Understandings of Antibiotics and Antimicrobial Resistance in Diverse Ethnic Communities in Australia: Findings from a Qualitative Study*." also confirmed importation of antibiotics by some migrant communities in Australia (34). Whittaker study's participants were recruited from hospital settings and among those migrants who were sufficiently confident in their English language skills and who wished to participate in an interview. So, as they recognized themselves, the results of the study are not generalizable (34).

4-5. Self-medication practice in European countries

Various studies investigated in a systematic review (2018) regarding the determinants of self-medication with antibiotics in European countries showed common practice of self-medication among immigrants around the world, such as Latino immigrants in the USA. This is explained by, among others, barriers that make it difficult to use primary health care services, language barriers, and the use of imported antibiotics from their home country (33).

4-6. Self-medication with antibiotics in USA

Article about "*Antibiotic use for the treatment of upper respiratory infections in a diverse community*." by McKee, et al (1999) showed that twenty-six percent of respondents used antibiotics for urinary tract infections (URIs) in the previous year that were not prescribed for that condition by a physician. While among these participants, 21percent obtained antibiotics from outside the USA, 61 percent used antibiotics left over from a previous illness, 46 percent obtained antibiotics from a family member and 31 percent obtained them directly from a pharmacist without a prescription (35). Participants were recruited from hospital settings which again bring the bias into the research toward those who have used antibiotics and can underestimate the actual number of people who used antibiotics. Under reporting is another limitation of the study (35).

4-7. Illegal online purchase of antibiotic in Europe

Another review on Drivers of Irrational Use of Antibiotics in Europe showed that antibiotics can be accessed inside European countries through illegal online pharmacies. There are numerous

international online pharmacies operating illegally outside the EU that can supply European patients by post or courier. These online vendors are neither authorized to operate in the EU nor do they adhere to national practices and guidelines (36).

4-8. Gap in the literature

While self-medication with antibiotics have been studied in many LMICs, there is very little information regarding high income countries (HICs). Self-medication with antibiotics by migrants and international students have been studied in a few contexts. Unfortunately, the studies conducted are relatively old. Furthermore, private importation practice of antibiotics to the hosting countries by migrants or international students had been never thoroughly investigated, and there is a gap for a comprehensive in-depth study in this field.

CHAPTER 5: STUDY DESIGN AND METHODOLOGY

5-1. Design and data collection

A qualitative methodology was considered optimal to answer the research questions. As Moen et al. (2015) state that qualitative research methods provide strategies for exploring experiences, practices and phenomena in sociocultural worlds (51). Qualitative methodology helps us to understand not only how people think and act but also explores how people give meaning to their life experiences (52). For data collection I used semi-structured interviews which are the most used method for data collection in a qualitative study and the best way to obtain comprehensive understanding of a phenomenon (53). Semi-structured interview allows participants to express their thoughts more freely rather than just answering the questions. Follow up questions were asked as required. The interview guide consisted of questions which would address the main research questions and objectives. It covered an array of ideas such as: reasoning behind the private importation of antibiotics, kind of imported antibiotic and participants' knowledge about the antibiotic's indications and conception of antibiotic resistance.

Interviews involved international students and were conducted in English, so there was no need for translators. Interviews were done during the autumn 2020 and beginning of the spring 2021 semesters. For recording the interviews, an app named "diktafon" was used which were installed on the smart phone and provided the ability to save the recorded interviews directly on TSD (service for student data). By using this method, audio files were not saved on the phone itself and the access to the interview data became limited and preserved for. The audio files were then transcribed and stored on TSD as well. After anonymizing, the transcripts were exported to the personal computer to be coded and analyzed. I made sure to ensure the privacy of the interviewees and all interviews were done in a one by one situation either face to face or online.

5-2. Conceptual framework

According to ecological perspective model proposed by Glanz et al., health behaviors such as private import of antibiotics cannot be analyzed independently from the surrounding environment and is in consistent in relation to physical and socio-cultural environment (49).

The individual's knowledge, attitude and perspectives have significant influence on how the person behaves and takes choices. So, in individual level, understanding people's values and attitudes toward antibiotic indication and antimicrobial resistance is therefore important in designing programmers and policies. On the interpersonal level "*primary groups, including family, friends and peers that provide*

social identity, support and role definition" (50, p.16) play a role. In this case self-medication habits of the family and peers can influence individual self-medication practices. On the wider community level, structural arrangements, social and cultural values, and policies and programs for instance have reciprocal connectedness with the earlier two levels (49, 50). According to the literature review, easy access to antibiotic in homelands (17-25) and difficulty in health care access in the country of destination (37-41) are the main contributing factors to private import of antibiotics by migrants and international students in community level. Global crisis such as the Covid-19 pandemic can be also considered as a contributing factor to this phenomenon in a community level.

The conceptual framework of this project can be summarized in figure 1.

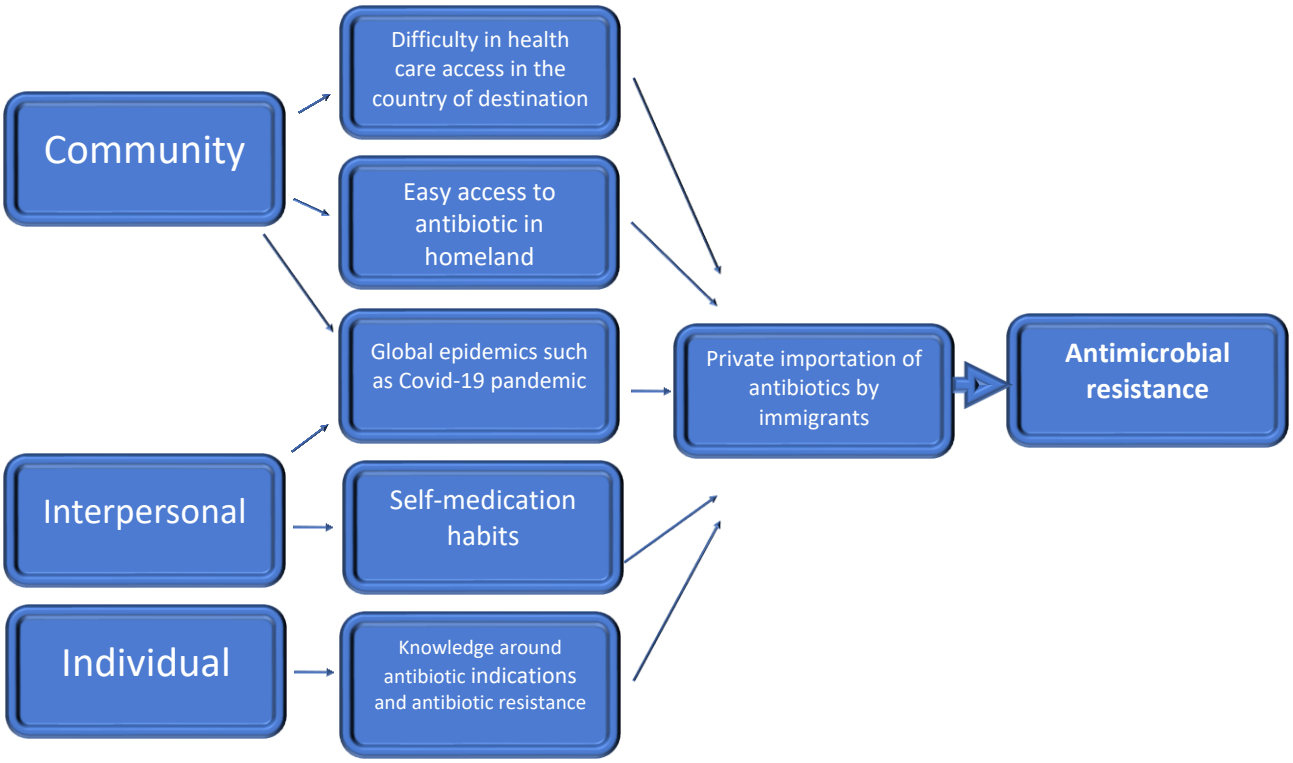

Figure1. conceptual framework

5-3. Recruitment and sample size

For sampling in a qualitative research, a wide and diverse range of participants that are of potential relevance to the theme should be included (51). I tried to engage a diverse range of international students by recruiting male and females of various ages and ethnicities, educational backgrounds, marital and parental statuses.

New international students arriving in Oslo were meant to be the participants of interest, however, due to the Covid-19 pandemic new international students could not enter Norway in Autumn 2020. Therefore, international students from previous semesters were recruited. Participants were recruited through the University of Oslo (UiO) international student's Facebook group as well as further snowballing. A pilot study was done using the same interview questions involving a small group of international students of the "international community health master's program" to validate the interview guide (Appendix 1)

An initial projection of 20 students coming from out of EØS countries who had imported antibiotics to Norway were considered for this study. I recruited 20 participants who were either current master students, PhD students, or had just finished a program. They all had antibiotic(s) on their person when they initially moved to Norway. Formal consent was received from all. Though interviews were stopped at 16 when saturation has occurred. From those 16 interviewees, one participant withdrew consent and the data was excluded immediately. the participant was unaware of the medications in her possession and had assumed some were antibiotics. After checking their medication list, no antibiotics were identified and, therefore, the participant did not match the inclusion criteria. The data was excluded from the study consequently. The audio files of the remaining 14 interviews were transcribed afterward.

Demographic information was gathered through interviews include age, gender, marital status, parental status, country of origin, educational background and the duration of stay in Norway.

Age range of the participants was from 25 to 37, with an average age of 29. Participants were chosen from different nationalities including Russia, Bangladesh, Iran, Palestine, Pakistan, Nepal, Sudan, Gambia, Ghana and Canada, which consisted of 11 were women and three men. seven of the participants were single and seven of them were married at the time of moving to Norway as an international student. Among the married participants six of them had children when emigrating to Norway.

To involve the effect of previous knowledge about the antibiotics, participants were chosen from health and non-health backgrounds. Seven were of health backgrounds and seven were of non-health backgrounds. The focus was on the study program that the students had graduated form before coming to Norway, as that considered to be the knowledge background they had when practicing the private import of the antibiotics. The health-based programs which were completed by the participants included pharmacology, MD, dentistry and physiotherapy while non-health programs included health information technology, molecular biology, biology, political science and international relation,

economy and mathematics, law, and English literature. Duration of stay in Norway varied from one to six years.

Summary of the demographic information is shown in table 1.

Candidate number	Gender	Age	Country of origin	Educational background	Marital status	Parental status	Duration of stay in Norway
1	Female	37	Gambia	MD*	Married	2 children	2 years
2	Female	26	Pakistan	Pharmacology*	Married	No child	3 years
3	Male	28	Palestine	MD*	Single	No child	1 year
4	Female	26	Bangladesh	Dentistry*	Single	No child	1 year
5	Male	33	Sudan	MD*	Single	No child	5 years
6	Female	33	Bangladesh	MD*	Married	2 children	1 year
7	Female	30	Bangladesh	Physiotherapy*	Married	1 child	1 year
8	Female	25	Iran	Health Information Technology	Single	No child	1 year
9	Female	27	Iran	Molecular Biology	Single	No child	3 years
10	Female	24	Canada	Biology	Single	No child	3 years
11	Male	25	Russia	Political science and international relation	Single	No child	2 years
12	Female	27	Bangladesh	Law	Married	1 child	1.5 year
13	Female	34	Ghana	Economy and mathematics	Married	1 child	6 years
14	Female	31	Pakistan	English literature	Married	1 child	3 years

Table 1. Demographic characteristics of the participants
*Health background

5-4. Ethical challenges

5-4-1. Notifying the Norwegian Center for research Data

As I did not gather health information regarding my participants, Ethical approval from the Regioanl Ethics Committee (REK) was not required. The Norwegian Centre for Research Data (NSD) was informed regarding the project and the NSD approval Was obtained in May, 2020 prior to fieldwork (Appendix 3)

5-4-2. Anonymity and confidentiality

It is the responsibility of the researcher to protect the privacy and the confidentiality of the participants in any kind of medical research (54). The Helsinki declaration paragraph 24 points out the importance of protecting the privacy and confidentiality of the research subjects by all precautionary means (55). Confidentiality of the participants can be preserved by two actions: (54)

1. Safe handling of the information to eliminate the possibility of violating the participant's anonymity and confidentiality (54).
2. Obtaining informed consent before using the personal information for the research (54).

In this study, the elements such as name and their current study program which could identify the participants identity were omitted from the transcripts. All participants were recognized by codes and the information collected from the participants were saved on the service for student data (TSD) to limit access to the data. The file which relates their real identity to the codes were stored separately. Informed consents were obtained from all participants after adequate explanation regarding the research and preservative methods for handling and safety of the data.

5-4-3. Informed Consent

Voluntarily informed consent is a fundamental requirement in research ethics which has been emphasized by many international guidelines (56). The requirement is based on the essential moral duty not to violate an individual benefit and integrity and respect human dignity (56). According to Council for International Organizations of Medical Sciences (CIOMS) guideline, informed consent is a decision made by a participant who (57):

- Has received the necessary information (57)
- Has understood it entirely and after thinking about it (57)
- Has made the decision without any constraint, inducement, or threatening (57)

In this study comprehensive, comprehensive and easy to understand information was developed for the participants regarding all aspects of the project in an information letter (Appendix 2) which was shared with the participants through email in forehand. I assured the participants that the information regarding their identity was not recorded while analyzing the data. Participants were informed that they can chose not to answer the research questions or withdraw from the research at any stage. They were provided with the contact information of the researcher, supervisor, the UiO's data protection officer and contact information for NSD. Participants were told that they can freely contact any of these contact points in case of any unclarity or issues.

This study was conducted under an assumption that not all participants would be aware of the legality status of importing antibiotics to Norway. The private importation of antibiotics is illegal in Norway and so to ensure the participants privacy and safety, they were made aware that their information would be made anonymous. No activity would be reported to the Norwegian authorities.

Referring to the project, not more than the minimum risk was predicted for the participants, which means that the consequences of the research is not bigger than what is expected in daily life. The participants were international students and data was collected through face to face interviews and online face to face video conferences. All the participants were asked to sign a written informed consent or send an email to confirm the informed consent. Participants who were interviewed face to face were provided a copy of the informed consent before the interview.

5-5. Validity and reflexivity

Being an international student coming from out of EØS made me an insider to a large extent. Being an insider, participants felt more comfortable to share their thoughts about the topic with me, however, this might have influenced the way I chose my research questions or perceived information shared by the participants.

Living in Iran for most of my life, I am thoroughly familiar with the self-medication habits and free access to antibiotic in the middle-income countries, and have some presumptions about the reasons claimed by the participants for bringing the antibiotics with them when coming to Norway. Also, my verbal and facial reactions throughout the interviews in some points led participants toward confirming or challenging my ideas and preconceptions of the topics.

In order to reduce the effect of my preconceptions and understandings, I constantly checked and reviewed the interview questions, findings and discussions with my supervisor to get a third insight throughout the process as well as to avoid terminologies or conclusions which would root in my background as a pharmacist and as an insider. I also shared the findings with my classmates from different ethnical and educational backgrounds to get their insights regarding the coding and analyzing processes.

Triangulation with the existing literature regarding the methodology, data analyzing and discussing the findings of existing literature was another way to validate the truthfulness of the study. Triangulation and comparisons were constantly done throughout all the processes of designing the study, data gathering and analyzing the data. Most of the findings of the study were discussed and explored with the appropriate literature review which helped to validate the study findings.

The point of saturation in the data is another factor which can evaluate the validity of a qualitative study. In the beginning of the project, it was determined to interview 20 international students coming from out of EØS who had antibiotics with them when coming to Norway. During the process of data

gathering and after conducting 16 interviews, I determined the point of saturation was reached as there was no new information being shared in the interviews. So, the interviews were stopped at this point.

To ensure the validity of the sampling process, I tried to engage a diverse range of international students by recruiting both male and female participants with a wide age-range from diverse ethnical, educational backgrounds and marital and parental statuses. The final group of participants were recruited based on the intended criteria.

The recruitment process began with making a public announcement in the Facebook group of international students of the UiO include as more diversity in ethnicity and educational background as possible. Though due to the sensitivity of the topic and the fact that private import of antibiotics is illegal in Norway, the response rate was very low and only four participants Were recruited through this method. Recruitment shifted to classmates of the researcher which expanded to snowballing through word of mouth. The limitations of recruitment can impose some bias into the study.

C HAPTER 6: FINDINGS AND DISCUSSIONS

Referring to the research questions and objectives the findings of this study was categorized into four categories:

- Reasons and contributing factors to private import of antibiotics
- contributing factors for self-medication practices
- Knowledge and perceptions of antibiotic resistance
- Association with Covid-19.

The categories were subsequently divided to more subcategories depending on different themes and related criteria. Each category is discussed against existing literature and the research objectives.

6-1. Reasons and contributing factors to private import of antibiotics

Findings obtained from the interviews demonstrated different reasons for importing antibiotics by international students. These can be categorized into the following subcategories: participants' previous information about the accessibility to antibiotics in Norway, accessibility to antibiotics in home countries, disease patterns in home countries, habit of prescribing and use of antibiotics back home, habit of export-import of antibiotics, fear of cold and sickness, antibiotics as precaution and doubts about the health system in Norway.

6-1-1. Previous information

Participants were asked about where and how they got the idea of buying and importing the antibiotics. Advice from friends and families who have already lived in Norway was the main source of information about the lack of accessibility to antibiotics in Norway. Personal investigations through internet was the other source of information.

"... when I was coming to Norway, one of my family members who is living here for seven years, told me that it is very hard to get antibiotics here ..." (Participant 2)

"I contact[ed] with some seniors who were studying here, they said that it is very difficult to get medicines without prescription." (Participant 7)

"So before coming I asked people who lived here, and they said before having a personal number you don't have access to health care" (Participant 6)

"Actually, I heard from the Iranian people who are here in Norway that doctors (GPs) don't prescribe antibiotics because of the antibiotic resistance program." (Participant 8)

"I had some concerns, I did some research about the health care here and some of my friends or the ones that were coming from Iran to Norway told me that health care here is very restricted in giving antibiotics…"(Participant 9)

"Because before I came here, I used to hear that doctors do not prescribe antibiotics when you need it. Because they want to see the natural evolution of the disease" (Participant 1)

"Because I know the system in Europe and how sometimes it is impossible to get antibiotics" (Participant 5)

"Because it is a general thing, first of all I knew when I was searching for my application … I searched for the health and lifestyle and there was something in there…" (Participant 4)

6-1-2. Access to antibiotics

When participants were asked about antibiotic access and availability in their home countries, they described how they freely accessed antibiotics back home by buying it directly from the pharmacies without prescription. They emphasized that there are regulations limiting antibiotic access to prescription but there is a huge gap in implementation.

"… in my country you don't need to always go to the hospital so if you like having a headache you can go to the pharmacy and take medicine" (Participant 13)

"In Bangladesh you can go to pharmacy and you just say you have had fever for three days or I was having runny nose, bla, bla, bla and they just suggest you antibiotics" (Participant 12)

*"**How do you access antibiotics back home?** Just go to the pharmacy and buy it without prescription, yeah! We just ask which one is better for the coughs? Which one is good for the fever? and they just give it to you over the counter." (Participant 14)*

"First of all, in my country if we want to buy antibiotic, even if we don't have prescription, we can buy it… Sometimes in some pharmacies like public hospitals you need to have a prescription, but in the private ones, they do not care as long as you have the money you can have access to them. It is illegal but it is practiced." (Participant 4)

"You need prescription, but you can buy without prescription also. It doesn't matter, there are regulations but no implementation." (Participant 6)

"We can go to pharmacist and get the medicine" (Participant 1)

"But in my country, it is very common thing, whenever we get sick, we just go to the pharmacy and we can take antibiotics." (Participant 7)

"People don't go for a doctor and ask for prescription, they just go and name what comes into their mind and they are comfortable with and they get it from the pharmacy." (Participant 14)

One of the participants from Canada declared that she had asked her doctor to prescribe some antibiotics for her just to carry them in case and the doctor accepted the offer and prescribed the antibiotics for her.

"But I asked my doctor to prescribe antibiotics so I could have some in case I needed it in Norway. She prescribed it to me, but I didn't need it at that time!" (Participant 10)

And another participant from Russia said that the pharmacy demanded prescription for the antibiotics, then he described how he verbally said to the pharmacist that he had the prescription and got the antibiotic without showing prescription to the pharmacist.

"…so, I went to the pharmacist and he asked me if I have a prescription and I said yes, but clearly, I didn't have the prescription, but I took it!" (Participant 11)

6-1-3. Disease patterns back home

Participants explained how they used to get more infectious diseases back home than in Norway and how they shared the common habit of just buying antibiotics directly from the pharmacy whenever they became sick.

"…I used to get really sick when I was in Iran" (Participant 9)

"The idea for me to consult other people before I came was because I have some chronic diseases [the recurrent sore throat and pneumonia], so I was thinking of bringing my medications with me…, in my mind I knew that antibiotic will take it away in few days." (Participant 5)

"I used to take lots of antibiotics back home, because you know usually we have a mindset, if you have a fever and it does not go in three days we just go to dispensary and get the antibiotic" (Participant 12)

"I used to get sick three to four times a year when I was back in Lebanon and I was used to use antibiotics. And 1-2 times a year back in Turkey but not here." (Participant 3)

*"**But how was the situation for you back home? Did you use to become sick more often than here?** Yeah! Specially for my baby. There, he would become sick more than here in Norway. Maybe because the weather is not clean and there are infectious things there, so maybe that is the reason." (Participant 7)*

6-1-4. Habit of prescribing and use of antibiotics back home

Participants declared that antibiotics are mainly the first thing to be prescribed by the doctors in their home countries and it is considered as a common practice.

"In Pakistan my child used to get antibiotics every time he was sick." (Participant 14)

"Doctors prescribe antibiotics obviously more than here and if you have fever and you go to the doctor in the first day, they prescribe you antibiotics." (Participant 7)

"*…It has become part of my culture and that is why I brought antibiotic with me in my trip to Norway." (Participant 5)*

Participants with medical background also explained how patients push them to prescribe antibiotics during the doctor visits. If the doctor does not prescribe antibiotic, they will get it directly from the pharmacy when they go to buy other prescribed medications.

One of the participants from Gambia who was a medical doctor described how people reacted to doctor's decision back home.

"In my country even if I, as a doctor, tell them that it is not bacterial and it does not need antibiotics… once they go out of the office they will say this doctor does not know what she or he is saying and they will go and buy the antibiotic." (Participant 1)

The other participant from Sudan with medical background shared the same experience regarding prescribing antibiotics back home.

"Back home the first thing you start the prescription with is antibiotic you know!? When I was working as a doctor, people wouldn't be satisfied if I wrote a prescription without antibiotic, and they have become familiar even with the names so whenever they go to the pharmacy and the prescription doesn't include the antibiotic, they won't be happy." (Participant 5)

There is a common belief that antibiotics can treat the disease much faster, even among the medical doctors and participants with a health background. One of the participants with a background in dentistry mentioned how she thinks using antibiotics makes disease go away faster.

"***…you mean antibiotic is safer?*** *I do not say safer, but it just takes less time for the disease to go away maybe, so it is faster." (Participant 3)*

The other participant with medical background also argued the same point.

"As a medical doctor, I know we shouldn't use it that much but still we feel it is kind of faster… it will speed up the process of treatment and we have to jump directly to the antibiotics." (Participant 5)

Many of the participants revealed that they have medicine cabinets back home and they would keep the leftovers or newly bought antibiotics and medicines and keep them for future use. They confirmed that this is a habit practiced by most of the population back home.

"*Every household has some medicines." (Participant 13)*

"…and of course! People have their own medicine cabinets in their home. Yeees! And it is also very common and also if someone get a disease in the house and take the antibiotics when the next person gets sick says that can I use the leftovers?" (Participant 1)

6-1-5. Habit of exporting and importing of antibiotics

The habit of travelling with antibiotics was mentioned as a common practice by most of the participants and they confirmed that this is also a habit practiced by most of the population in their homelands. This was a common practice among participants with health and non-health backgrounds.

Participants with non-health background simply described how taking antibiotic when traveling or moving to other countries is a mutual practice in their families and society.

"*Because I used to travel and usually those antibiotics are also prescribed for prophylaxis. Also, when I travelled to India it was very useful because of the sanitary condition obviously, yeah!... My mum said, 'Why don't you take them with you?' ". (Participant 11)*

"I don't know if you have interviewed other Bangladeshi people, but you know every region has something different, some common diseases. So maybe most of the Bangladeshi people say we have fever, we have diarrhea, so people coming from Bangladesh, most of them carry those basic medicines." (Participant 12)

"…my mum just gave me a pack of basic medicines and she put two different types of antibiotics… Sometimes when I was travelling my mum would just give me a package of medicines that I might need. Including pregnancy test and …I think it is the way that they care for us back in Pakistan. And also, everyone who is travelling they take medicines with them." (Participant 14)

"Because my parents told me that you should take them for emergency days, and I brought some…" (Participant 8)

Even participants with health background illustrated that their practice of importing antibiotics were mostly based on them being a traveler moving to another country rather than being based on their health knowledge.

The participant with dentistry background said:

"Yes! It is very common. Everybody in my country knows that the amount of free access that we have in our country is not the same in other countries. At least within south Asia it might be easy but outside of south Asia, everybody knows it is very difficult to access. So, I think for any kind of trip… because I saw my sisters who are going for the vacation for USA, they always take antibiotics or other medicines with them." (Participant 4)

One of the participants with medical background from Sudan also declared how he did not think as a medical doctor but as a student when decided to buy and bring antibiotics and confirmed the fact that it is practiced by everybody back home.

"For me when I was coming to Norway and bringing the medication with me, I wasn't thinking with my medical background. Just as a normal student who is going to a different country who has to bring his first aid with him. And for us first aid includes the antibiotic.

It is common to take your antibiotic with you when you are travelling to Europe or the United States, because people know it is hard to take it. But that requires that you are going to a long trip, not a short trip. For long trips, yeah! It is advisable to take antibiotics with you. And even some people ask who is coming to this country to bring antibiotics for me." (Participant 5)

The other participant with a medical background from Palestine also mentioned that he regularly travels with antibiotics.

"Ooh! I think I got it directly when I knew I am traveling. Yes, I always take them when I travel, and I remember that I forgot to bring them, so I got them when I was at the airport. So, I wrote a

prescription in the airport to my friend who was with me so that I can get it from the airport." (Participant 3)

Two of the participants confirmed that their acquaintances who have lived here for long time had asked them to bring antibiotics for them when they wanted to move to Norway which shows that people tend to keep the habit of importing antibiotics even after years of living in the destination country.

"A friend who has lived here for more than 10 years, asked me to bring antibiotics for her." (Participant 9)

"I know a friend who have been here for 20 years and first when he understood that I have brought antibiotics with me, he was so surprised and told me that you do not need them here, but then he was the one who came to me and asked for antibiotics. And he asked me to bring him more from home." (Participant 5)

6-1-6. Fear triggers precautionary act

On one hand, there were concerns of the weather and fears of becoming ill, especially children. On the other hand, there were doubts about the healthcare system in Norway.

6-1-6-1. Fear of cold

Fear of cold was one of the most common reasons among the participants. Most of the participants were from countries with warmer and sometimes more humidity climates, and Norwegian cold climate could be a big challenge for them.

"*Some of my friends or the ones that have come from Iran to Norway told me that health care here is very strict in giving antibiotics. and I was so concerned with the cold weather, that I will catch cold or become sick, so I brought some medications with me and among them there were antibiotics as well." (Participant 9)*

"I was living in a country that climate is different, it is tropical, so I never had cold problem but because I thought it is the first time I am coming here and Norway is the coldest area so I might have" (Participant 6)

"Because it is a cold country, so that is why I took some medicines." (Participant 6)

6-1-6-2. Fear of sickness

Fear of sickness was more dominant in the participants with children. Participants with children mentioned their children's health and safety is their foremost concern and priority.

A participant from Bangladesh who was the mother of a two-year-old explained:

"Basically, I focused on fever part because maybe you know that when you have a kid and they have fever, and temperature increases more than 101 degree [Fahrenheit], sometimes they have breathing problems or other issues. So, I just brought those medicines for safety, so I mainly focused on my kid." (Participant 12)

One of the participants with two children who had the medical background from Bangladesh also declared:

"I was afraid that if we, specially my children, if they suffer any illness, so I will not have the access to medicine" (Participant 6)

The other participant also with medical background from Gambia with two children shared the same concern:

"When I was coming, I was coming with two children and I was not sure about the health system of Norway so just to safeguard I brought Amoxicillin syrup with me and Amoxicillin tablets for adults." (Participant 1)

6-1-7. Doubts about the health system

The uncertainties around the health system of a new land created a big concern for the participants of both health and non-health backgrounds.

"and of course, the fear that you may not get good health care here might lead you to bring antibiotics with you" (Participant 9)

"I didn't know the system here so that is why..." (Participant 13)

"Ok, the second we moved to Norway, we didn't know about the medical system or everything" (Participant 12)

"I think another thing why also people bring antibiotics to Europe or Norway is because you [they] are not sure of the health system. Before you come here you don't know whether you have to pay a lot…some people are just uncertain about the whole situation so for them they think it is ideal

to bring the medicine with them, so then when they get sick and it is so expensive for them they can start their own treatment." (Participant 1)

"*I thought if I get any infectious disease it is not possible to contact the doctor and it takes more time to get medicine or maybe they will not give antibiotic to me and only [for] that purpose I took some medicine[s]." (Participant 7)*

6-1-8. Antibiotic as precaution

The concerns and fears mentioned in previous parts made the participants think cautiously. They described as bellow:

"I brought those as a precaution for myself, my baby and my husband, especially for the baby." (Participant 12)

*"**Why did you bring the antibiotics?** If say in one word, that is only for prevention purpose." (Participant 7)*

"***Why did you bring the antibiotics?*** *I don't know, just in case, and it is like the simple ones though I thought they are really effective" (Participant 11)*

6-1-9. Discussion

One of the objectives of this study was to explore the reasons behind private importation of antibiotics by international students coming from out of EØS to Oslo. Upon findings from this study, the most common reasons which many of the participants have referred to was that they knew access to antibiotics is very difficult in Norway and considering the free access of antibiotic and habit of using lots of antibiotics in their home countries, they felt the urge to import antibiotics with them as a precaution when moving to Norway.

Participants mainly received information about the accessibility of antibiotics in Norway from their friends and families who have already lived here. They encouraged students to bring medications and antibiotics with them which can show how they are concerned about the accessibility of antibiotics in Norway. Two of the participants also revealed how their compatriots who lived in Norway for years, have asked them to bring antibiotics for them.

Free access to antibiotics in LMICs is reported by many studies (17-25). It is concluded that open and easy access to antibiotics in the participants' home countries is a main driver in the importation of

antibiotics for international students. Almost all the participants declared that they could easily buy antibiotics from pharmacies without prescription.

Even though in most of Asian and African countries, there are established rules indicating the obligation of having prescription for buying antibiotics but there is a huge gap in implementation of the rules and controlling measures (3, 8). Even in the countries such as Canada that there are strict rules about dispensing antibiotics from pharmacies, it seems it is possible to find some gaps in the health system which allows people buying antibiotics without actually needing it. Pointing out the participant from Canada who succeeded to obtain antibiotics through a prescription which was written without indication by a doctor.

According to the participants of this study accessibility to antibiotic in general plays a significant role in the amount of antibiotic self-medication as the students with medical background from Sudan who has lived here for 5 years and know many immigrants here claimed: *"I can imagine if antibiotic is over the counter more people will ask for antibiotic from the pharmacy during the winter here."* Or the other student with dentistry background from Bangladesh described how her perspective regarding the self-medication has changed as she has not access to them freely here: "*here the access to medications is very hard so, my perspective changes even if I had so many back pains or even if I had fever or something I tried to bear it or go to doctors rather than just taking pills that I have."*

In fact, people coming from LMICs are so used to purchasing antibiotics freely from the pharmacies without prescription that they have begun to believe it is natural for antibiotics to be over the counter globally. The Mainous study which investigated "*Nonprescribed antimicrobial drugs in Latino community, South Carolina*" shows that 30.6 percent of participants believed that antimicrobial drugs should be available as over the counter in the USA (31). This is also confirmed by Hu and Wang's study, "*In-home antibiotic storage among Australian Chinese migrants"* where 40 percent of the participants believed that antibiotics should be available over the counter in Australia (32).

Participants explained the high occurrence of infectious diseases back home and how they followed a common habit of self-medication with antibiotics. Even participants with medical background felt the urge to prescribe antibiotics for all patients with infection back home, regardless of the cause being viral or bacterial. Prescribing and use of antibiotics is so common in Asian and African countries that participants believe it as a part of their *culture*. Many studies have also clearly shown how the amount of self-medication is high in LMICs (4) including Asian countries (3, 6, 7-10, 13, 15), Latin countries (5), and African countries (11, 12).

The habit of self-medication back home accompanied with the habit of taking antibiotics when travelling to European countries and USA, mentioned by most of the participants, resulted in practicing the private import of antibiotics to Norway. Khan's study showed that almost all (98.8 percent) of the antibiotics used for self-medication by Pakistani students in the University of Södertörnin in Stockholm were obtained from Pakistan (30). Also, Mainous' study confirmed that 16.4 percent of antibiotics used by Latino communities inside USA as self-medication, was transported to USA from abroad (31). Participants of this study also confirmed that the export and import of medicines including antibiotics is a common practice among the people in their home countries which is also confirmed by literature such as studies related to self-medication practices of immigrants (30-35).

The other strong driver that led international students to import antibiotics to Norway was fear. Fear of cold weather, fear of sickness and fear of not knowing how the health system works in Norway made them import the antibiotics as precaution when moving to Norway. Participants who had children, in particular, were more concerned about their children health, fearing unknown diseases that they may become involved in, especially fever.

Though the clear difference between the incidence of infectious diseases here in Norway in compare with their home-countries has proved that this fear has been to a large extent unreasonable and unnecessary. It seems antibiotics in particular are also used as tokens, safeguarding one's health in a vague fashion. The fact that transmission and prevalence of infectious diseases are more dominant in warm countries than cold countries has been demonstrated in the literature (72). Humidity, heat, and weather conditions such as heavy rainfalls and flooding are recognized to be drivers of increased vector-borne diseases, infections transmitted by rodents and viral and bacterial diseases in general (72).

Challenges that immigrants may have in accessing health care in Norway is discussed in different studies (37-41). A research review by Abebe about the public health challenges of immigrants in Norway shows that although immigrants have more frequent visits to the doctors than Norwegian population, they are less satisfied with the health system, due to different reasons such as "*language, culture and conflicting conceptions of the doctor's role"* (40, p.71). Mainous also explains that mistrust of medications inside the United States and being more comfortable with medicines coming from one's home country, as one of the reasons for importing medication to USA (31). Hearing about these challenges from friends and families who have already been in Norway seems to ignite the insecure feeling and motivates international students to import the antibiotics and other medicines.

6-2. contributing factors for self-medication practices

Self-medication practices among international students, includes what kind of antibiotics they choose, what do they know about the indications of those antibiotics and how often they use them.

6-2-1. Kinds of imported antibiotics

The antibiotics which were imported by the international students were mostly simple and broad spectrum antibiotics including Amoxicillin (syrup and tablets), Maxilin (capsules), Cephalexin (capsules), Azithromycin (capsules and tablets), Erythromycin (tablets), Norbactin (tablets) Cefradine (capsules), Norfloxacin (tablets), Metronidazole (tablets), Silver sulfadiazine (cream), Bacitracin (ointment), Neomycin (ointment) and Augmenitin (tablets).

International students with non-health background mostly chose a single antibiotic (such as Augmenitin and Amoxicillin) recommended by family members or the pharmacist back home.

One of the participants from Iran with molecular biology background whose father was a doctor illustrated how his father has chosen the antibiotics for her and that she was not sure about the names and indications of the antibiotics:

"I am really bad in remembering the names of antibiotics because I really don't know them. But I can tell you the reasons why I have brought those. One was for stomach problem (if you have any diarrhea) and one was for fever yeah! These are the two main ones." (Participant 9)

The participant from Russia with Political Science and international relation background argued his indifference about the kind of antibiotic that he had brought and that he just took it because his mother had suggested it:

"Then my mum said why don't you take some Norbactin with you and I was like yeah! OK! …" (Participant 11)

One of the participants from Pakistan with English literature background revealed that it was in fact her mother who suggested the kinds of antibiotics and she has just accepted the offer as something routine to be done before travelling:

"I think my mum just gave me a pack of basic medicines and she put two different types of antibiotics Augmentin and Clarimex…I think everyone knows Augmentin and trust it. I know I am not

good with some specific kind of antibiotics, so that is why I got Augmentin that I am comfortable with." (Participant 14)

While other students with health background tended to import different types of antibiotics with more specified usage and purposes. Antibiotics such as azithromycin for acne or recurrent sore throat, Metronidazole for gastric infections or Amoxicillin syrup for children.

One of the participants who is a pharmacist from Pakistan explained that she has brought different kinds of antibiotics for different purposes:

"*The first time that I came to Norway I brought Maxilin* [*Amoxycillin + Dicloxacillin*] *and Metronidazole, but the second time that I came here I also brought Azithromycin. I had achene problem that is why I brought Azithromycin with me, to treat the achene." (Participant 2)*

The other participant with medical background from Sudan mentioned sore throat as the main reason for importing specifically Azithromycin:

"I brought mainly Azithromycin because I have recurrent sore throat and Erythromycin…" (Participant 5)

Another participant with medical background from Palestine described the number of the antibiotics needed for one course of treatment and the reason behind the number of antibiotics he has brought:

"I tried to get the wide spectrum such as Augmentin [amoxicillin and clavulanate] two packages which each is like one dose, so I took two doses." (Participant 3)

The participant with dentistry background from Bangladesh specified the names and types of the antibiotics that she had with her while later, she mentioned that she has used Metronidazole for food poisoning.

"…and three kinds of antibiotics [metronidazole, Amoxicillin and cefradine] …only one time I had food poisoning, so I took metronidazole." (Participant 4)

One of the participants with medical background from Bangladesh illustrated why she had selected Azithromycin and not amoxicillin, as many of the participants did, being aware of that bacteria are highly resistant against Amoxicillin in Bangladesh:

*"**Only Azithromycin? And not Amoxicillin?** No, only Azithromycin because Amoxicillin is highly resisted [bacteria are highly resistant against Amoxicillin] in our country." (Participant 6)*

Again, the participant from Gambia with medical background mentioned choosing Amoxicillin syrup for her kids:

"When I was coming, I was coming with two children and I was not sure about the health system of Norway so just to safeguard I brought Amoxicillin syrup with me and Amoxicillin tablets for adults." (Participant 1)

Participants with a family member as a doctor though, brought the antibiotics upon direct suggestions from them without knowing the exact names and indications.

"…and also, my father was a motivation because he is a doctor, so he told me to take it with me, so yeah I just brought them with me… I don't remember the names, I must check, because my father chose them for me and whenever I want to use them, I contact him" (Participant 9)

*"**Why did you bring the antibiotics?** First of all, because my husband was a doctor, so he packed some emergency drugs that are used" (Participant 13)*

6-2-2. Knowledge

Participants had different levels of knowledge about the antibiotic indications and course of treatment which sourced from their education background, experiences, or knowledge acquired from local pharmacies and close relatives with health background.

Participants with health background had more extensive knowledge about the indications, doses, and duration of consumption of the antibiotics.

The participant from Gambia with medical background extensively explained the different situations that she used the antibiotics for her kids giving description of her diagnosis and dose of the medication:

"... but then as a doctor I thought maybe something else might be wrong that needs intervention before we wait for 72 hours so I gave her (my daughter) Amoxicillin syrup according to her weight… The second time was I think few months ago, she had this very bad cold and was coughing and the temperature also but because of the Covid-19 outbreak getting an appointment with your GP takes a long time so I gave it to her again… Usually for me as a health practitioner I don't start antibiotics right away and I observe the situation, so initially will just use our home remedies and try and see if it improves the situation but if it goes like two-three days and no improvement, yes I usually start the antibiotic." (Participant 1)

The pharmacist participant from Pakistan enlightened her proficiency in choosing the antibiotics

"I am a pharmacist and that is why I use different medications for different purposes. So, I knew the indications. And that is why I used them according to the symptoms and indications…second time that I came here I also brought Azithromycin because I had achene problem, that is why I brought Azithromycin with me. To treat the achene." (Participant 2)

The medical doctor from Palestine and the dentist from Bangladesh also confirmed their knowledge about the indications of the antibiotics.

"*Because I used to work as a doctor, so I just prescribed it and of course I know about the indications and everything." (Participant 3)*

"For any kind of emergency that I don't want to go to doctor, and I am a dentist, so I know some of the health conditions by myself. I feel like I can treat myself and that is why I bought them." (Participant 4)

Whereas participants with non-health backgrounds mostly obtained information from the local pharmacies, relatives with health background or their own experiences from previous treatments. The information they received could be in some cases inaccurate and obscured.

The participant with political science and international relations from Russia just tried to explain his knowledge of the indications and course of treatment which was accompanied with lots of "*I think*" and "*probably*" expressions:

"…I think it is for a week and I think one per day and I think it is produced in India, it is used to treat diarrhea and other gut bacterial infections, but I think in Norway it is not prescribed for that, and I think in Norway it is prescribed for chlamydia, but probably it is a different dose for that. But it is not prescribed for chlamydia in Russia. Because the only thing in the instruction is diarrhea. But I think it is the same antibiotic…" (Participant 11)

The participant from Bangladesh with Law background also illustrated her knowledge of the indication and course of treatment which was upon relatively inaccurate instructions of the pharmacist back home:

"The only thing I know about those medicines is that if you are adult we need to give them medicine like…, the one for fever, three times like for breakfast, lunch and dinner, after the meal and if they are baby maybe half portion after their meal. That is what I know… where did you get that information? The pharmacist suggested it. He said if the baby is this age and the adult is this age, you should use it like this way..." (Participant 12)

While the participant from Iran with health information background simply confessed that she does not know anything about the indications or course of treatment:

"So, you had Metronidazol and Cefixim with you, do you know about the indication and courses of treatment for these two antibiotics? No nothing!" (participant 8)

When participants with non-health background, who had a family member as a doctor were asked about the indication of the antibiotics that they had, they clearly said they had no idea and they are totally dependent on their relative for the information.

The participant with molecular Biology background from Iran whose father was a doctor emphasized that she has no idea about the indications, and she will have to call her father for the instructions.

"*Well, I know very little and I remember that my father put the days on the pills, for me in case I want to use them and I always have the contact with him, so if I want to use them, I will contact him." (Participant 9)*

This was also the same case for the participant from Ghana with economy and mathematics background whose imported antibiotics were picked up by her physician husband. She revealed that she is going to call him in case of need:

"I am just dependent because he [her husband] said just take this and this and you will be fine. I call her if I need to use them." (Participant 12)

6-2-3. Self-medication practice (consumption of the imported antibiotics)

There was a big difference among the participants regarding how they handled the antibiotics they had with them. Some used all the antibiotics, while some other did not use any due to different circumstances. Participants who used the antibiotics were mostly from health background group, while others with non-health background used less antibiotics.

The medical doctor from Sudan named different situation which he used the antibiotics and the time that he had given antibiotic to a friend to be used.

"I used it three times, full course of antibiotics for seven days in total 21 I can say. So yeah! Three times… I also have a friend who has living here for… longer time than me, and he was struggling with the same problem like me, the recurrent sore throat, for a while, and he thought like the medication he receives is not helpful, so yeah! I gave him one course of Azithromycin." (Participant 5)

My dentist participant from Bangladesh also brought up the only time she had to use the antibiotic:

"*… But in the whole year I had it only one time because I had food poisoning, so I took metronidazole…" (Participant 4)*

The medical doctor from Gambia also named how she used the antibiotics for her kids in two different situations:

"… but then as a doctor I thought maybe something else might be wrong that needs intervention before we wait for 72 hours so I gave her Amoxicillin syrup according to her weight and the second time was I think few months ago. She had this very bad cold and was coughing and the temperature also but because of the Covid-19 outbreak getting an appointment with your GP takes a long time so I gave it to her again." (Participant 1)

Some other participants with health background declared that they have not used the antibiotics yet.

"I haven't been sick ever since I came to Norway. I didn't used them, and I still have them." (Participant 3)

"In other words, that is only for prevention purpose. I thought if I get any infectious disease it is not possible to contact with doctor and it takes more time to get medicine, or maybe they will not give antibiotic to me, and only [for] that purpose I took some medicine. But fortunately, I haven't used yet, and they are almost expired," (Participant 7)

"The antibiotics I took from Bangladesh, I didn't use any of them. I took my sons to the doctor each time they were sick. And all the antibiotics I took are discarded now." (Participant 6)

Participants from non-health backgrounds who did not use the antibiotics, described that the reason was either they have not been sick since they have moved to Norway or they preferred to visit a doctor when they had health problems.

"Actually that is funny, I haven't been using them at all because I have been sick here for two times very short, there were like one night of sickness, they were sever sickness but I got over it very soon. So, I didn't use any…!" (Participant 9)

"*I never used the antibiotics, when we came here the first winter my son got very sick and we went to the hospital, and the thing is that they checked his blood before we went to see the doctor, and the doctor told me that according to his blood, he doesn't need antibiotics because it is viral. With that information, even though I had the antibiotic, I didn't feel the need to give it to him and then the next day he got better." (Participant 14)*

"…I brought some, but I hadn't used them and today I just have them." (participant 8)

"No I haven't used the antibiotics because I never had suspicion of having bacterial infection and I have been sick three times or four times during the last year, three times I think, that first two times were seasonal flu I think and the third one was probably Covid." (Participant 11)

6-2-4. Offering antibiotics to others

Participants from both health and non-health backgrounds had offered antibiotics to friends and roommates whether they used it or not.

The participant from Sudan with medical background mentioned that he had given the antibiotic to one of his friends with recurrent sore throat who had not received antibiotic from his GP here in Norway, and he explained that his friend has benefitted from the medication:

"I have a friend who has lived here for… longer time than me, and he struggles with the same problem like me, the recurrent sore throat, and he thinks like the medication he receives is not helpful. So, yeah! I gave him one course of Azithromycin...then I followed up on him and made sure he became well after he finished the course." (Participant 5)

The participant with law background from Bangladesh confirmed that she had offered antibiotic to her neighbor though she had not accepted it:

"When I came here, I used to have a Norwegian neighbor, so she had fever or something…I suggested some medication, but she did not take it…" (Participant 12)

The doctor from Palestine also said that he has and will suggest medicines to others whenever he feels they need it:

"When someone is sick, I would say I have some medications, and I offer them antibiotics." (Participant 3)

The participant from Iran with Health Information Technology background also revealed that she had given some antibiotics to a friend who is a nurse:

"I have a friend who lives in Sweden and she is also Iranian, and she told me that she needs the antibiotic, so I took some to her last Christmas. She is a nurse" (Participant 8)

The dentist from Bangladesh also declared that she had offered an antifungal ointment to her roommate when sha had a nail infection which she refused to use it

"My roommate had this nail infection, so I offered her some antifungal ointment, but she did not accept it" (Participant 6)

6-2-5. Renewing the stock

Some of the international students who have already used all the antibiotics that they have brought, indicated that they have already renewed their stock or had plans to do it in future visits to their home countries. All these participants were from health background.

The doctor from Sudan talked about his plans to renew his stock for antibiotics and other medications:

"Yeah! Yeah! That is on my list. To bring antibiotics and also some medications like antihistamine for instance, that's what I can't get here. And cold takes lots of process. That [antibiotic] is on my list to bring from home." (Participant 5)

The doctor from Palestine also confirmed that he is going to renew his stock when he is finished with the current stock:

*"**Would you renew your stock if you go back?** Yes, definitely! If I finish the ones that I already have, or if they become expired!" (Participant 3)*

The dentist from Bangladesh explained that how she checked the expiry dates of her antibiotics carefully to make sure she will have them at least for two years and she said that she will renew her stock afterward.

"I think I have enough antibiotics for two years, maybe after two years I will. Because when I bought them, I made sure about the expiry dates so that at least I can have them for two years. Maybe after two years when I go, and I have access then I will buy. I don't want to be short!" (Participant 4)

The doctor from Gambia reported that she had already renewed her stock once and she was looking to renew it as soon as she could, as she was already out of stock:

"When my husband went to Congo last year, he brought other two bottles of amoxicillin for the kids. Which are finished now, and I have to renew them whenever I can." (Participant 1)

On the other hand, some of the participants with non-health background said that they have no plans to renew their stock.

The participant from Iran with Molecular Biology background explained that she had not renewed her stock even though she had the chance, because she still had the previous antibiotics with her.

"I went back three times after I came to Norway and I didn't bring any antibiotics back with me. because I already had them and I didn't use them," (Participant 9)

The participant from Pakistan with English literature background though revealed that she had not renewed her stock when she had the chance and did not also have any plans to do so, because she did not feel the need to have them anymore.

"Now everything is expired, and I haven't purchased it even though I have been to Pakistan every year. I never used antibiotics. And I didn't feel to need to use the antibiotics." (Participant 14)

6-2-6. Change of perspective

Some of the participants also declared that their consumption habits of antibiotics have changed since they have moved to Norway.

The participant from Bangladesh with law background explained how her attitude toward the antibiotics changed after and several visits to doctor here in Norway.

"...we went to legevakt [GP] and then the doctor didn't give my son a single medicine, and I was so angry. I thought this doctor knows nothing [Laughing] `why didn't he give us any medicine? ` So, they just suggested to give him some apple juice and some natural liquids and they said trust us it goes off automatically. And then I realized OK, medicine is not everything. But in our country if anything happens there is always medicine. But after coming to Norway I have learned that OK sometimes we should give our body some time to naturally heal something... And I realized that antibiotics are like high-powerful medicines so we should not just use these if there is something small or something has just happened… we are also habituated, if anything happens we should not just give any medicine randomly.

The participant also explained that once she had offered some antibiotic to a Norwegian neighbor. She further explained that her neighbor's explanation about the Norwegian's attitude toward antibiotic consumption, has given her some insight about the system in Norway.

"When I came here I used to have a Norwegian neighbor, so she had fever or something, because that time I was new and according to Bangladeshi culture I was suggesting her… you are having fever, I have these medicines with me you can take this because my doctor said it is very good and then she told me because you are new, you don't know in Norway we don't have the practice of you know sharing the medicine like this. I know your intentions are good and you want to help me but just don't suggest it randomly to anyone because we Norwegian have so many different allergies in

our body, it reacts differently in our bodies, maybe you are giving it for something good, but you don't know if I have allergy to the ingredients or not. So, I said `OK, I learned something. `" (Participant 12)

Though her compatriot with dentistry background agreed that her perspectives has changed because of less access to medications here and not due to the fact that her mind set has changed toward the use of antibiotics:

"…in one year, my perspective has changed a lot. Even though I am from health professional background, when I was in my country the access to drugs was easy so I thought I can just get it and … but in here it was very hard, and my perspective changed." (Participant 4)

The participant with English literature from Pakistan had change of perspective through the trust she had gained from the health system:

"I think then because doctors do these tests here and because they tell us what kind of infection it is, I am getting or whatever so, I don't feel to need starting antibiotics." (Participant 14)

6-2-7. Discussion

Regarding the type of imported antibiotics, it can be said that while students with health background were more aware of the type and indication of the antibiotics and imported several specified antibiotics, international students with non-health background mostly chose a single antibiotic which they were used to use back home and as one of them said: "*they were comfortable with*". Students with a family member with health background such as father or husband followed the same pattern as the students with health background regarding the diversity and specificity of the antibiotics with the main difference that they had no idea how those antibiotics worked.

International students' educational background and their knowledge about the indications and consumptions of the antibiotics also clearly reflected in how they used antibiotics. Students with health background had extensive knowledge about the antibiotics and when coming to the consumption, they confidently declared that they had used the antibiotics in different occasions, when they felt it is necessary, or they had offered the antibiotics to their friends from time to time.

Most of the international students with non-health background did not have adequate knowledge about the courses of action and indications of the antibiotics, which brings up the alert regarding possibilities of incorrect use of antibiotics and elevated chances of developing antibiotic resistance.

International students with non-health background, claimed that they rarely used any of the antibiotics they have brought with them. The reasons claimed by them for not using the antibiotics were that they either did not get sick or preferred to visit a doctor when they themselves or their family members became sick. Hu and Wang's study shows that risk of storing antibiotic at home was slightly higher among those who had knowledge about antibiotic resistance and side effects and participants who could correctly identify amoxicillin as an antibiotic were more than twice as likely to store antibiotics at home as those who were not sure whether amoxicillin was an antibiotic (32) which shows that prior knowledge about the antibiotics play a role in amount of buying, storing and consumption of antibiotics. This somehow complies with the findings of the study.

Some studies though show that the amount of self-medication is almost the same among the students with health and non-health backgrounds (69, 70). Khan's study also reflects the effect of knowledge about the antibiotics, indicating the self- medication rates were not significantly lower in groups of students who knew it may be harmful or unsafe ($p=0.2$).

International students with non-health background seem to be more susceptible for adapting to the health system here in Norway than students with health background. Some students with non-health background stated that their antibiotics are just lying there untouched or have become expired as their perspective toward using antibiotics has been changed. They explained that they no more feel the urge to use antibiotics after experiencing the health system in Norway and they do not have any intentions to renew their stock in future.

Conversely, almost all the participants who had already used, renewed, or had plan to renew their stock whenever they would have gotten the chance, were from health background. This can show that students with health background rely heavily on their own knowledge and perspectives rather than what they have acquired from the system here. While students with non- health background were more prone to adapt to the health system in Norway due to lack of previous knowledge.

The consistency in importing practice is shown in Mainous' study. The study highlights the point that 23.7 percent of the participants (Latino immigrants) who brought antibiotics back to USA, reported it is "likely" or "very likely" that they purchase and bring antibiotics back to USA again without visiting a doctor when they go to trips outside USA in future. This confirms the findings of this study showing the tendency to renew the stock of antibiotics among participants.

The tendency to renew antibiotic stock and the point that some immigrants who have lived here for many years still renew their stocks by different means alarmingly shows the consistency of importation practice among immigrants and the effects it may have on antibiotic resistance.

6-3. knowledge and perceptions of antibiotic resistance

Knowledge and concepts around antibiotic resistance varied significantly among participants, depending on their educational background and knowledge. Participants were asked to give a definition of antibiotic resistance and what they think about the reasons of developing resistance.

6-3-1. Definition of antibiotic resistance

Participants with health background mostly addressed the correct technical understanding about the antibiotic resistance and could give a clear, definition about it, though with some exceptions. Even some participants with health background could not give a complete correct definition about the antibiotic resistance. They mostly believed that antibiotic resistance has something to do with our bodies and our immune systems. They thought that it is the body or the immune system which becomes resistance to antibiotic and not the bacteria. And that was the same mistake made by participants with non-health background.

The participants with dentistry background described the antibiotic resistance to be the body's immune system safeguard or resistance against antibiotic:

"It might interrupt your system and your body's immune system gets that kind of safeguard against these antibiotics so that is the antibiotic resistance." (Participant 4)

While the medical doctor from Gambia stated that people start to become resistance to antibiotics,

"I know that so many people use antibiotics to relieve their symptoms but they usually don't complete the dose and because of that many people have started to become resistance to the antibiotics that they require so they end up go using the strong ones... so later on as your body get used to that little dose you used to give, it will not be effective, so you end up going to[using] bigger or broader spectrum antibiotics" (Participant 1)

One of the participants from Bangladesh who had physiotherapy background again considered antibiotic resistance the immune system reaction to antibiotics:

"Whenever we use antibiotic repeatedly, again and again, without requirement, our immune system get effected by the bacteria or antibiotic. Then antibiotic resistance occurs." (Participant 7)

The participant with law background from Bangladesh though interpreted the resistance to be caused by hurt cells in the body:

"If we take ever any antibiotic that the doctor prescribes, we must complete the course. Otherwise it works negatively in your body. It will hurt some cells in your body." (Participant 12)

6-3-2. Reasons of antibiotic resistance

When participants were asked about what they know about the reasons of developing antibiotic resistance, the most named reasons included overuse, abuse and misuse of antibiotics as well as not completing the antibiotic course, shared by both groups with health and non-health backgrounds.

"When you use antibiotic very much your bacteria in your body which are a lot, would be resistance to the antibiotic" (Participant 9)

"I think the reason [of antibiotic resistance] is the overuse or abuse of the antibiotic." (Participant 2)

"Antibiotic resistance; whenever we use antibiotic repeatedly, again and again, without requirement," (Participant 7)

"The misuse of antibiotics has been every day, so the antibiotic resistance is so bad in our country," (Participant 6)

"For every antibiotic there is a course of duration for example for Metronidazole you have to take three times for 3 days or 5 days or 7 days durations, and for some people they do not finish it before the complete duration, like after taking two or three times they feel getting better so they stop it. If they just keep doing that thing at one-point resistance against those group happens…" (Participant 4)

"So, we use antibiotics for a specific period of time, if we do not use the proper dosing and timing, we don't complete the proper period so, bacteria get resistant." (Participant 2)

Self-medication and prolonged exposure to antibiotics were among other reasons named by some of the participants. Participants shared common reasons regardless of their correct conception of antibiotic resistance.

"… and also I have examples from home that some people feel they have headache and fever and think they have infection and start self-medicating themselves without going to the hospital or doing a proper test to see whether they require it or not. So, after using it for few days once the symptoms are gone they just stop it and they don't finish the course... taking it for two days instead of taking it for 5 days so the antibiotics will not be strong enough to attack because now they [bacteria]

are maybe getting accustomed to what you [have] used ,so later on as your body get used to that little dose, it will not be effective so you end up going for bigger or broader spectrum antibiotics... Some also take it today, jump tomorrow and then they take it the third day." (Participant 1)

"The reason is prolonged exposure. ***Can you elaborate?*** *Yeah! Across many people and across long time, especially in hospitals and incomplete courses of treatment." (Participant 11)*

6-3-3. Concerns about the antibiotic resistance

Although some participants could not give a clear definition of antibiotic resistance and its triggers, mostly all of them had heard about it, and had clear concerns about the issue. Especially participants with health background. They all agreed that antibiotic resistance is a growing issue in their home countries due to excessive use of antibiotics and it is going to cause big problems in future.

Doctor from Sudan said,

"I know it is a growing issue, and I am the one who was concerned about it…the resistance is a problem and back home I guess it will be more problem than here." (Participant 5)

Pharmacist from Pakistan emphasized,

"And it is a very serious problem these days, because if we keep on using antibiotics like this as we are using now specially in our countries, so it is more likely to develop antibiotic resistance in our communities." (Participant 2)

Doctor from Gambia explained,

"In my country bigger and broad-spectrum antibiotics are very expensive and mostly people cannot afford it. So, only Amoxicillin and Erythromycin are everywhere and reasonable. So, you see at the end that they will not cure what you present it with, and you have the need for the expensive ones which is a problem." (Participant 1)

Doctor from Bangladesh pointed out,

"I can compare two countries, here antibiotic resistance is so low, because I experienced that they use Penicillin, the basic antibiotic, even now, which doesn't work that much in my country… every day there is misuse of antibiotics so, the antibiotic resistance is so bad in our country. There are so many cases that we have resistance to even the newest antibiotics." (Participant 6)

6-3-4. Discussion

Although all the participants had heard about the antibiotic resistance, many of them did not have a correct clear perception of the antibiotic resistance definition. They made the common mistake that it is the body or the immune system which becomes resistance against antibiotics. Nevertheless, they agreed on the fact that antibiotic resistance is a growing issue worldwide, especially in their home countries, regardless of their educational background and that they could give a correct definition of the antibiotic resistance or not.

Participants commonly recognized factors such as “misuse”, “overuse”, and “self-medication” as the main reasons of higher level of antibiotic resistance in their home countries in comparison with Norway, and acknowledged that the prescribing few antibiotic in Norway is the reason behind low level of antibiotic resistance in Norway. Still, they confirmed that they kept on buying and using antibiotics back home and kept the habit when moving to Norway.

Most of the students who used that antibiotics, especially participants with health background, were positive that they used the antibiotics right. Although correct use of antibiotic is an important factor in avoiding development of resistance in microorganisms, today, it is demonstrated that the main driver for development of antibiotic resistance is antibiotic use itself, regardless of how correct the antibiotic is used (71). Antibiotic exposure leads to resistance in bacteria. On the other hand, antibiotic used by humans and animals washed into the environment exposes more bacteria to the antibiotic giving it the opportunity to develop resistance (80). Although participants believe they use antibiotics correctly, it does not mean the antibiotics do not affect the environment and do not contribute to antibiotic resistance.

6-4. Association with Covid-19

This research investigated how Covid-19 could affect antibiotic consumption and private import practices of international students. Unfortunately, the pandemic posed many uncertainties for international travel. The data collection phase of this project was in Autumn 2020, When education was delivered primarily on digital platforms. Very few students, mostly from the EØS countries, could manage to travel to Norway. Therefore, the interviews were conducted with the participants who have already been here from previous semesters. This affected the possibility of investigating the role of the Covid-19 pandemic on antibiotic importation practices by international students. During the interviews, some questions were asked from the participants about the association of Covid-19 and

importation practices, however, answers were mostly hypothetical and uncertain, but could in some degree reflect participants thoughts.

6-4-1. Covid-19 and antibiotic consumption and antibiotic resistance patterns

Participants were asked about their perception about the effect of the Covid-19 pandemic on the antibiotic-consumption around the world and its association with antibiotic resistance. Most of the participants, regardless of their background, believed that Covid-19 pandemic can lead to more consumption of antibiotics especially in their home countries which would inevitably increase antibiotic resistance.

"*Being more cautious*" was described as the reason for using more antibiotics worldwide by the participant with pharmacy background:

"I think people use more antibiotics these days because they are more cautious... Because Covid has the symptoms like sneezing and coughing that are also related to some other infectious diseases, so people just start taking antibiotics. Before, if somebody had flu they wouldn't specially treat it but now if somebody gets flu they start the medications and they take it seriously so some people may start taking antibiotics so maybe it can affect the antibiotic resistance." (Participant 2)

Whereas, limitation for doctor visit was the other reason suggested by the physiotherapist from Bangladesh as the reason to trigger self-medication with antibiotics among people:

"From my experience especially back in my country in this Covid-19 situation, they don't want to go to the doctor, whenever they feel some symptoms, they try to use antibiotic to protect from the virus or complications. So obviously it has strong effect on the antibiotic-use." (Participant 7)

The doctor from Bangladesh assumed that in Covid-19 situation, people will just use the antibiotic with the first symptoms of the disease without going for being tested.

"Because whenever someone is having a common cold or something they are using like Azithromycin and other antibiotics without testing. So, they will use more antibiotic in Covid-19 situation." (Participant 6)

The participant with political science and international relations background gave an interesting reason for using more antibiotics in Covid-19 situation. He said using more antibiotics can be due to more hospitalization and occurrence of more secondary infections. His reflection was surprising according to his background, as even none of participants with health background pointed out to the fact:

"Probably it will affect antibiotic resistance negatively, since the high risk of secondary infection, and many people who are hospitalized and take antibiotics." (Participant 11)

6-4-2. Covid-19 and private import of antibiotics

Participants were asked if their antibiotic import practices would be affected anyhow if they hypothetically were supposed to come to Norway during the Covid-19 pandemic.

Most of the participants believed they would bring more antibiotics in the pandemic situation, for more protection and safeguard. They thought that if they wanted to come to Norway during Covid-19 pandemic they would be more cautious and needed more protection, so they would bring more antibiotics.

"I think I would be more cautious and bring more medicines because I would want to be prepared." (Participant 14)

"I would think that I need more protection so if I were 80 percent sure before, now I would be 100 percent sure that I should bring the antibiotics." (Participant 4)

"So, if I wanted to come here now definitely, I would bring more antibiotics with me. I would bring them for safeguard because I cannot get it from the hospitals... I think with Covid-19 more people are likely to bring antibiotics with them. Because with Covid people are not sure, yes, it is a viral disease, but it has symptoms that mimic bacterial infection, so most people use antibiotics in order to …" (Participant 1)

"So, yeah, but for now I guess even for me ,I've lived here for five years I say yes if I am coming now or if someone is coming I will give them the same advice like to bring medication with them, not only antibiotic but other medications too." (Participant 5)

"Hmmm! Maybe yes because Covid-19 is like a really new disease, I want to add something," (Participant 12)

The participants with pharmacy background said that she would not bring more because she already had enough medications with her. And she could not think of any other antibiotic that she could add to her list:

"I think I have already covered all kind of medications. I don't think there is more medicines I could bring. Even my husband came here after Covid, I did not ask him to bring some specific medications." (Participant 2)

The participant with political science and international relations background believed that since Covid-19 is a viral disease, there is no need to bring any specific kind of medication including antibiotics! which seemed to be a pretty wise answer regarding his educational background.

"Probably not. Because Covid is obviously viral, so there wouldn't be anything different." (Participant 11)

The other participants from Iran with Molecular biology background though, was not sure about how the pandemic would affect her in that situation because she could not imagine herself not in the actual situation right now.

"It really depends! If you live in Iran and then want to come to Norway it would really affect you but in my situation right now, I cannot put myself in that shoes, but I would say yeah! It will influence but I cannot say in what degree it will influence, it will influence me that much that I will bring lots of medications with me? I don't know! But it would cause me to bring vitamin C or vitamin D or different kinds of vitamins with me." (Participant 9)

6-4-3. Discussion

At the beginning, concurrency of Covid-19 pandemic with the fieldwork phase of the project Posed an opportunity to explore the perspectives of international students regarding the effect of the pandemic on the antibiotic consumption and antibiotic resistance. While in practice, it enforced a big limitation to the study as new international students could not enter Norway due to the travelling restrictions. Regarding the fact that participants were recruited from the international students who have already been in Norway before the pandemic, the information gathered can be considered more hypothetical than the real situation reflections.

Most of the participants shared the same points of view towards the possibility of elevated antibiotic consumption in Covid-19 situation. They stablished reasons which rooted in the people's fear of the new unknown disease and the urge to be more cautious which could fortify self-medication practice. Their reasoning also was in constant harmony with their thoughts of importing more antibiotic if they were supposed to move to Oslo in pandemic situation.

The findings of the study though being hypothetical, interestingly complies with the literature. The use of antibiotic has risen during the pandemic of Covid-19 is demonstrated in many studies (66-68). It is also demonstrated that the amount of self-medication with antibiotics and other medications has been relatively high in pandemic situation for protective and treatment purposes (73-75). So, it can be concluded that the probability of importing more antibiotics due to the pandemic which was

hypothetically claimed by the participants could be actual happening if they had entered Norway during the pandemic.

The participants' perspective regarding the increase of antibiotic resistance during the Covid-19 pandemic needs to be investigated further. Covid-19 has led to improved hand hygiene and less interpersonal contacts, international travels, and elective hospitalization. While on the other hand, antibiotics has been commonly used for preventing secondary infections, as a standard healthcare pathway against Covid-19 and by self-medication (64-66, 78). These factors contribute to the unknown relationship between Covid-19 and antibiotic resistance.

CHAPTER 7: STRENGHTS AND LIMITATIONS

Due to time and resource limitations of a master thesis project, international students were chosen as the research population to develop an understanding of the population and their corresponding countries. The findings of this project confirm that international students share the same reasons for importation and self-medication habits with their other compatriots and the findings can be somehow expanded to the whole population.

Concurrency of Covid-19 pandemic with the fieldwork phase of the project Provided a good opportunity to explore the understandings of international students' conception regarding the effect of the pandemic on the antibiotic consumption and antibiotic resistance, while in practice, it enforced limitation to the study as new international students could not enter Norway due to the travelling restrictions. This limitation resulted in the recruitment of international students from out of EØS who entered Norway prior to the pandemic, losing the opportunity to benefit from the experiences of fresh international students who had just moved to Oslo carrying antibiotics.

Participants residing in Norway from before the pandemic, affected investigation of the contribution of Covid-19 pandemic to the private importation practices of international students. Thus, the findings obtained from the participants regarding how Covid-19 would affect their private importing practices can be considered more hypothetical than being real.

The Covid-19 pandemic and social distancing measures also limited the possibility of in person interviews. With the exception of the first 5 interviews, the rest were conducted on various digital platforms. Despite the high-quality video and audio in using these digital platforms, there were other factors which could not replicate an in-person interview. For example, poor internet connection, depth perception, a limited field of view of the interviewer and interviewee and inability for true eye contact were major factors.

Illegal status of private import of antibiotics into Norway without a valid prescription (79) imposed limitation to the recruiting process by reducing the response rate. As mentioned, the recruitment process was altered due to the sensitivity of the topic. The recruiting process began with posting an announcement in the Facebook group of university of Oslo, but only 4 participants voluntarily took part in the project by seeing the announcement. Recruitment process consequently shifted to friends and expanded to snowballing by words of mouth. So, the participants who were recruited mostly trusted me as they knew me directly or through my friends.

The participants' awareness about the fact that they are doing something illegal, could be sensed in their body languages, when they laughed shamefully, avoided eye contacts, became anxious or hesitated when explaining their self-medication practices. This awareness could affect the way participants answered the questions regarding the consumption of the antibiotics or their plans for renewing their stock and could impose limitations to getting honest and truthful answers in this regard.

The hesitation when giving the answer to the question about whether they have used any of the antibiotics they had with them, could be clearly sensed when students with non-health background were asked about how they used the antibiotics when they had already answered questions which had revealed their lack of knowledge about the correct indications, dosage and timings of the antibiotics. Coming to students with health background who claimed they have not used the antibiotics they had, the situation was even worse when they felt responsible or guilty considering their position as health professionals.

Private import of antibiotic is a sensitive topic in a vulnerable population (not citizens or permanent residents) so discussing something illegal could have resulted in hesitancy to share some information. It seems that subjects might have wanted to appear more rule abiding then they actually were, and they were biased by anticipating my or their own disapproval.

This study is based on self-reporting. No one actually watched these participants use antibiotics which can be another limitation of the study.

CHAPTER 8: CONCLUSION

This qualitative research study was conducted to investigate private import of antibiotics by international students coming from out of EØS, their perceptions of antibiotic resistance, Covid-19 pandemic association with their antibiotic importation practices as well as the relationship between antibiotic resistance and Covid-19 pandemic situation. Private importation of antibiotics is extensively practiced by people around the world, which can be traced in many studies investigating self-medication habits of immigrants and international students in different destination lands, but this study is the first qualitative research concentrating on the private importation of antibiotics by any of the immigrant groups.

Throughout the conducted interviews, reasons such as: easy access to antibiotics and habit of self-medication in home-countries, fear of becoming sick and doubts about the health system and difficulties in accessing antibiotics in Norway, were pointed out by most of the participants as the most common drivers for importing antibiotics as precaution when moving to Norway.

Considering the tendency among the international students to renew their stock whenever possible and the point that people who have already been here ask international students to bring them more antibiotics, reveals the fact that this is a continuous practice. The tendency to import and renew the stock has also been reported in literature studying the self-medication practices of immigrants (31). This is a serious issue, considering the large number of immigrants in Norway, especially in Oslo.

However, study revealed smooth adaptation of students with the health system in Norway and their change of attitude toward self-antibiotic therapy. This fact makes it difficult to estimate how living in Norway for a long period of time can affect self-antibiotic practices among students and other immigrants. Further studies are required to bring light to the relationship between the duration of stay in Norway and the importing practices.

The study identified that prior knowledge about antibiotic indications and consumption courses, which is mostly related to the participants' educational background is an important factor, affecting the amount of antibiotics and the specificity of the imported antibiotics. Students with health-background imported different types and more specified kinds of antibiotics while students with non-health background mostly imported one kind of a broad-spectrum antibiotic.

Also, the amount of antibiotic consumption by the international students seems to be related to the student's level of knowledge about antibiotics. Study revealed that international students with non-

health backgrounds tend to use less antibiotics comparing to students with health backgrounds. Students with health background were more confident and relied more on their knowledge and experience than the health system in Norway.

However, the sensitivity of the topic (illegality of importing antibiotics) and the vulnerability of the population (not citizens or permanent residents), put forward the possibility of hesitation to give the truthful answers regarding the use of antibiotics in both groups of participants with and without health backgrounds. Considering the low level of knowledge about antibiotics courses of action and indications among students with non-health background, and high risk of incorrect antibiotic consumption, training and educating this group is highly important.

On the other hand, study revealed that international students with non-health background had adapted more easily to the health system in Norway and used less antibiotics. This could have been due to the lack of prior knowledge regarding antibiotics indications and consumption, making them more dependent on the local health system than students with health background. This shows how proper education and guidance can reduce self-medication practices among people.

All the participants accepted antibiotic resistance as a huge threat, although most of them could not provide a correct definition of antibiotic resistance. They also introduced misuse, overuse, and self-medication as the main reasons for the growing issue of antibiotic resistance in their home countries in comparison with Norway. Though this acknowledgment had not stopped them from buying and bringing antibiotics with them (32). This highlights the importance and need for educational programs regarding antibiotic use and antibiotic resistance among immigrants.

The Covid-19 pandemic was the most relevant topic in the time of study and one of the objectives of this study was to contribute to the different aspects of it as far as the project capacity allowed. The effect of the Covid-19 pandemic on the private import of antibiotics by international students and their perception about the association of Covid-19 pandemic and antibiotic resistance were investigated.

Most of the participants shared the same points of view towards the possibility of elevated antibiotic consumption in a Covid-19 situation. They established reasons which rooted in their fear of the new unknown disease and the urge to be more cautious, which could increase self-medication practices. Their reasoning was also in keeping with their thoughts of importing more antibiotic if they were supposed to move to Oslo in pandemic situation. Although these findings are more hypothetical because students had already moved to Norway before the pandemic.

Adequate number of international students have moved to Norway in spring semester 2021 during the pandemic and more investigations can provide a better overview of the real relation between the pandemic and private importation of antibiotics by international students. Nonetheless the findings of this study can largely relate to the real situation considering the burden the disease has put upon people and the fear it has induced worldwide.

Participants of the study believed that Covid-19 may increase the amount of antibiotic resistance world-wide, which is in fact debatable according to the available studies so far. There have been some studies to investigate the status of antibiotic resistance in the Covid-19 pandemic worldwide, which have not produced an exact answer to how the phenomenon has been really affected by the pandemic, though all these studies have clearly stated the extent and the importance of the impact (76-78). Considering different factors which have contrastingly affected the amount of antibiotic consumption (64-66, 78), the relation between Covid-19 and the level of antibiotic resistance yet needs to be more investigated.

Private import of antibiotic and self-medication with antibiotics by international students coming from out of EØS is actively and continuously practiced regardless of the country of origin and educational background. Evidence shows that the data obtained from international students could be representative of the entire immigrant communities from the same countries. Considering the large number of immigrants in Norway, particularly Oslo, this can confirm the assumption of the study about the relation between the private import of antibiotics by immigrants and patterns of antibiotic resistance in the country, which can be important while making policies to control antibiotic resistance in Norway.

Further comprehensive studies are needed to investigate the magnitude of private import practice of antibiotics by all migrant groups in Norway, the level of self-medication with antibiotics, the most common imported antibiotics and most importantly the effect that this phenomenon has on the antibiotic resistance in Norway.

REFERENCES

1. Peter Vikesland, Emily Garner, Suraj Gupta, Seju Kang, Ayella Maile-Moskowitz, and Ni Zhu, Differential Drivers of Antimicrobial Resistance across the World, Accounts of Medical Research, 2019, 52, 4, 916-924.
2. Denyer Willis, Laurie, and Clare Chandler. "Quick Fix for Care, Productivity, Hygiene and Inequality: Reframing the Entrenched Problem of Antibiotic Overuse." BMJ Global Health 4, no. 4 (2019).
3. Holloway KA, Kotwani A, Batmanabane G, Puri M, Tisocki K. Antibiotic use in South East Asia and policies to promote appropriate use: reports from country situational analyses. BMJ. 2017;358:j2291-j.
4. Torres NF, Chibi B, Middleton LE, Solomon VP, Mashamba-Thompson TP. Evidence of factors influencing self-medication with antibiotics in low and middle-income countries: a systematic scoping review. Public Health. 2019;168:92-101.
5. Mainous AG, 3rd, Diaz VA, Carnemolla M. Factors affecting Latino adults' use of antibiotics for self-medication. J Am Board Fam Med. 2008;21(2):128-34.
6. Darwish DA, Abdelmalek S, Abu Dayyih W, Hamadi S. Awareness of antibiotic use and antimicrobial resistance in the Iraqi community in Jordan. J Infect Dev Ctries. 2014;8(5):616-23.
7. El Zowalaty ME, Belkina T, Bahashwan SA, El Zowalaty AE, Tebbens JD, Abdel-Salam HA, et al. Knowledge, awareness, and attitudes toward antibiotic use and antimicrobial resistance among Saudi population. Int J Clin Pharm. 2016;38(5):1261-8.
8. Om C, Daily F, Vlieghe E, McLaughlin JC, McLaws M-L. Pervasive antibiotic misuse in the Cambodian community: antibiotic-seeking behaviour with unrestricted access. Antimicrob Resist Infect Control. 2017;6:30-.
9. Saleem A, Steadman KJ, Fejzic J. Utilisation of Healthcare Services and Medicines by Pakistani Migrants Residing in High Income Countries: A Systematic Review and Thematic Synthesis. J Immigr Minor Health. 2019;21(5):1157-80.
10. Pan H, Cui B, Zhang D, Farrar J, Law F, Ba-Thein W. Prior knowledge, older age, and higher allowance are risk factors for self-medication with antibiotics among university students in southern China. PLoS One. 2012;7(7):e41314-e.
11. Morgan DJ, Okeke IN, Laxminarayan R, Perencevich EN, Weisenberg S. Non-prescription antimicrobial use worldwide: a systematic review. Lancet Infect Dis. 2011;11(9):692-701.

12. Torres NF, Solomon VP, Middleton LE. Patterns of self-medication with antibiotics in Maputo City: a qualitative study. Antimicrob Resist Infect Control. 2019;8:161-.
13. Sarahroodi S, Arzi A. Self medication with antibiotics, is it a problem among Iranian college students in Tehran. J Biol Sci. 2009;9(8):829-32.
14. Scicluna EA, Borg MA, Gür D, Rasslan O, Taher I, Redjeb SB, et al. Self-medication with antibiotics in the ambulatory care setting within the Euro-Mediterranean region; results from the ARMed project. J Infect Public Health. 2009;2(4):189-97.
15. Barker AK, Brown K, Ahsan M, Sengupta S, Safdar N. Social determinants of antibiotic misuse: a qualitative study of community members in Haryana, India. BMC Public Health. 2017;17(1):333-.
16. Nepal G, Bhatta S. Self-medication with Antibiotics in WHO Southeast Asian Region: A Systematic Review. Cureus. 2018;10(4):e2428-e.
17. Wertheim HFL, Chuc NTK, Punpuing S, Khan WA, Gyapong M, Asante KP, et al. Community-level antibiotic access and use (ABACUS) in low- and middle-income countries: Finding targets for social interventions to improve appropriate antimicrobial use - an observational multi-centre study. Wellcome Open Res. 2017;2:58-.
18. Anstey Watkins J, Wagner F, Xavier Gómez-Olivé F, Wertheim H, Sankoh O, Kinsman J. Rural South African Community Perceptions of Antibiotic Access and Use: Qualitative Evidence from a Health and Demographic Surveillance System Site. Am J Trop Med Hyg. 2019;100(6):1378-90.
19. Safrany N, Monnet DL. Antibiotics obtained without a prescription in Europe. The Lancet Infectious Diseases. 2012;12(3):182-3.
20. Horumpende PG, Sonda TB, van Zwetselaar M, Antony ML, Tenu FF, Mwanziva CE, et al. Prescription and non-prescription antibiotic dispensing practices in part I and part II pharmacies in Moshi Municipality, Kilimanjaro Region in Tanzania: A simulated clients approach. PLoS One. 2018;13(11):e0207465-e.
21. Sabry NA, Farid SF, Dawoud DM. Antibiotic dispensing in Egyptian community pharmacies: an observational study. Res Social Adm Pharm. 2014;10(1):168-84.
22. Sommanustweechai A, Chanvatik S, Sermsinsiri V, Sivilaikul S, Patcharanarumol W, Yeung S, et al. Antibiotic distribution channels in Thailand: results of key-informant interviews, reviews of drug regulations and database searches. Bull World Health Organ. 2018;96(2):101-9.
23. Salim AMA, Elgizoli B. Exploring the reasons why pharmacists dispense antibiotics without prescriptions in Khartoum state, Sudan. Int J Pharm Pract. 2017;25(1):59-65.

24. Barker AK, Brown K, Ahsan M, Sengupta S, Safdar N. What drives inappropriate antibiotic dispensing? A mixed-methods study of pharmacy employee perspectives in Haryana, India. BMJ Open. 2017;7(3):e013190-e.
25. Bin Nafisah S, Bin Nafesa S, Alamery AH, Alhumaid MA, AlMuhaidib HM, Al-Eidan FA. Over-the-counter antibiotics in Saudi Arabia, an urgent call for policy makers. J Infect Public Health. 2017;10(5):522-6.
26. Nguyen HH, Ho DP, Vu TLH, Tran KT, Tran TD, Nguyen TKC, et al. "I can make more from selling medicine when breaking the rules" - understanding the antibiotic supply network in a rural community in Viet Nam. BMC Public Health. 2019;19(1):1560-.
27. Aziz MM, Fang Y. Pakistan should immediately curb the sale of non-prescribed antibiotics from community pharmacies. Int J Health Plann Manage. 2019;34(2):e1376-e7.
28. Auta A, Hadi MA, Oga E, Adewuyi EO, Abdu-Aguye SN, Adeloye D, et al. Global access to antibiotics without prescription in community pharmacies: A systematic review and meta-analysis. J Infect. 2019;78(1):8-18.
29. Mohlala G, Peltzer K, Phaswana-Mafuya N, Ramlagan S. Drug prescription habits in public and private health facilities in 2 provinces in South Africa. East Mediterr Health J. 2010;16(3):324-8.
30. Khan RA. Self-medication with antibiotics: Practices among Pakistani students in Sweden and Finland [Student thesis]2011.
31. Mainous AG, 3rd, Cheng AY, Garr RC, Tilley BC, Everett CJ, McKee MD. Nonprescribed antimicrobial drugs in Latino community, South Carolina. Emerg Infect Dis. 2005;11(6):883-8.
32. Hu J, Wang Z. In-home antibiotic storage among Australian Chinese migrants. Int J Infect Dis. 2014;26:103-6.
33. Lescure D, Paget J, Schellevis F, van Dijk L. Determinants of Self-Medication with Antibiotics in European and Anglo-Saxon Countries: A Systematic Review of the Literature. Front Public Health. 2018;6:370-.
34. Whittaker A, Lohm D, Lemoh C, Cheng AC, Davis M. Investigating Understandings of Antibiotics and Antimicrobial Resistance in Diverse Ethnic Communities in Australia: Findings from a Qualitative Study. Antibiotics (Basel). 2019;8(3):135.
35. McKee MD, Mills L, Mainous AG, 3rd. Antibiotic use for the treatment of upper respiratory infections in a diverse community. J Fam Pract. 1999;48(12):993-6.

36. Machowska A, Stålsby Lundborg C. Drivers of Irrational Use of Antibiotics in Europe. Int J Environ Res Public Health. 2018;16(1).
37. Schein YL, Winje BA, Myhre SL, Nordstoga I, Straiton ML. A qualitative study of health experiences of Ethiopian asylum seekers in Norway. BMC Health Serv Res. 2019;19(1):958.
38. Mbanya VN, Terragni L, Gele AA, Diaz E, Kumar BN. Access to Norwegian healthcare system - challenges for sub-Saharan African immigrants. Int J Equity Health. 2019;18(1):125-.
39. Diaz E, Kumar BN. Differential utilization of primary health care services among older immigrants and Norwegians: a register-based comparative study in Norway. BMC Health Serv Res. 2014;14(1):623.
40. Abebe DSJNr. Public health challenges of immigrants in Norway: a research review. 2010;2:2010.
41. Tschirhart N, Diaz E, Ottersen T. Accessing public healthcare in Oslo, Norway: the experiences of Thai immigrant masseuses. BMC Health Serv Res. 2019;19(1):722-.
42. aulshus E, Kuhn I, Mollby R, Colque P, O'Sullivan K, Midtvedt T, et al. Diversity and antibiotic resistance among Escherichia coli populations in hospital and community wastewater compared to wastewater at the receiving urban treatment plant. Water Res. 2019;161:232-41.
43. Summary of the latest data on antibiotic resistance in the European Union, EARS-Net surveillance data November 2017, by European Center for Disease Prevention and Control (ecdc)
44. WHO, 29 January 2018, News release, BANGKOK, High levels of antibiotic resistance found worldwide, new data shows. WHO website.
45. Ringard Å, Sagan A, Sperre Saunes I, Lindahl AK. Norway: health system review. Health Syst Transit. 2013;15(8):1-162.
46. Report by the Statistisk sentralbyrå (statistics Norway) published on 15 March 2018, "14 per cent of population are immigrants". ssb.no.
47. Jan Petter Myklebust, Call for reform of admissions for international students, 27 April 2018, University World News the global window on higher education.
48. FACTS & FIGURES 2016 – a leading European university, uio.no https://www.uio.no/english/about/facts/figures/uio-facts-2016.pdf
49. Glanz, K., Rimer, B. K., & Viswanath, K. (2008). Health behavior and health education : theory, research, and practice (4th ed. ed.). San Francisco, Calif: Jossey-Bass.
50. National Cancer, I. (1995). Theory at a glance: a guide for health promotion practice: Bethesda, Md.: U.S. Dept. of Health and Human Services, Public Health Service, National Institutes of Health, National Cancer Institute.

51. Moen, Kåre and Anne Lise Middelthon. "Qualitative Research Methods." Research in Medical and Biological Sciences: From Planning and Preparation to Grant Application and Publication. Petter Laake, Aakon Breien Benestad and Bjorn Reino Olsen. Amsterdam: Elsevier, 2015. 321-378.
52. Karina Kielmann, F. C., Janet Seeley. (2010). Introduction to Qualitative Research Methodology (pp. 84).
53. Spradley J P. The Ethonographic Interview. New York, NY, USA: Holt, Rinehart and Winston; 1979.
54. Ahmed Bedru Omer, Knut W. Ruyter, Medical Research Ethics – Lesson 4 confidentiality, protection of privacy and genetic research, Revised by Jan Helge Solbakk, October 2014.
55. World Medical Association Declaration of Helsinki Ethical Principles for Medical Research Involving Human Subjects, Declaration of Helsinki (2013).
56. Ahmed Bedru Omer, Knut W. Ruyter, Medical Research Ethics – Lesson 2, Informed consent, Revised by Jan Helge Solbakk, January 2012
57. Council for international organizations of medical science. International ethical guidelines for biomedical research involving human subject. Geneva: CIOMS, 2002.
58. Christin Brux, Validity and Reflexivity in Qualitative Research, Department of Community Medicine and Global Health, October 29, 2019.
59. Maxwell, Jo seph. (2013) QualitativeResearchDesign: AnInteractiveApproach, 3rdEdition. LosAngeles:SAGEPublications.
60. Malterud, Kirsti. (2001) "The Art and Science of Clinical Knowledge: Evidence Beyond Measures and Numbers." The Lancet 358, 397-400.
61. Els van Wijngaarden a, Carlo Leget b, Anne Goossensen, Ready to give up on life: The lived experience of elderly people who feel life is completed and no longer worth living, Social Science & Medicine 138 (2015) 257e264
62. Hennink, M., & Kaiser, B. (2019). Saturation in Qualitative Research. In P. Atkinson, S. Delamont, A. Cernat, J.W. Sakshaug, & R.A. Williams (Eds.), *SAGE Research Methods Foundations.*
63. Patricia I. Fusch and Lawrence R. Are We There Yet? Data Saturation in Qualitative Research, The Qualitative Report 2015 Volume 20, Number 9, How To Article 1, 1408-1416
64. Maryn McKenna, Covid-19 May Worsen the Antibiotic Resistance Crisis, April 23, 2020, published on wired.com and Boston university's web page, CARB-X combating antibiotic resistance bacteria.

65. Kathy Talkington, Superbugs in the News: How Covid-19 Is Increasing Antibiotic Use, April 27, 2020, published on www.pewtrusts.org
66. Ruiz J. Enhanced antibiotic resistance as a collateral COVID-19 pandemic effect?. The Journal of hospital infection. 2021 Jan;107:114.
67. Getahun H., Smith I., Trivedi K., Paulin S., Balkhy H.H. Tackling antimicrobial resistance in the COVID-19 pandemic. Bull WHO. 2020;98:442---442A. doi: 10.2471/BLT.20.268573.
68. Clinical management of COVID-19 Interim Guidance - May 2020. Geneva: World Health Organization; 2020. Available from: https://www.who.int/publications-detail/clinical-management-of-Covid-19 [cited 2020 Jun 4].
69. Alshogran OY, Alzoubi KH, Khabour OF, Farah S. Patterns of self-medication among medical and nonmedical University students in Jordan. Risk management and healthcare policy. 2018;11:169.
70. Ali H, Naureen ON, Ahmad A, Yasmeen S, Mehmood R, Arshad A. Assessment of self-medication among medical and non-medical students. Biomedica. 2015 Oct;31(4):311.
71. Sabtu N, Enoch DA, Brown NM. Antibiotic resistance: what, why, where, when and how?. British medical bulletin. 2015 Dec 1;116(1).
72. Philip M Polgreen, Evelyn L Polgreen, Infectious Diseases, Weather, and Climate, Clinical Infectious Diseases, Volume 66, Issue 6, 15 March 2018, Pages 815–817,
73. Quispe-Cañari JF, Fidel-Rosales E, Manrique D, Mascaró-Zan J, Huamán-Castillón KM, Chamorro–Espinoza SE, Garayar–Peceros H, Ponce–López VL, Sifuentes-Rosales J, Alvarez-Risco A, Yáñez JA. Self-medication practices during the COVID-19 pandemic among the adult population in Peru: A cross-sectional survey. Saudi Pharmaceutical Journal. 2021 Jan 1;29(1):1-1.
74. Malik M, Tahir MJ, Jabbar R, Ahmed A, Hussain R. Self-medication during Covid-19 pandemic: challenges and opportunities. Drugs & Therapy Perspectives. 2020 Dec;36(12):565-7.
75. Zhang A, Hobman EV, De Barro P, Young A, Carter DJ, Byrne M. Self-medication with antibiotics for protection against COVID-19: The role of psychological distress, knowledge of, and experiences with antibiotics. Antibiotics. 2021 Mar;10(3):232.
76. Lucien MA, Canarie MF, Kilgore PE, Jean-Denis G, Fénélon N, Pierre M, Cerpa M, Joseph GA, Maki G, Zervos MJ, Dely P. Antibiotics and antimicrobial resistance in the COVID-19 era: Perspective from resource-limited settings. International Journal of Infectious Diseases. 2021 Mar 1;104:250-4.

77. Pelfrene E, Botgros R, Cavaleri M. Antimicrobial multidrug resistance in the era of COVID-19: a forgotten plight?. Antimicrobial Resistance & Infection Control. 2021 Dec;10(1):1-6.
78. Knight GM, Glover RE, McQuaid CF, Olaru ID, Gallandat K, Leclerc QJ, Fuller NM, Willcocks SJ, Hasan R, van Kleef E, Chandler CI. Antimicrobial resistance and COVID-19: Intersections and implications. Elife. 2021 Feb 16;10:e64139.
79. Import av legemidler til personlig bruk ved forsendelse, legemiddelverket.no, oppdatert: 27.02.2020, Publisert: 28.11.2017.
80. Wright GD. Antibiotic resistance in the environment: a link to the clinic?. Current opinion in microbiology. 2010 Oct 1;13(5):589-94.

APPENCICES

Appendix 1

Interview guide:

Private import of antibiotics to Norway. A qualitative study on international students coming from out of EØS.

First information regarding Gender, age, country of origin, educational background, duration of residence and marital and parental status will be recorded.

These are the interview questions:

- Why did you bring the antibiotics?
- Where and when did you get the idea of bringing antibiotics with you?
- Did Covid-19 pandemic affect your decision-making process (for newcomers)
- Depending on the duration of the residence: How often have you been sick and how often have you used the antibiotics you have brought?
- How did you bring the antibiotics?
    - Carrying them with you when flying to Oslo
    - Receiving them by mail
    - Online shopping
- What kind of antibiotics have you brought with you?
- Have you ever consumed the antibiotics you have brought?
    - How many times?

    - For how long? (Have you completed the treatment)
    - Was that effective?
- How did you access antibiotics back home?
- How much do you know about the indication of the antibiotics that you bring?
- Do you know anything about antibiotic (antimicrobial) resistance?
- Do you think Covid-19 crisis will affect antibiotic resistance patterns?
- How is your experience with the SIO health center?
- How is your experience with the fastlege (GP)?
- Have you ever asked your fastlege (GP) for antibiotics?

Appendix 2
Informed consent form

Informed consent form

This informed consent form is for the international students who are invited to participate in research titled " Private import of antibiotics to Norway. A qualitative study on international students coming from out of EØS."

Name of Principle Investigator: Laleh Mireskandari
Name of Organization: University of Oslo, Institute for Health and Society
Name of supervisor: Professor Christoph Gradmann
Project: Master thesis

This Informed Consent Form has two parts:

• Information Sheet (to share information about the study with you)

• Certificate of Consent (for signatures if you choose to participate)

You will be given a copy of the full Informed Consent Form

Information sheet:

Introduction

I am a master student, working on my master thesis in the university of Oslo. I am doing research on the private import of antibiotics by international students coming from out of EØS, which seems common in this country and in other European countries. I am going to give you information and invite you to be part of this research. You do not have to decide today whether or not you will participate in the research. Before you decide, you can talk to anyone you feel comfortable with about the research.

This consent form may contain words that you do not understand. Please ask me to stop as we go through the information and I will take time to explain. If you have questions later, you can ask them of me.

Purpose of the research

The private import of antibiotics is being practiced by many people who move to live in another country, including international students, all over the word. We believe that you can help us by telling us how and why you have brought antibiotics to Oslo, and how do you use these antibiotics. We also want to learn more about your perception of antibiotic resistance which is a growing challenge in the current era. We would also like to know if Covid-19 global epidemy has influenced your decision to import antibiotic with you to Norway (If you have recently moved to Norway) or has affected your consumption patterns.

Type of Research Intervention

This research will involve your participation in a one-hour interview.

Participant selection

You are being invited to take part in this research because we feel that your experience as an international student who has imported antibiotics, can contribute much to our understanding and knowledge of the phenomenon. Information provided by you will be completely anonymous and preserved.

- ***Questions to elucidate understanding:*** *Do you know why we are asking you to take part in this study? Do you know what the study is about?*

Voluntary Participation

Your participation in this research is entirely voluntary. It is your choice whether to participate or not. The choice that you make will have no bearing on your education or on any study-related evaluations or reports. You may change your mind later and stop participating even if you agreed earlier.

- ***Questions to elucidate understanding:*** *If you decide not to take part in this research study, do you know what your options are? Do you know that you do not have to take part in this research study, if you do not wish to? Do you have any questions?*

Procedures

We are asking you to help us learn more about private importation of antibiotics by international students coming from out of EØS. We are inviting you to take part in this research project. If you accept, you will be asked to participate in an interview with me.

During the interview, I will sit down with you in a comfortable place at the university. If it is better for you, the interview can take place in your home or a friend's home, while taking care for social distancing regulations due to Covid-19 situation. Interview can also take place virtually by any means available for you. If you do not wish to answer any of the questions during the interview, you may say so and I will move on to the next question. No one else but me will be present unless you would like someone else to be there. The information recorded is confidential, and no one else except me will access to the information documented during your interview. The entire interview will be recorded, but no-one will be identified by name on the recording. The recordings will be kept on TSD (UiO service for research data). The information recorded is confidential, and no one else except me will have access to the recordings.

- ***Questions to elucidate understanding:*** *If you decide to take part in the study, do you know how much time will the interview take? Where will it take place? If you agree to take part, do you know if you can stop participating? Do you know that you may not respond to the questions that you do not wish to respond to? Do you have any more questions?*

Risks

There is a risk that you may share some personal information about carrying antibiotics with you that you may feel uncomfortable talking about them or you may be concerned about the consequences. We do not wish for this to happen; however, we assure you that your information is completely confidential and will not be reported to any third party or authority. You do not have to answer any question or take part in the interview if you feel the question(s) are too personal or if talking about them makes you uncomfortable.

Benefits

There may be no direct benefit to you, but your participation is likely to help us find out more about the private importation of antibiotic practices by international student population coming from out of EØS in Oslo.

Reimbursements

You will not be provided any incentive to take part in the research. However, we will provide you with transport expenses (if applicable) or any other costs you may undergo in order to participate in the interview.

- ***Questions to elucidate understanding:*** *Can you tell me if you have understood correctly the benefits that you will have if you take part in the study? Do you know if the study will pay for your travel costs and do you know how much you will be re-imbursed? Do you have any other questions?*

Confidentiality

The research being done in the university may draw attention and if you participate you may be asked questions by other people in the university. The information that I collect from this research project will be kept private. Any information about you will have a number on it instead of your name. Only I will know what your number is and I will lock that information on TSD (UIO service for research data). It will not be shared with or given to anybody else. After the project is finished All personal data will be anonymized.

- ***Questions to elucidate understanding:*** *Did you understand the procedures that we will be using to make sure that any information that I as the researcher collect about you will remain confidential? Do you have any more questions?*

Sharing the Results

Nothing that you tell us today will be shared with anybody else and nothing will be attributed to you by name. The knowledge that we get from this research will be shared with you before it is made available to the public. Each participant will receive a summary of the results then we will publish the results so that other interested people may learn from the research.

Right to Refuse or Withdraw

You do not have to take part in this research if you do not wish to do so and choosing to participate will not affect your education or study-related evaluations in any way. You may stop participating in the interview at any time that you wish without your study being affected. After transcribing your interview, I will give you a copy of your personal data and you will have the opportunity to review your remarks, and you can ask to delete the data or modify or remove portions of those, if you do not agree with my notes or if I did not understand you correctly.

You can also send a complaint to the Data Protection Officer or The Norwegian Data Protection Authority regarding the processing of your personal data.

Whom to Contact

If you have any questions, you can ask them now or later. If you wish to ask questions later, you may contact me, Laleh Mireskandari, telephone number: +4796805564, Email: laleh.mireskandari@studmed.uio.no.

Or you can contact professor Christoph Gradmann who is the supervisor of the project from UiO, telephone number: +4722850615, Email: Christoph.gradmann@medisin.uio.no

You can also contact the UiO's data protection officer who is the point of contact for individuals who have questions about the UiO processing of personal information and about how they can fulfill their rights under the privacy policy. Data protection officer of UiO is Roger Markgraf-Bye, telephone number: +4790822826, Email: personvernombud@uio.no.

This proposal has been reviewed and approved by NSD (Norwegian Center for research Data) which is a committee whose task it is to make sure that research participants' data are protected. You can also contact them in case of any questions or complaint, telephone: +47 55 58 21 17, Email: personverntjenester@nsd.no

- ***Questions to elucidate understanding:*** *Do you know that you do not have to take part in this study if you do not wish to? You can say No if you wish to? Do you know that you can ask me questions later, if you wish to? Do you know that I have given the contact details of the person who can give you more information about the study?*

Certificate of Consent

Statement by the participant

I have been invited to participate in research about private import of antibiotics by international students coming from out of EØS.

I have read the foregoing information, or it has been read to me. I have had the opportunity to ask questions about it and any questions I have been asked, have been answered to my satisfaction. I consent voluntarily to be a participant in this study

Print Name of Participant_____

Signature of Participant _____

Date _____

Day/month/year

Statement by the researcher taking the consent

I have accurately read out the information sheet to the potential participant, and to the best of my ability made sure that the participant understands that the following will be done:

1.

2.

3.

I confirm that the participant was given an opportunity to ask questions about the study, and all the questions asked by the participant have been answered correctly and to the best of my ability. I confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily.

A copy of this ICF has been provided to the participant.

Print Name of Researcher taking the consent_____

Signature of Researcher taking the consent_____

Date _____

Day/month/year

Appendix 3
NSD Approval

Melding16.06.2020 15:39

Det innsendte meldeskjemaet med referansekode 160833 er nå vurdert av NSD.

Følgende vurdering er gitt:
Our assessment is that the processing of personal data in this project will comply with data protection legislation, so long as it is carried out in accordance with what is documented in the Notification Form and attachments, dated 16 June 2020, as well as in correspondence with NSD. Everything is in place for the processing to begin.

NOTIFY CHANGES
If you intend to make changes to the processing of personal data in this project it may be necessary to notify NSD. This is done by updating the Notification Form. On our website we explain which changes must be notified. Wait until you receive an answer from us before you carry out the changes.

TYPE OF DATA AND DURATION
The project will be processing special categories of personal data about health, and general categories of personal data, until 30 June 2021.

LEGAL BASIS
The project will gain consent from data subjects to process their personal data. We find that consent will meet the necessary requirements under art. 4 (11) and 7, in that it will be a freely given, specific, informed and unambiguous statement or action, which will be documented and can be withdrawn. The legal basis for processing special categories of personal data is therefore explicit consent given by the data subject, cf. the General Data Protection Regulation art. 6.1 a), cf. art. 9.2 a), cf. the Personal Data Act § 10, cf. § 9 (2).

PRINCIPLES RELATING TO PROCESSING PERSONAL DATA
NSD finds that the planned processing of personal data will be in accordance with the principles under the General Data Protection Regulation regarding: - lawfulness, fairness and transparency (art. 5.1 a), in that data subjects will receive sufficient information about the processing and will give their consent - purpose limitation (art. 5.1 b), in that personal data will be collected for specified, explicit and legitimate purposes, and will not be processed for new, incompatible purposes - data minimisation (art. 5.1 c), in that only personal data which are adequate, relevant and necessary for the purpose of the project will be processed - storage limitation (art. 5.1 e), in that personal data will not be stored for longer than is necessary to fulfil the project's purpose

THE RIGHTS OF DATA SUBJECTS

Data subjects will have the following rights in this project: transparency (art. 12), information (art. 13), access (art. 15), rectification (art. 16), erasure (art. 17), restriction of processing (art. 18), notification (art. 19), data portability (art. 20). These rights apply so long as the data subject can be identified in the collected data. NSD finds that the information that will be given to data subjects about the processing of their personal data will meet the legal requirements for form and content, cf. art. 12.1 and art. 13. We remind you that if a data subject contacts you about their rights, the data controller has a duty to reply within a month.

FOLLOW YOUR INSTITUTION'S GUIDELINES

NSD presupposes that the project will meet the requirements of accuracy (art. 5.1 d), integrity and confidentiality (art. 5.1 f) and security (art. 32) when processing personal data. Tjenester for sensitive data (TSD) is a data processor for the project. NSD presupposes that the processing of personal data by a data processor meets the requirements under the General Data Protection Regulation arts. 28 and 29. To ensure that these requirements are met you must follow your institution's internal guidelines and/or consult with your institution (i.e. the institution responsible for the project).

FOLLOW-UP OF THE PROJECT

NSD will follow up the progress of the project at the planned end date in order to determine whether the processing of personal data has been concluded.

Good luck with the project!

Contact person at NSD: Simon Gogl Data Protection Services for Research: +47 55 58 21 17 (press 1)