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Migration and infectious disease risk: knowledge and perception among university students in two European countries

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Abstract

Background. *In the past years, migration has increasingly affected the European continent. The concerns of the local population about infection spread by migrants may increase as an unjustified stigma. Our study aimed to assess the knowledge and risk perception of infectious disease associated with migration among university students.*
Methods. *Between January and February 2020, we conducted an online survey in Italian and Spanish University students. We collected data on demographics, perception, and knowledge of infectious diseases associated with migration. We performed descriptive and risk factors analysis to assess the association among selected variables.*
Results. *We collected 1,397 answers, 73.16% from Italian students and 26.84% from Spanish students, 34.54% and 38.67% enrolled in healthcare degrees, respectively. We found a statistically significant correlation between the knowledge of infectious diseases and the perception of the infectious risk associated with migration, not confirmed for the area of study. Healthcare students had the best levels of knowledge and perception of the migratory phenomenon, but the higher perception of infectious risk. Exposure to the media coverage about migration was associated with the worst perception of the migratory phenomenon and infectious risk.*
Conclusion. *Our study showed that, despite healthcare students had the best levels of knowledge, they had the highest risk perception of infectious diseases associated with migration. The inclusion of courses on migration medicine in current healthcare curricula and the increase of practical training could help to avoid the development of biased approaches towards migrants among healthcare professionals.*

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Introduction

Europe, particularly the European Union (EU), represents one of the most historically sought-after destinations for migrants. In recent years, the migration phenomenon has gained increasing significance, with estimates indicating that by 2017, the immigration rate had surpassed the emigration rate in the EU (1). Nowadays, migrants constitute at least 10% of the EU population (2).

Southern Europe, notably Italy and Spain, is significantly impacted by irregular migration via sea and land routes, a topic widely debated in public discussions and extensively covered by national media outlets (3). Media coverage often perpetuates prejudices against migrants, contributing to the increasing concerns regarding the potential transmission of infectious diseases (4). Refugees and migrants frequently find themselves ending their journeys in marginalised urban areas, where they are perceived as a matter of emotional security (4,5). They are commonly viewed as competing with citizens for employment opportunities and social services, thus exacerbating xenophobic sentiments and anti-migrant attitudes. This current situation has influenced migrant health policies, which typically prioritise the health of the resident population and aim to prevent the importation of infectious diseases from abroad, neglecting the health needs of migrants (5).

However, literature indicates that infections in migrants have marginal public health implications for European countries' populations. Indeed, the unprecedented arrival of a considerable number of refugees and migrants in the last decade has not been associated with significant outbreaks of infectious diseases (6).

This is partly due to the limited interaction between migrants and the host population. On the contrary, data suggest that an increase in disease transmission is often observed among refugees and migrants, who often suffer from low vaccination coverage (7-9).

Available data indicate that foreign individuals often arrive in a state of good health, sometimes surpassing that of the host population, a phenomenon defined in literature as the "healthy migrant effect" (10). Their health tends to decline after their arrival in the destination country, referred to as the "exhausted healthy migrant effect", due to poor living conditions and suboptimal social integration. In particular, the limited integration into the host country leads to a state of loneliness and isolation, which inevitably affects the health of migrants (8-11): the stigma towards this population represents a negative health determinant and discrimination is a fundamental cause of negative health outcomes, exacerbating inequalities (12-13). These disparities persist regardless of socioeconomic status, even when adjusting for the latter, indicating that differences in health outcomes remain, primarily attributable to ethnic/racial inequalities (13,14).

Perceived discrimination negatively impacts healthcare-seeking and adherence behaviours among migrants (15-18). On the other hand, health professionals may have unconscious biases towards minorities, affecting the quality of care, doctor-patient communication and professional performance (15, 19-21).

Only recently migrant health emerged as a key issue. Prevention services and access to care by refugees and migrants are recognised as fundamental human rights (22) and prioritising vulnerable populations and at high risk groups in societies is increasingly considered the appropriate public health strategy to achieve global health goals (23).

This study aimed to investigate the perception of the infectious disease risk associated with the migrant population among the university student population residing in Italy and Spain. Secondly, we focused on the perception of risk among students enrolled in healthcare degrees, as they represent the future healthcare workforce.

Methods

1. Data collection and participants

This study is based on two national cross-sectional surveys conducted between January and February 2020. The survey was administered to two cohorts of university students in Italy and Spain, recruited through convenience sampling. The questionnaire was distributed via various online platforms, including undergraduate students' Facebook groups, QRcode posted on the noticeboards within university premises, and via the mailing list of the University of Murcia. The students were invited to participate in an online survey conducted using Google Forms®. The survey included a detailed explanation regarding the purpose and the voluntary nature of the study and clarified that respondents' anonymity was guaranteed.

2. Measurements

The questionnaire development was informed by a narrative synthesis of existing literature on migrants' health and infections, in particular, we referred to the

study by Visalli et al (24) and by Istituto Cattaneo (25). The questionnaire (available in Annex 1) consisted of five parts.

The first part of the questionnaire collected the students' personal information (age, gender, geographical area, field of study). The second and third parts respectively investigated the attitude towards the migrant population and knowledge about the migratory phenomenon. The fourth part explored the knowledge regarding the risks associated with acquiring and/or transmitting infectious diseases by migrants, while the fifth and final part investigated the participants' risk perception.

The survey comprised categorical responses and a 5-point Likert scale (2 levels of agreement, 1 neutral choice, 2 levels of disagreement).

Three questions were designed to investigate the perception of the migratory phenomenon, two with a scoring range of0 to 2 and one with a scoring range of 1 to 3. The total score ranges from 1 to 7, where the higher scores indicate a more negative perception of the migratory phenomenon.

Four questions were designed to assess the perception of the infectious risk associated with migration. Among these, three were scored items on a 5-point Likert scale, while one was a yes/no question. The median of the Likert scale responses was calculated, and an additional point was attributed for a negative answer to the yes/no question. The total score ranges from 1 to 6, where the higher scores indicate a more negative perception of the infectious risk.

A Likert question was included to test the knowledge and perception of infectious risk concerning 6 selected infectious diseases, tuberculosis, meningitis, malaria, HIV/AIDS, tetanus, and scabies. The question stated: "Some infectious diseases have re-emerged in the last ten years due to migration".

Two additional questions were designed to investigate the knowledge of infectious diseases. The total knowledge score ranges from 1 to 7 points, where a higher score corresponds to a worse knowledge of infectious diseases.

The questions used in the scores are reported in the table below (Table 1).

A pilot study was conducted with 10 Italian students purposively selected among researchers' acquaintances. The questionnaire was revised based on their feedback and suggestions.

Data analysis was carried out using the software Stata (version 13.0). We excluded participants who met the following criteria: a) people older than 32 yo; b) people who were not currently enrolled in a university course; c) people who didn't answer the question about the area of study (missing data). We categorised the variable "area of study" into four groups. Following the guidelines of the University of Pisa, we identified "healthcare area", "scientific-non-healthcare area", "non-scientific area" and "other" to include all those respondents who had not indicated the exact course of study.

A descriptive analysis of the main characteristics of the sample was performed. A bivariate analysis was carried out to explore the association between each independent variable and the different outcomes of interest using Wilcoxon-Mann-Whitney or Kruskal-Wallis tests. Then, a univariate analysis was carried out to explore the association between each independent variable and the different outcomes of interest using linear regression. Independent variables, with an association with a p-value less than 0.05 during the univariate analyses, were included in the multivariate linear regression. Lastly, a multivariate linear regression model was constructed to identify factors significantly and independently associated with the following binary outcome variable: "perception of the migratory phenomenon", "perception of the infectious risk associated with the migratory phenomenon" and "knowledge of infectious diseases".

To build multivariate models a manual stepwise variables' selection procedure was used to assess confounding and effect modification. To select the variables included in the models, the Likelihood-ratio test was used. All reported values are two-sided, and a value of $p \leq 0.05$ was used as a threshold for statistical significance for all analyses.

During the study planning period, we checked the requirements of the competent Ethics Committee of the University of Pisa. In accordance with the Ethics Committee's guidelines, the study did not require approval as it did not require the involvement of patients, medical interventions of any sort, or experiments on animals. However, we complied with the principles of informed consent and anonymization: we obtained consent from each respondent following the written explanation of the study's aims and objectives.

Results

1. Sample characteristics

We collected 1,469 (1,086 from Italy and 383 from Spain) answers. After applying the exclusion criteria, we included 1,397 responders in the study: 1,022

Table 1 - Questions used to elaborate the scores "knowledge of infectious diseases", "perception of the migratory phenomenon" and "perception of the infectious risk associated with migration"

Questions used for building the score evaluating the knowledge of infectious diseases		1-7
Have infectious diseases increased over the past 10 years?	Yes, No, I don't know	0-2
Tuberculosis is contagious in all its forms.	Likert scale	1-5
Questions used for building the score evaluating the perception of the migratory phenomenon		**1-7**
Do immigrants represent a security problem in your country?	Yes, No, I don't know	0-2
Do immigrants affect the unemployment in your country?	Yes, No, I don't know	0-2
How many foreigners do you think are resident on average in your country?	<3%, 3-6%, 6-9%, 9-12%, 12-25%, 25-50%, >50%	1-3
Questions used for building the score evaluating the perception of the infectious risk associated with migration		**1-6**
Migrations cause the spread of new diseases that were not present in your country before	Likert scale	1-5
Some infectious diseases have re-emerged in the last ten years due to migration: tuberculosis	Likert scale	1-5
Some infectious diseases have re-emerged in the last ten years due to migration: meningitis	Likert scale	1-5
Some infectious diseases have re-emerged in the last ten years due to migration: malaria	Likert scale	1-5
Some infectious diseases have re-emerged in the last ten years due to migration: HIV	Likert scale	1-5
Some infectious diseases have re-emerged in the last ten years due to migration: tetanus	Likert scale	1-5
Some infectious diseases have re-emerged in the last ten years due to migration: scabies	Likert scale	1-5
Serious and contagious diseases are more common in the foreign population than in the resident population (1-5)	Likert scale	1-5
Can migrants living in our city spread diseases and represent a danger to our health?	Yes, No	(+1)

a. Likert scale: 1. Strongly disagree 2. Disagree 3. Neither agree nor disagree 4. Agree 5. Strongly agree.

Table 2 - Frequency distribution (absolute number and percentage) of on Likert scale for each item.

Questions	Strongly disagree		Disagree		Neither agree nor disagree		Agree		Strongly agree		Total	Missing data	
	n	%	n	%	n	%	n	%	n	%	n	n	%
Tuberculosis is contagious in all its forms	406	29.06	324	23.19	454	32.50	152	10.88	61	4.37	1397	0	0
Migrations are the cause of new diseases that were not present in your country before	275	19.69	331	23.69	340	24.34	294	21.05	157	11.24	1397	0	0
Some infectious diseases have re-emerged in the last ten years due to migration: tuberculosis	382	27.36	321	22.99	424	30.37	186	13.32	83	5.95	1396	1	0.07
Some infectious diseases have re-emerged in the last ten years due to migration: meningitis	602	43.19	323	23.17	319	22.88	117	8.39	33	2.37	1394	3	0.21
Some infectious diseases have re-emerged in the last ten years due to migration: malaria	388	27.81	304	21.79	369	26.45	231	16.56	103	7.38	1395	2	0.14
Some infectious diseases have re-emerged in the last ten years due to migration: HIV	670	47.99	286	20.49	289	20.70	102	7.31	49	3.51	1396	1	0.07
Some infectious diseases have re-emerged in the last ten years due to migration: tetanus	802	57.45	242	17.34	278	19.91	53	3.80	21	1.50	1396	1	0.07
Some infectious diseases have re-emerged in the last ten years due to migration: scabies	437	31.33	312	22.37	393	28.17	178	12.76	75	5.38	1395	2	0.14
The health of foreigners improves after they arrive in your country	73	5.23	183	13.11	506	36.25	471	33.74	163	11.68	1396	1	0.07
Serious and contagious diseases are more common in the foreign population than in the population of your country	189	13.54	323	23.14	470	33.67	297	21.28	117	8.38	1396	1	0.07

(73.16%) were Italian (F: 668/1,022, M: 341/1,022, others: 13/1,022) and 375 (26.84%) Spanish (F: 253/375, M: 119/375, others: 3/375). The median age was 24 for Italy and 22 for Spain (range 18 to 32). In Italy, 34.54% of students were pursuing healthcare degrees, 30.92% studied scientific subjects, 34.15% studied non-scientific subjects, and 0.39% did not specify their field of study. In Spain, these percentages were 38.67%, 19.73%, 28.80%, and 12.80%, respectively. The sample included students from various regions of Italy, with 59% from central regions, 27% from southern regions and 14% from northern regions. In Spain, most respondents (73%) came from the region of Murcia, in the South.

Approximately 45% of the sample agreed or strongly agreed that migrants' health improves after r they arrive in Italy or Spain. However, a significant proportion of the sample either did not know if they agreed or gave a neutral answer (36%).

Additionally, almost half of the sample (52.15%) referred exposure to media coverage on infectious diseases among migrant population.

The answers to Likert-scale questions are reported in Table 2.

2. Perception of the migratory phenomenon

In both countries there was a non-negative perception of the migratory phenomenon: approximately 80% of the Italian sample and 77% of the Spanish one had a score lower than or equal to 3/7.

Regarding the area of study, we observed that the students pursuing a healthcare degree had the best perception of the migratory phenomenon. Descriptive data are reported in Table 1 in Annex 2.

The multivariate linear regression analysis showed that female students (Coef. 0.19, p< 0.01), Spanish students (Coef. 0.25, p< 0.01) and students from scientific and non-scientific areas (Respectively Coef. 0.30 and 0.33, p< 0.01) had a worse perception of the migratory phenomenon. Moreover, students with a worse perception of the infectious risk associated with migration also exhibited a worse perception of the migratory phenomenon (Coef. 2.38, p<0.01). Exposure to media coverage related to infectious diseases in the migrant population was associated with a worse perception of the migratory phenomenon (Coef. 0.16, p< 0.01).

3. Perception of the infectious risk associated with migration

Almost half of the sample exhibited a low perception of the infectious risk (47.8%, score 1-2/6). When considering the country, Italian students had a lower risk perception (52.1%) than Spanish students (35.9%).

The perception of infectious risk was highest among healthcare students (48.29%, score 1-2/6).

The multivariate linear regression analysis showed that Spanish students (Coef. 0.16, p < 0.04) had a higher perception of the infectious risk associated with migration. Students from scientific and non-scientific degrees (Respectively Coef. -0.28 and -0.65, p<0.01) had a lower perception of the infectious risk associated with migration when compared with students enrolled in healthcare degrees. A lower level of knowledge of infectious diseases was associated with a higher perception of the infectious risk associated with migration. Students with worse perception of the migratory phenomenon had a higher perception of the infectious risk associated with migration. In addition, exposure to news related to infectious diseases in the migrant population is associated with a higher perception of the infectious risk associated with migration (Coef. 0.31, p < 0,01).

4. Knowledge of infectious diseases

The level of knowledge, as determined by our scoring system, was considered good in almost half of the respondents (51.2% scoring between 1-3/7). Healthcare students had the highest level of knowledge of infectious diseases.

The multivariate linear regression analysis showed that students aged 23-25 years (Coef. -0.28, p< 0.01) had a better knowledge of infectious diseases, while students from scientific and non-scientific areas (Respectively Coef. 0.89 and -0.84, p<0.01) had a worse knowledge of infectious diseases when compared with students who were pursuing a healthcare degree.

Discussion

This study aimed to investigate the perception of the migratory phenomenon and the perception of the infectious risk associated with migration among Italian and Spanish university students.

Existing literature reports that stigma and prejudice negatively affect both the mental and physical health of migrants. Numerous studies have demonstrated the association between perceived discrimination and depression, anxiety, and psychological distress (26), as well as chronic conditions; stigma has been linked to increased mortality rates too (27). In our study,

we found that the majority of the students (79%) had a positive perception of migration (score <4, score 1-7). Additionally, we observed that students with a worse perception of migration had also a higher perception of the infectious risk related to migration. This finding aligns with previous studies reporting an association between perceived infectious risk and stigma (28-29).

This correlation appears particularly strong during infectious disease outbreaks. For instance, during the Ebola outbreak in 2014-2015, an increase in discrimination and stigmatisation episodes against African immigrants (30) was documented in the US.

Data collection for our study took place from January to mid-February 2020, in the very early phase of the COVID-19 pandemic. Although there were no autochthonous cases reported in Italy nor in Spain in that period, the high media coverage may have influenced the risk perception of the study participants. In the first phase of the pandemic, an increase in stigmatizing and discriminating behaviours towards Chinese and Asian-looking individuals was observed (31). However, the survey referenced specific infectious diseases, such as tuberculosis and malaria, which may have limited the impact.

Both a worse perception of migration and a higher perception of the infectious risk associated with migration were found to be associated with exposure to media coverage about infectious diseases in the migrant population. It is now established that the media plays a relevant role in influencing the public opinion towards immigration (32). In addition, social media platforms can exacerbate stigma towards migration, as it happened during the Ebola outbreak, when sensationalized reports spread fast on online platforms and increased fear among the population (30). Several studies have corroborated that social media influences public opinion on the matter of infectious diseases (33).

Around 45% of our sample agreed or strongly agreed that the migrants' health improves after their arrival in Italy or Spain. However, this response was not correlated to the perception of the migratory phenomenon, while it was directly correlated with the risk perception of infectious diseases. This finding may reveal the lack of knowledge of the barriers to access to health services that migrants can experience, such as stigma, legal obstacles, administrative and financial hurdles, low health literacy, language and cultural barriers, and even fear of detention and deportation for irregular migration. The migrant population is heterogeneous, and as a result risks and vulnerabilities often vary among groups of people. Some groups (e.g. refugees) are more vulnerable or marginalized because of their history which affects all aspects of their health. Migratory status is an important determinant of health and a determinant of access to health services that contribute to health outcomes (5).

Almost half of the sample (51.2%) had a good knowledge of infectious diseases (score < 3). As expected, students pursuing a healthcare degree had a higher score than the rest of the respondents. This finding is relevant due to the observed correlation between level of knowledge and risk perception of infectious diseases related to migration, highlighting the importance of fostering knowledge on communicable diseases also among students enrolled in other degrees.

According to a recent study analyzing the health conditions of migrants who landed in Sicily and the perception of the resident population (24), the level of education influences the perception of infectious disease risk associated with migration. In that study, 42.7% of responders believed that migrants represented a danger for their health, whereas in our study only 28.34% of students expressed the same wrong concern. The disproportion among the two studies may be related to the different population sampled, as in the Sicilian study respondents were mainly males, older and few had a university degree. The findings are congruent with the correlation we found between the risk perception and the level of knowledge.

Interestingly, students in the healthcare field, despite having a higher level of knowledge, reported an increased risk perception of infectious diseases associated with migration than students in other fields, however, this heightened risk perception did not translate into a similar perception regarding the migratory phenomenon itself. This may be explained by the fact that their future profession will expose them to a higher risk of acquiring infectious diseases compared with the general population.

Studies investigating knowledge, attitude and perception among medical students toward patients living with HIV or HCV have shown that students with higher knowledge about the disease tend to have a better attitude toward visiting patients. It is evident that there is a need to increase education on infectious diseases in order to reduce the stigma and negative attitudes (34,35).

Furthermore, a study conducted among Polish medical students in the fifth grade showed that a period

of training with HIV patients reduced the fear of being infected and improved the confidence in relationships with patients (36).

The planning of targeting training activities is crucial to reduce the risk perception and to establish a better doctor-patient relationship (36). This is particularly relevant to assure equity in healthcare. According to the literature, preconceived ideas based on prejudice and stereotypes among healthcare workers may affect their behaviours towards migrants with consequences on diagnostic services and care access (20, 37-39).

Among Spanish students we observed a poorer perception of the migratory phenomenon and higher perception of risk towards infectious disease. The socio-cultural context may have contributed to these results, however further studies need to be carried out to thoroughly understand these differences.

A limitation of our study is the uneven number of respondents across the two countries, preventing more detailed analysis of convergences and differences between the two populations. Furthermore, because of the snowball sampling method used, a selection bias is present, and the sample could not be representative of the national populations. In addition, despite the exclusion criteria adopted, we cannot completely exclude the presence of individuals of the same age group who are not enrolled in university. Despite conducting an extensive literature review, we were unable to identify a validated questionnaire that adequately addressed the specific needs and objectives of our study. Consequently, we developed our own questionnaire.

To the best of our knowledge, this is the first study to investigate the perception of the risk of infectious diseases associated with migration among undergraduates. Of particular interest is the perception and attitude of healthcare students, for whom it is necessary to plan tailor-made educational interventions.

Conclusions

In conclusion, our study showed that university students generally have a positive perception of the migration phenomenon. A higher risk perception of infectious diseases was observed among students pursuing a healthcare degree, despite their higher level of knowledge of infectious diseases. To address the gap between knowledge and perception, we believe it is necessary to introduce changes in the educational curriculum of the health areas, incorporating education about human rights, equity, sensitivity to diversity and reflecting on the inclusiveness of the health services. Other university courses could also benefit from including these topics in their curricula. Furthermore, as demonstrated in previous studies, increasing the time that healthcare areas' students dedicate to practical training in hospital and social services, such as outpatient services for people in vulnerable situations, could help reduce their heightened perception of risk regarding the transmission of infectious diseases.

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Riassunto

Fenomeni migratori e rischio infettivo: percezione, attitudini e conoscenze in due coorti di studenti universitari italiani e spagnoli

Introduzione. Negli ultimi anni il fenomeno migratorio ha interessato sempre più il continente europeo. Lo stigma nei confronti di questa minoranza e la xenofobia hanno alimentano le preoccupazioni della popolazione residente circa il rischio di trasmissione di malattie infettive dai migranti ai residenti. I migranti, tuttavia, solitamente arrivano in Europa in uno stato di buona salute. Lo stigma nei loro confronti è assimilabile ad un determinante di salute.

Metodi. Tra gennaio e febbraio 2020 abbiamo condotto un sondaggio online in due coorti di studenti universitari in Italia e Spagna. Abbiamo raccolto dati circa caratteristiche demografiche, percezione e conoscenza di trasmissione di malattie infettive dalla popolazione migrante alla popolazione residente in questi due Paesi. Per studiare le nostre variabili abbiamo eseguito analisi descrittive e analisi multivariate. Il livello di significatività stabilito è $p < 0,05$.

Risultati. Abbiamo raccolto 1397 risposte, il 73,16% da studenti italiani e il 26,84% da studenti spagnoli, rispettivamente il 34,54% e il 38,67% iscritti a lauree sanitarie. Abbiamo trovato una correlazione statisticamente significativa tra la conoscenza delle malattie infettive e la percezione del rischio infettivo associato alla migrazione, non confermata per l'area di studio. Gli studenti del settore sanitario avevano i migliori livelli di conoscenza e percezione del fenomeno migratorio, ma la percezione del rischio infettivo era più elevata. L'esposizione alla copertura mediatica sulla migrazione è stata associata alla peggiore percezione del fenomeno migratorio e del rischio infettivo.

Conclusioni. Il nostro studio ha dimostrato che gli studenti di

medicina, pur avendo i migliori livelli di conoscenza, hanno la più alta percezione del rischio di malattie infettive associate alla migrazione. L'inclusione di corsi sulla medicina delle migrazioni negli attuali curricula sanitari e l'aumento della formazione pratica potrebbero contribuire a evitare lo sviluppo di approcci stigmatizzanti nei confronti dei migranti tra gli operatori sanitari.

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Annex 1.

Survey

FIRST SECTION

Welcome, below you will be asked to answer a few short questions about the perception of transmission of infectious diseases. The survey is anonymous.

1. Gender: M, F, other

2. Age: 18-22, 23-25, >26

3. University course

4. Region of residence

5. Have infectious diseases increased over the past 10 years? Yes, No, I don't know

SECOND SECTION

Here are some multiple-choice questions with the possibility of marking a single answer. We remind you that the survey is anonymous.

6. Do you feel uncomfortable shaking hands with a person from an African country? Yes, No, I don't know

7. You are in public transport, such as a bus, and the person seated in front of you is a foreigner and coughs. How do you react? I move, it annoys me, I put something to cover my nose and mouth, I don't care

8. Do immigrants represent a security problem in your country? Yes, No, I don't know

9. Do immigrants affect the unemployment in your country? Yes, No, I don't know

THIRD SECTION

10. How many foreigners do you think are living on average in your country?

<3%, 3-6%, 6-9%, 9-12%, 12-25%, 25-50%, >50%

In the next questions, we ask you to give your opinion on a series of affirmations.

Please indicate 1 when you are not agreeing at all with the affirmation and 5 when you are strongly in agreement. Select number 3 when you neither agree nor disagree.

11. Tuberculosis is contagious in all its forms (1-5)

12. Migrations are the cause of new diseases that were not present in your country before (1-5)

13. Some infectious diseases have re-emerged in the last ten years due to migration:

Tuberculosis (1-5)

Meningitis (1-5)

Malaria (1-5)

HIV (1-5)

Tetanus (1-5)

Scabies (1-5)

14. The health of foreigners improves after they arrive in your country (1-5)

15. Serious and contagious diseases are more common in the foreign population than in the resident population (1-5)

16. Can migrants living in our city spread diseases and represent a danger to our health? Yes, No

17. In the last year, have you heard or read any news on media about infectious diseases in the migrant population? Yes, No

Thank you for answering to our survey.

Annex 2.

Table 1 - Perception of migratory phenomenon

	1		2		3		4		5		6		7		
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	N
Country															1,397
Italy	200	19.57	343	33.56	270	26.42	117	11.45	61	5.97	17	1.66	14	1.37	1,022
Spain	10	2.67	123	32.80	158	42.13	34	9.07	31	8.27	13	3.47	6	1.60	375
Gender															1,397
F	114	12.38	288	31.27	313	33.98	107	11.62	62	6.73	21	2.28	16	1.74	921
M	92	20.00	172	37.39	110	23.91	44	9.57	30	6.52	9	1.96	3	0.65	460
other	4	25.00	6	37.50	5	31.25	0	0.00	0	0.00	0	0.00	1	6.25	16
Age															1,397
18-22	69	11.64	199	33.56	198	33.39	67	11.30	36	6.07	14	2.36	10	1.69	593
23-25	85	15.92	181	33.90	158	29.59	59	11.05	37	6.93	9	1.69	5	0.94	534
>26	56	20.74	86	31.85	72	26.67	25	9.26	19	7.04	7	2.59	5	1.85	270
Area of study															1,397
Health care area	96	19.28	179	35.94	124	24.90	51	10.24	31	6.22	10	2.01	7	1.41	498
Non-scientific area	61	13.35	138	30.20	158	34.57	53	11.60	33	7.22	8	1.75	6	1.31	457
Scientific area	52	13.33	132	33.85	126	32.31	40	10.26	24	6.15	9	2.31	7	1.79	390
Others area	1	1.92	17	32.69	20	38.46	7	13.46	4	7.69	3	5.77	0	0.00	52
Knowledge of infectious diseases															1,397
1	34	20.73	72	43.90	35	21.34	14	8.54	6	3.66	2	1.22	1	0.61	164
2	36	21.30	56	33.14	49	28.99	18	10.65	8	4.73	0	0.00	2	1.18	169
3	61	15.93	137	35.77	99	25.85	47	12.27	26	6.79	11	2.87	2	0.52	383
4	53	13.77	130	33.77	123	31.95	44	11.43	28	7.27	3	0.78	4	1.04	385
5	15	8.11	46	24.86	84	45.41	17	9.19	14	7.57	5	2.70	4	2.16	185
6	7	8.86	18	22.78	25	31.65	11	13.92	8	10.13	6	7.59	4	5.06	79
7	4	12.50	7	21.88	13	40.63	0	0.00	2	6.25	3	9.38	3	9.38	32
Perception of infectious risk associated with migration															1,395
1	65	20.44	147	46.23	85	26.73	14	4.40	5	1.57	2	0.63	0	0.00	318
2	84	24.07	125	35.82	100	28.65	26	7.45	8	2.29	4	1.15	2	0.57	349
3	39	10.08	128	33.07	127	32.82	52	13.44	29	7.49	7	1.81	5	1.29	387
4	17	8.46	43	21.39	74	36.82	33	16.42	25	12.44	4	1.99	5	2.49	201
5	5	4.42	19	16.81	35	30.97	22	19.47	20	17.70	11	9.73	1	0.88	113
6	0	0.00	3	11.11	6	22.22	4	14.81	5	18.52	2	7.41	7	25.93	27
Health improvement after arrival															1,396
1	8	10.96	26	35.62	24	32.88	4	5.48	10	13.70	0	0.00	1	1.37	73
2	21	11.48	53	28.96	62	33.88	27	14.75	13	7.10	6	3.28	1	0.55	183
3	82	16.21	158	31.23	167	33.00	54	10.67	30	5.93	10	1.98	5	0.99	506
4	78	16.56	182	38.64	132	28.03	44	9.34	22	4.67	7	1.49	6	1.27	471
5	21	12.88	47	28.83	42	25.77	22	13.50	17	10.43	7	4.29	7	4.29	163
News about infectious diseases in the migrant population															1,396
No	116	17.39	233	34.93	211	31.63	64	9.60	35	5.25	5	0.75	3	0.45	667
Sì	94	12.89	233	31.96	216	29.63	87	11.93	57	7.82	25	3.43	17	2.33	729
Foreigners living in your country															1,397
<6%	210	78.95	28	10.53	21	7.89	2	0.75	5	1.88	0	0.00	0	0.00	266
6-12%	0	0.00	438	72.52	75	12.42	75	12.42	6	0.99	10	1.66	0	0.00	604
>12%	0	0.00	0	0.00	332	63.00	74	14.04	81	15.37	20	3.80	20	3.80	527

Tab 2. Perception of infectious risk associated with migration

	1		2		3		4		5		6		
	n	%	n	%	n	%	n	%	n	%	n	%	N
Country													1,395
Italy	250	24.46	283	27.69	261	25.54	138	13.50	73	7.14	17	1.66	1022
Spain	68	18.23	66	17.69	126	33.78	63	16.89	40	10.72	10	2.68	373
Gender													1,395
F	195	21.2	223	24.24	257	27.93	141	15.33	86	9.35	18	1.96	920
M	119	25.93	124	27.02	124	27.02	58	12.64	26	5.66	8	1.74	459
other	4	25	2	12.5	6	37.5	2	12.5	1	6.25	1	6.25	16
Age													1,395
18-22	120	20.27	146	24.66	180	30.41	86	14.53	47	7.94	13	2.2	592
23-25	119	22.33	137	25.7	139	26.08	83	15.57	47	8.82	8	1.5	533
>26	79	29.26	66	24.44	68	25.19	32	11.85	19	7.04	6	2.22	270
Area of study													1,395
Healthcare area	95	19.11	145	29.18	111	22.33	74	14.89	55	11.07	17	3.42	497
Non-scientific area	130	28.45	102	22.32	132	28.88	63	13.79	26	5.69	4	0.88	457
Scientific area	83	21.34	93	23.91	122	31.36	58	14.91	28	7.20	5	1.29	389
Others area	10	19.23	9	17.31	22	42.31	6	11.54	4	7.69	1	1.92	52
Knowledge of infectious diseases													1,395
1	53	32.32	53	32.32	32	19.51	13	7.93	7	4.27	6	3.66	164
2	61	36.09	43	25.44	36	21.3	15	8.88	14	8.28	0	0	169
3	90	23.56	116	30.37	87	22.77	52	13.61	32	8.38	5	1.31	382
4	71	18.49	81	21.09	140	36.46	69	17.97	22	5.73	1	0.26	384
5	26	14.05	35	18.92	72	38.92	29	15.68	16	8.65	7	3.78	185
6	10	12.66	16	20.25	18	22.78	15	18.99	17	21.52	3	3.8	79
7	7	21.88	5	15.63	2	6.25	8	25	5	15.63	5	15.63	32

Tab 3. Knowledge of infectious disease

	1		2		3		4		5		6		7		
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	N
Country															1,397
Italy	124	12.13	134	13.11	277	27.10	296	28.96	123	12.04	47	4.60	21	2.05	1,022
Spain	40	10.67	35	9.33	106	28.27	89	23.73	62	16.53	32	8.53	11	2.93	375
Gender															1,397
F	106	11.51	109	11.83	246	26.71	244	26.49	130	14.12	62	6.73	24	2.61	921
M	55	11.96	58	12.61	135	29.35	136	29.57	53	11.52	16	3.48	7	1.52	460
other	3	18.75	2	12.50	2	12.50	5	31.25	2	12.50	1	6.25	1	6.25	16
Age															1,397
18-22	51	8.60	66	11.13	156	26.31	169	28.50	97	16.36	41	6.91	13	2.19	593
23-25	83	15.54	69	12.92	147	27.53	142	26.59	56	10.49	27	5.06	10	1.87	534
>26	30	11.11	34	12.59	80	29.63	74	27.41	32	11.85	11	4.07	9	3.33	270
Area of study															1,397
Healthcare area	123	24.70	77	15.46	147	29.52	80	16.06	36	7.23	20	4.02	15	3.01	498
Non-scientific area	19	4.16	54	11.82	119	26.04	146	31.95	84	18.38	29	6.35	6	1.31	457
Scientific area	15	3.85	36	9.23	99	25.38	149	38.21	57	14.62	24	6.15	10	2.56	390
others area	7	13.46	2	3.85	18	34.62	10	19.23	8	15.38	6	11.54	1	1.92	52
Perception of the migratory phenomenon															1,397
1	34	16.19	36	17.14	61	29.05	53	25.24	15	7.14	7	3.33	4	1.90	210
2	72	15.45	56	12.02	137	29.40	130	27.90	46	9.87	18	3.86	7	1.50	466
3	35	8.18	49	11.45	99	23.13	123	28.74	84	19.63	25	5.84	13	3.04	428
4	14	9.27	18	11.92	47	31.13	44	29.14	17	11.26	11	7.28	0	0.00	151
5	6	6.52	8	8.70	26	28.26	28	30.43	14	15.22	8	8.70	2	2.17	92
6	2	6.67	0	0.00	11	36.67	3	10.00	5	16.67	6	20.00	3	10.00	30
7	1	5.00	2	10.00	2	10.00	4	20.00	4	20.00	4	20.00	3	15.00	20
Perception of the infectious risk associated with migration															1,395
1	53	16.67	61	19.18	90	28.30	71	22.33	26	8.18	10	3.14	7	2.20	318
2	53	15.19	43	12.32	116	33.24	81	23.21	35	10.03	16	4.58	5	1.43	349
3	32	8.27	36	9.30	87	22.48	140	36.18	72	18.60	18	4.65	2	0.52	387
4	13	6.47	15	7.46	52	25.87	69	34.33	29	14.43	15	7.46	8	3.98	201
5	7	6.19	14	12.39	32	28.32	22	19.47	16	14.16	17	15.04	5	4.42	113
6	6	22.22	0	0.00	5	18.52	1	3.70	7	25.93	3	11.11	5	18.52	27

Health improvement after arrival														1,396
1	16	21.92	14	19.18	15	20.55	19	26.03	4	5.48	1	1.37	4	5.48	73
2	21	11.48	25	13.66	43	23.50	46	25.14	34	18.58	12	6.56	2	1.09	183
3	53	10.47	62	12.25	146	28.85	149	29.45	59	11.66	30	5.93	7	1.38	506
4	50	10.62	50	10.62	128	27.18	143	30.36	70	14.86	20	4.25	10	2.12	471
5	24	14.72	18	11.04	50	30.67	28	17.18	18	11.04	16	9.82	9	5.52	163
News about infectious diseases in the migrant population														1,396
No	61	9.15	86	12.89	175	26.24	215	32.23	90	13.49	28	4.20	12	1.80	667
Sì	103	14.13	83	11.39	207	28.40	170	23.32	95	13.03	51	7.00	20	2.74	729
Foreigners living in your country														1,397
<6%	40	15.04	45	16.92	79	29.70	71	26.69	20	7.52	7	2.63	4	1.50	266
6-12%	85	14.07	76	12.58	178	29.47	162	26.82	70	11.59	21	3.48	12	1.99	604
>12%	39	7.40	48	9.11	126	23.91	152	28.84	95	18.03	51	9.68	16	3.04	527