

# Mpox: Awareness, knowledge and information channels used by individuals accessing a sexually transmitted infections Helpline

Pietro Gallo<sup>1</sup>, Norman Galea<sup>1,2</sup>, Anna Colucci<sup>1</sup>, Rudi Valli<sup>1</sup>, Matteo Schwarz<sup>1</sup>, Emanuele Fanales Belasio<sup>1</sup>, Alfredo d'Ari<sup>3</sup>, Francesca Furiozzi<sup>3</sup>, Anna Caraglia<sup>4</sup>, Rosa Dalla Torre<sup>1</sup>, Anna D'Agostini<sup>1</sup>

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**Parole chiave:** Mpox, Consapevolezza, Conoscenze, Canali informativi, Vaccino

## Abstract

**Background.** Up until recently, monkeypox (mpox) was considered to be a rare zoonotic infection restricted to Central and West Africa. However, in July 2022, the World Health Organization declared mpox to be a public health emergency of international concern, after there were several outbreaks in non-endemic countries. This study assessed the information channels used by individuals accessing the “Telefono Verde AIDS e Infezioni Sessualmente Trasmesse” of Istituto Superiore di Sanità (National Institute of Health in Italy) with regard to mpox. We also evaluated their awareness, and knowledge about mpox focusing on transmission and prevention.

**Methods.** This is a cross-sectional study conducted on “Telefono Verde AIDS e Infezioni Sessualmente Trasmesse” users, between January and April 2023. The target population was helpline users who were older than 18 years of age, and were phoning the service for the first time (i.e. who have not phoned in the last 12 months). Participants were interviewed using a questionnaire containing 19 questions filled by the interviewer. Collected data were analysed through descriptive statistics, and significance testing.

**Results.** From January to April 2023, “Telefono Verde AIDS e Infezioni Sessualmente Trasmesse” received 2,389 phone calls, 216 of which participated in this study. Most of these were male (85.2%; n=186), single (79.2%; n=171) and in employment (72.2%; n=156). Awareness about mpox was high (71.3%; n=154), with the central and south/islands regional areas having the highest percentage of participants who heard about the virus (84.3%; n=43 vs 72.4%; n=42; p=0.078). Television was the most frequently mentioned source of information about mpox by participants (63%; n=97; p<0.001). This medium was also the most preferred source of information about mpox (39%; n=60; p=0.109). The majority of participants stated that they did not know what mpox

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<sup>1</sup> Operational Unit of Psycho-Socio-Behavioural Research, Communication and Training, Infectious Diseases Department, National Institute of Health, Rome, Italy

<sup>2</sup> Infectious Disease Prevention and Control Unit, Health Promotion and Disease Prevention Directorate, Pietà, Valletta, Malta

<sup>3</sup> Office 3 – Communication and information, ex General Directorate for Communication and European and international relations, Ministry of Health, Rome, Italy

<sup>4</sup> Office 1 – General Affairs, ex General Directorate of Health Prevention, Ministry of Health, Rome, Italy

is (67.6%;  $n=146$ ), and less than half knew that it is preventable (42.4%;  $n=89$ ). Of those who stated that mpox is a preventable illness, less than half knew about the existence of a vaccine (44.9%;  $n=40$ ;  $p<0.001$ ).

**Conclusions.** This study provides insights into the awareness, knowledge, prevention tools and information channels of individuals who contacted the “Telefono Verde AIDS e Infezioni Sessualmente Trasmesse”. Useful indications for defining future information campaigns were obtained.

## Introduction

The monkeypox (mpox) virus is a human pathogen that is a member of the *orthopoxvirus* genus (1). Other members of this genus include the *Vaccinia* and *Variola* viruses, which are the causative agents of smallpox. Since smallpox was eradicated globally, mpox became the most prevalent *orthopoxvirus* infection in humans, with the majority of cases being reported in the Democratic Republic of Congo which is where the first zoonotic case was reported in 1970 (2–4). Smallpox eradication also led to most countries stopping routine vaccination against the virus, and as a result over 70% of the global population now has no protection against it and other *orthopoxviruses* through cross-immunity (5).

Up until recently, mpox was considered to be a rare zoonotic infection restricted to Central and West Africa (6). However, in July 2022 the World Health Organization (WHO) declared mpox to be a public health emergency of international concern, after there were several outbreaks in non-endemic countries (7). In the European Union/European Economic Area (EU/EEA) there were 4,908 cases reported between May and July 2022, which represented 65% of cases reported around the world at the time (8).

Human to human transmission of mpox may happen through both physical contact (body fluids, skin lesions, mucosal surfaces and sexually), and indirect contact (respiratory droplets and fomites) (9–12). There were also reported cases of vertical transmission from mother to foetus (13).

It is difficult to distinguish between how mpox and smallpox present clinically, as the signs and lesions are similar (14). The disease caused by this virus is self-limiting, and symptoms usually last between 14 and 21 days (13). At first, signs and symptoms like backache, headache, chills, fever, weariness, myalgia, lethargy, and enlarged lymph nodes might be present (15). After three days the fever usually resolves and

a rash erupts from the trunk and spreads to the rest of the body in a centrifugal fashion. This rash starts of as macules which last for two to four weeks, and then changes into papules, vesicles, pustules, and lastly crusts and scabs.

Gallè et al., 2022 mentioned that Italians showed a low level of knowledge about mpox and related prevention measures, with the majority of participants not being able to identify the epidemiological characteristics of the infection (16). In Italy, lower knowledge was associated with mass media being the main source of information, with the most common ones being television, radio and newspapers (16). However, in 2022 both Alshahrani and Temsah reported that social networks were the main source of information about mpox in Saudi Arabia for these individuals (13,17).

Alshahrani et al., also mentioned that public engagement is vital to prevent, control and treat possible outbreaks successfully (13). In addition to this, Rodriguez-Morales et al., suggests that to combat mpox one requires to educate the population so as to increase awareness and encourage preventative behaviours to reduce transmission (18). Al-Mustapha et al., reported that in Nigeria knowledge of correct preventive measures against mpox were below average (19). Less than half of respondents in this study knew about the mpox vaccine, and that proper hygiene practices, along with avoiding contact with infected persons and wildlife could limit transmission of this virus.

The Modified Vaccinia Ankara–Bavaria Nordic (MVA-BN) vaccine was approved to prevent mpox in people over 18 years of age who are at high risk of infection (20). Mass vaccination is not recommended at the moment, and the Italian Ministry of Health targeted particular populations for the mpox vaccine (21). These include laboratory personnel with possible direct exposure to *orthopoxvirus*, and men who have sex with men (MSM) who in the last three months had

multiple sexual partners, participated in group sex, were involved in chemsex and had been diagnosed with a sexually transmitted infection (STI) in the past year (20).

The “Telefono Verde AIDS e Infezioni Sessualmente Trasmesse” 800 861061 (TV AIDS e IST) is a national helpline service, anonymous and free, operated by the Operational Unit of Psycho-Socio-Behavioural Research, Communication and Training of the Department of Infectious Diseases at the Istituto Superiore di Sanità since 1987 (22). The aim of this service is to provide primary and secondary prevention information about the human immunodeficiency virus (HIV), acquired immunodeficiency syndrome (AIDS) and other STIs. Users living in the Italian territory and those living abroad, are provided with information and advice in a personalised and evidence-based manner.

The aim of this study is to assess the information channels used by people accessing TV AIDS e IST with regard to mpox, and to determine their awareness, and knowledge of mpox focusing on how it is transmitted and prevented.

## Methodology

This is a cross-sectional study conducted on TV AIDS e IST users between January and April 2023 (3 months). The target group consists of users who were older than 18 years of age and were phoning the service for the first time (i.e. who have not phoned in the last 12 months). Various callers who used the service during this time period were chosen using a convenience sampling technique.

An anonymous questionnaire (Supplementary Material S1) was developed to be used in this study. This type of questionnaire has already been used in previous cross-sectional studies; thus, a replicable structure was already created (23–27). The questionnaire was divided into four parts, with the first part containing identification elements including progressive ID, date, and interviewer’s code. In the second part verbal informed consent was sought and obtained from the service user before participation in this study. If the participant refused to participate, the reason for this was documented. The third part dealt with socio-demographic aspects including marital status, schooling, and professional activity. Information collected during the counselling telephone intervention including gender, age, geographic area of origin of the phone call, HIV testing and type of

caller were added to this part of the questionnaire. The fourth part addresses themes on awareness of mpox, information channels concerning mpox, knowledge about this infection and prevention tools. A pilot study was conducted before the main research was started to be able to finalise the questionnaire.

Towards the end of the telephone intervention, based on the fundamental skills of the counselling, the caller was asked if they were interested to participate in this survey. These individuals were then asked to give verbal consent before commencing the questionnaire. During the interview self-reported data which is usually documented during the usual counselling activity was collected (age, province and reasons for the telephone call). At the end, each response was linked to the identification code assigned to every call received by TV AIDS e IST.

Collected data was analysed using descriptive and inferential statistical tests, to determine the demographics of participants along with hypothesis testing to determine if there were any associations between variables.

This was achieved by using the chi-square ( $\chi^2$ ) and Fisher’s exact tests, which are nonparametric tests used to describe any relationships between categorical variables. The Fisher’s exact test was used when there were less than five observations expected in each group. IBM® SPSS® statistics v.28.0.1.1 was the software used to carry out this analysis.

## Results

During the study period, TV AIDS e IST received 2,389 phone calls of which 220 were chosen randomly to participate in this survey. The vast majority agreed to participate (98.2%; n=216), however four users refused. The reasons given by those who declined to participate included not having enough time, work reasons and not being interested.

Most participants were males (n=186; 85.2%), with the rest being females (n=30; 13.9%). The average age of all the participants was 32 years (Median: 30 years, Range: 19 to 65 years), and most commonly they called from the South/islands geographical region of Italy (Table 1). When assessing social determinants of the participants, most had a secondary level education, were in employment and not in a relationship (Table 2).

Awareness about mpox was high (71.3%; n=154), with callers from the centre and south/islands regions of Italy accounting to more than half of participants

Table 1 - Participant demographic details. N=216

	Male, n (%)	Female, n (%)	Total, n (%)	p-value
Age				0.227
19-24	41 (22)	6 (20)	47 (21.8)	
25-29	56 (30.1)	5 (16.7)	61 (28.2)	
30-34	35 (18.8)	4 (13.3)	39 (18.1)	
35-39	19 (10.2)	7 (23.3)	26 (12)	
40-44	16 (8.6)	4 (13.3)	20 (9.3)	
45-49	6 (3.2)	3 (10)	9 (4.2)	
50-54	3 (1.6)	1 (3.3)	4 (1.9)	
55-59	5 (2.7)	0 (0)	5 (2.3)	
60+	5 (2.7)	0 (0)	5 (2.3)	
Region				0.411
South and Islands	51 (27.4)	9 (30)	60 (27.8)	
North-West	50 (26.9)	5 (16.7)	55 (25.5)	
Centre	45 (24.2)	6 (20)	51 (23.6)	
North-East	40 (21.5)	10 (33.3)	50 (23.1)	
Total, n (%)	186 (85.2)	30 (14.8)	216 (100)	

Table 2 - Educational, employment, marital status and caller type. N=216

	Male, n (%)	Female, n (%)	Total, n (%)	p-value
Education				0.165
Primary (6-8 years)	12 (6.5)	0 (0)	12 (5.6)	
Secondary (9-13 years)	107 (57.5)	14 (48.3)	121 (56)	
Tertiary (>14 years)	67 (36)	15 (51.7)	82 (38)	
Not reported	0 (0)	1 (3.3)	1 (0.5)	
Profession				0.03
In employment	136 (73.1)	20 (66.7)	156 (72.2)	
Student	32 (17.2)	9 (30)	41 (19)	
Not in employment	18 (9.7)	1 (3.3)	19 (8.8)	
Marital status				0.04
Single	152 (81.7)	19 (63.3)	171 (79.2)	
Cohabiting/Married	25 (13.4)	9 (30)	34 (15.7)	
Divorced/Separated/Widowed	8 (4.3)	2 (6.7)	10 (4.6)	
Not reported	1 (0.5)	0	1 (0.5)	
Caller type				<0.001
Heterosexual	36 (19.4)	11 (36.7)	47 (21.8)	
Multiple sexual partners	67 (36)	11 (36.7)	78 (36.1)	
Sex worker client	48 (25.8)	0 (0)	48 (22.2)	
Men who have sex with men	16 (8.6)	- (-)	16 (7.4)	
Other	14 (7.5)	7 (23.3)	21 (9.7)	
HIV positive partner/relative	5 (2.7)	0 (0)	5 (2.3)	
Not reported	0 (0)	1 (3.3)	1 (0.5)	

Table 3 - Sources from which aware users heard about mpox. N=154

	n	%	p-value
Television	97	63	<0.001
Internet	60	38.7	<0.001
Social media	31	20.1	<0.001
Relative/friends	15	9.7	0.007
Radio	12	7.8	0.021
Newspaper	12	7.8	0.021
Institutional websites	5	3.2	0.325

stating that they heard about this virus (55.1%; n=86; p=0.079), as seen in figure 1. Data also showed that most of those who had a previous HIV test carried out (68.5%; n=89; p=0.015) have also heard about mpox making them aware about its existence.

The most common three sources of information about mpox included television, internet and social media (Table 3). There were no significant statistical differences by gender and age for those who mentioned television as their source of information about mpox. It should be also pointed out that no participant mentioned his trusted physician as a source of information. When asked about the preferred source to receive information about mpox television was again the most commonly mentioned, followed by social media and their family physician (Table 4). Again, there were no statistical significant associations with age and gender.

A subgroup of callers (31.8%; n=68), displayed a knowledge of the disease, half of them claiming to know the symptoms of this infection (53.7%; n=36; p<0.001). Fever was the only statistically significant symptom mentioned by participants claiming to possess knowledge about mpox (71.4%; n=25; p=0.022). Boils and skin lesions were also mentioned frequently; however they were not statistically significant (74.3%; n=26; p=1.000). Other mentioned

symptoms included muscle/joint pain, weakness, diarrhoea, vomiting, sore throat, cough, headache and lymph nodes.

When asked about viral transmission, most participants said that this happens in an unclear manner, or they did not know (90.6%; n=193). The only statistically significant transmission route mentioned was through sexual contact (81.3%; n=13; p=0.009). This was followed by transmission through body fluids (saliva, urine, blood and semen), physical contact and the respiratory system.

Very few participants knew what to do in case of infection (29.9%; n=63), and most of them felt that mpox might be of interest to everyone (70.3%; n=130). Of those who thought that mpox might be of interest to a certain group of people (9.2%; n=17), around half stated that men who have sex with men (MSM) were the most negatively affected group. Those who had contact with animals, immunocompromised individuals, and people with risky behaviours were also mentioned by our participants.

When asked about prevention, less than half thought that mpox is a preventable illness (42.4%; n=89). The three most commonly mentioned prevention methods mentioned included; protecting sexual relations (36.8%; n=25), physical precautions (22.1%; n=15) and vaccination (17.6%; n=12).

Table 4 - Preferred source of information about mpox by aware users. N=154

	n	%	p-value
Television	60	39	0.109
Social media	47	30.5	0.353
Family physician	45	29.2	0.836
Institutional websites	39	25.3	0.350
Internet	38	24.7	0.745
Radio	15	9.7	0.238
Newspaper	14	9.1	0.622
Relative/friends	9	5.8	1.000

When assessing knowledge about the existence of an mpox vaccine, around a quarter of participants stated that they knew that this existed (26.8%; n=57). Less than half of those who stated that mpox is preventable knew about the existence of a vaccine, with the rest stating that it does not exist or they did not know (44.9%; n=40 vs 33.7%; n=30 vs 21.3%; n=19; p<0.001).

Finally, participants were asked about their thoughts about the future of this infection, most did not know how things will develop in the future (49%; n=102), and a minority of these individuals thought that it will become a major health issue (11.5%; n=24).

## Discussion and Conclusion

The helpline is mostly called by those individuals who undergo risky sexual behaviours in their life making them at risk of being infected with HIV and other STIs. In fact, most participants were involved in risky sexual behaviours like having multiple sexual partners and being clients of sex workers. Most participants in this study were male and of a younger age group, and according to Asamoah et al, in Sweden these groups were associated with having increased risky sexual behaviours (28). Other Italian studies which also targeted helpline users, reported similar demographic details to what was observed in our study (29, 30). A possible reason as to why these individuals contact an anonymous helpline could be due to the presence of stigma when it comes to sexual health and STIs. Hence, those who engage in risky sexual behaviour are more likely to disclose this in an anonymous setting than with their healthcare providers who might be perceived as judgmental (31). Thus, these individuals are probably more likely to seek advice from a helpline than in a face-to-face consultation with their physician.

Awareness about mpox was high, and surprisingly the most frequent source of information about this virus was from television. The same was reported by Gallè et al., 2022 (16) however this study reported that more people obtained their information through the medium of television. Interestingly television was also confirmed as the preferred source of information about mpox, thus people who are hard to reach and undergo risky sexual behaviour could be targeted through this medium in future educational health promotion campaigns. It should be however emphasised that given the relatively small sample size and the fact that there is no statistical significance, this finding

could be due to chance and is not generalizable to the population who utilize our helpline service.

Knowledge about mpox was low, with most helpline callers not knowing the symptoms and modes of transmission. This is very concerning as these individuals have no idea if they are at risk of infection, and what to look for in the case of infection. As a consequence, there could be increased transmission, as most participants did not know what to do in the case of a suspected infection. When those who claimed to possess knowledge on mpox symptoms were asked to mention them, fever was the only statistically significant one. This symptom is very nonspecific as it is a commonly present in many different infections caused by various pathogens. That being said in mpox fever is usually present in the first three days of infection, along with other ones like backache, headache, chills, weariness, myalgia, lethargy and enlarged lymph nodes (15). Some of these were mentioned by participants, however they were strongly not significant statistically. An important symptom of mpox is the development of a cutaneous rash three days after infection, and a good number of participants mentioned development of skin lesions as a possible symptom. This indicates that our users did possess some knowledge about symptomatology, but it was very limited. On the other hand, when those who claimed to know about the transmission routes of mpox were asked to list them most rightly mentioned through the sexual route and body fluids, however none mentioned fomites as a possible source. Again, this indicates that further education of these at-risk individuals should take place to prevent future outbreaks of mpox that may arise in the future. This is very important during the summer period when more individuals come into contact with one another, potentially increasing transmission in the community again resulting in new outbreaks.

Finally, very few participants knew that mpox infection is preventable, highlighting the fact that they had little awareness and knowledge about the mpox vaccine resulting in reduced uptake among the at-risk populations in Italy. This is problematic as a higher uptake of this preventative tool will reduce the transmission of this virus among those who are at increased risk of infection, namely MSM who seem to be the subpopulation that is most negatively impacted (32).

The main limitations of this study were the small sample size, and the fact that the findings are not generalizable to the population of TV AIDS e IST users due to the recruitment method used. It

is recommended that more longitudinal studies are carried out over a longer period of time to be able to make the findings more representative. This will also give information about trend changes over time, thus giving a clearer picture.

#### Author statements most

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**Author's Contribution:** NG drafted the manuscript. AC, FF AC, AD designed the study. AC, PG, EFB, RV, MS, RD, AD constructed the questionnaire. AC, PG, EFB, RV, MS performed the telephone interviews with the anonymous questionnaire. NG, PG analyzed the data and interpreted the results. NG, AC, PG, EFB, MS contributed to the review of the manuscript.

#### Riassunto

**Mpox: Consapevolezza, conoscenze e canali informativi utilizzati dagli utenti che hanno contattato il servizio Helpline infezioni sessualmente trasmesse**

**Premessa.** Fino a poco tempo fa, il vaiolo delle scimmie (mpox) era considerato una rara infezione zoonotica limitata all'Africa centrale e occidentale. Tuttavia, nel luglio 2022 l'Organizzazione mondiale della sanità ha dichiarato l'mpox un'emergenza di sanità pubblica di interesse internazionale, dopo che si sono verificati diversi focolai in paesi non endemici. Questo studio ha valutato i canali informativi utilizzati dalle persone che accedono al "Telefono Verde AIDS e Infezioni Sessualmente Trasmesse" dell'Istituto Superiore di Sanità in merito al mpox e ha rilevato le conoscenze relative a come questa infezione venga trasmessa e trattata. Abbiamo anche valutato la loro consapevolezza e la conoscenza riguardo alla malattia, concentrando sulla trasmissione e sulla prevenzione.

**Metodi.** Si tratta di uno studio trasversale, rivolto agli utenti del "Telefono Verde AIDS e Infezioni sessualmente trasmesse", svolto tra gennaio e aprile 2023. Lo studio è stato rivolto alle persone di età uguale o superiore ai 18 anni, che hanno telefonato al Servizio per la prima volta (ovvero che non hanno telefonato negli ultimi 12 mesi). I partecipanti sono stati intervistati, usando un questionario contenente 19 domande. I dati raccolti sono stati analizzati, producendo statistiche descrittive e test di significatività.

**Risultati.** Da gennaio a febbraio 2023, sono pervenute al "Telefono Verde AIDS e Infezioni sessualmente trasmesse" 2.389 telefonate, di queste 216 sono state incluse nello studio. La maggior parte dei rispondenti è di sesso maschile (85,2%; n=186), celibe/nubile (79,2%; n=171) e occupato (72,2%; n=156). La consapevolezza dell'mpox è elevata (71,3%; n=154), con le aree regionali del centro e del sud/isole che presentano la percentuale più alta di partecipanti che hanno sentito parlare del virus (84,3%; n=43 vs 72,4%; n=42; p=0,078). La televisione è stata la fonte di informazione più frequentemente citata dai partecipanti (63%; n=97; p<0,001). Questo mezzo di comunicazione è stato indicato quale fonte di informazione preferita (39%; n=60; p=0,109). La maggior parte dei partecipanti ha dichiarato di non sapere cosa sia l'mpox (67,6%; n=146) e meno della metà sa

che è prevenibile (42,4%; n=89). Tra coloro che hanno dichiarato che l'mpox è una malattia prevenibile, meno della metà è a conoscenza dell'esistenza di un vaccino (44,9%; n=40; p<0,001).

**Conclusioni.** Questo studio fornisce indicazioni sulla consapevolezza, le conoscenze, gli strumenti di prevenzione e i canali di informazione delle persone che hanno contattato il "Telefono Verde AIDS e Infezioni Sessualmente Trasmesse". Sono state ottenute indicazioni utili per la definizione di future campagne informative.

#### References

1. Realegeno S, Puschnik AS, Kumar A, Goldsmith C, Burgado J, Sambhara S, et al. Monkeypox Virus Host Factor Screen Using Haploid Cells Identifies Essential Role of GARP Complex in Extracellular Virus Formation. *J Virol*. 2017 May 12; **91**: e00011-17. doi: 10.1128/JVI.00011-17.
2. Breman JG, Kalisa-Ruti, Steniowski MV, Zanotto E, Gromyko AI, Arita I. Human monkeypox, 1970-79. *Bull World Health Organ*. 1980; **58**(2): 165-82.
3. Emergence of monkeypox in West Africa and Central Africa, 1970–2017. *Wkly Epidemiol Rec*. 2018 Mar 16; **93**(11): 125-32.
4. McCollum AM, Damon IK. Human monkeypox. *Clin Infect Dis*. 2014 Jan; **58**(2): 260-7. doi: 10.1093/cid/cit703. Epub 2013 Oct 24.
5. Simpson K, Heymann D, Brown CS, Edmunds WJ, Elsgaard J, Fine P, et al. Human monkeypox - After 40 years, an unintended consequence of smallpox eradication. *Vaccine*. 2020 Jul 14; **38**(33): 5077-81. doi: 10.1016/j.vaccine.2020.04.062. Epub 2020 May 13.
6. Petersen E, Abubakar I, Ihekweazu C, Heymann D, Ntoumi F, Blumberg L, et al. Monkeypox — Enhancing public health preparedness for an emerging lethal human zoonotic epidemic threat in the wake of the smallpox post-eradication era. *Int J Infect Dis* 2019 Jan; **78**: 78-84. doi: 10.1016/j.ijid.2018.11.008. Epub 2018 Nov 16.
7. Kupferschmidt K. WHO holds off on global alarm for monkeypox: Critics blast agency for not declaring a Public Health Emergency of International Concern. *Science*. 2022 Jul; **377**(6601): 17. doi: 10.1126/science.add6994. Epub 2022 Jun 30.
8. European Centre for Disease Prevention and Control (ECDC). Monkeypox multi-country outbreak - first update. ECDC; 2022.
9. Kannan S, Shaik Syed Ali P, Sheeza A. Monkeypox: epidemiology, mode of transmission, clinical features, genetic clades and molecular properties. *Eur Rev Med Pharmacol Sci*. 2022 Aug; **26**: 5983-90. doi: 10.26355/eurrev\_202208\_29540.
10. World Health Organization (WHO). Monkeypox. Available from: [https://www.who.int/health-topics/monkeypox#tab=tab\\_1](https://www.who.int/health-topics/monkeypox#tab=tab_1) [Last accessed: 2024 April 1].
11. Beeson A, Styczynski A, Hutson CL, Whitehill F, Angelo KM, Minhaj FS, et al. Mpox respiratory transmission: the state of the evidence. *Lancet Microbe*. 2023 Apr; **4**(4):e277-e283. doi: 10.1016/S2666-5247(23)00034-4. Epub 2023

- Mar 7.
12. Whitehouse ER, Bonwitt J, Hughes CM, Lushima RS, Likafi T, Nguete B, et al. Clinical and Epidemiological Findings from Enhanced Monkeypox Surveillance in Tshuapa Province, Democratic Republic of the Congo during 2011-2015. *J Infect Dis.* 2021 Jun 4; **223**(11):1870-8. doi: 10.1093/infdis/jiab133.
  13. Alshahrani NZ, Alzahrani F, Alarifi AM, Algethami MR, Alhumam MN, Ayed HAM, et al. Assessment of Knowledge of Monkeypox Viral Infection among the General Population in Saudi Arabia. *Pathogens.* 2022 Aug 11; **11**(8): 904. doi: 10.3390/pathogens11080904.
  14. Hatmal MM, Al-Hatamleh MAI, Olaimat AN, Ahmad S, Hasan H, Ahmad Suhaimi NA, et al. Comprehensive literature review of monkeypox. *Emerg Microbes Infect.* 2022 Dec; **11**(1): 2600-31. doi: 10.1080/22221751.2022.2132882.
  15. Khan MR, Hossain MJ, Roy A, Islam MR. Decreasing trend of monkeypox cases in Europe and America shows hope for the world: Evidence from the latest epidemiological data. *Health Sci Rep.* 2023 Dec 29(1); **6**: e1030. doi: 10.1002/hsr2.1030.
  16. Gallè F, Bianco L, Da Molin G, Mancini R, Sciacchitano S, Ferracuti S, et al. "Monkeypox: What Do You Know about That?" Italian Adults' Awareness of a New Epidemic. *Pathogens.* 2022 Nov 1; **11**(11): 1285. doi: 10.3390/pathogens1111285.
  17. Temsah MH, Aljamaan F, Alenezi S, Alhasan K, Saddik B, Al-Barag A, et al. Monkeypox caused less worry than COVID-19 among the general population during the first month of the WHO Monkeypox alert: Experience from Saudi Arabia. *Travel Med Infect Dis.* 2022 Sep-Oct; **49**: 102426. doi: 10.1016/j.tmaid.2022.102426. Epub 2022 Aug 11.
  18. Rodriguez-Morales AJ, Lopardo G. Monkeypox: Another Sexually Transmitted Infection? *Pathogens.* 2022 Jun 21; **11**(7): 713. doi: 10.3390/pathogens11070713.
  19. Al-Mustapha AI, Ogundijo OA, Sikiru NA, Kolawole B, Oyewo M, El-Nadi H, Mustapha AM, et al. A cross-sectional survey of public knowledge of the monkeypox disease in Nigeria. *BMC Public Health.* 2023 Mar 29; **23**(1): 591. doi: 10.1186/s12889-023-15398-0.
  20. Ministero della Salute. Mpox - Vaccino. 2023. Available from: <https://www.salute.gov.it/portale/vaioloScimmie/detttaglioContenutiVaioloScimmie.jsp?lingua=italiano&id=5911&area=vaioloScimmie&menu=vuoto> [Last accessed: 2024 April 1].
  21. Pittalis S, Mazzotta V, Orchi N, Abbate I, Gagliardini R, Gennaro E, et al. Results of an interventional HIV testing programme in the context of a mpox (formerly monkeypox) vaccination campaign in Lazio Region, Italy, August to October 2022. *Euro Surveill.* 2022 Dec; **27**(48): 2200890. doi: 10.2807/1560-7917.ES.2022.27.48.2200890.
  22. Ministero della Salute. Telefono Verde AIDS e Infezioni Sessualmente Trasmesse compie 35 anni di attività. 2022. Available from: [https://www.salute.gov.it/portale/news/p3\\_2\\_1\\_1.jsp?lingua=italiano&menu=notizie&p=dalm&inistero&id=5933](https://www.salute.gov.it/portale/news/p3_2_1_1.jsp?lingua=italiano&menu=notizie&p=dalm&inistero&id=5933) [Last accessed: 2024 April 1].
  23. Colucci A, Gallo P, Valli R, Fanales-Belasio E, Gallo P, Schwarz M, et al. La prevenzione delle infezioni sessualmente trasmesse nella popolazione femminile: risultati di due survey. *Not Ist Super Sanita.* 2020; **33**(10): 11-5.
  24. Mulieri I, Santi F, Colucci A, Fanales-Belasio E, Gallo P, Luzi AM. Sex workers clients in Italy: results of a phone survey on hiv risk behaviour and perception. *Ann Ist Super Sanita.* 2014; **50**(4): 363-8. doi: 10.4415/ANN\_14\_04\_12.
  25. Regine V, Raimondo M, Camoni L, Salfa MC, Gallo P, Colucci A, et al. Low perception of sexual behaviours at risk for human immunodeficiency virus infection among blood donors who call the AIDS/STI Help Line in Italy. *Blood Transfus.* 2013 Oct; **11**(4): 575-9. doi: 10.2450/2013.0257-12. Epub 2013 May 23.
  26. Gallo P, Colucci A, Camoni L, Regine V, Luzi AM, Suligoi B. Social and behavioural characteristics of a sample of AIDS Help-Line users never tested for HIV in Italy. *Eur J Public Health.* 2011 Oct; **21**(5): 627-31. doi: 10.1093/eurpub/ckq151. Epub 2010 Oct 13.
  27. Mulieri I, Gallo P, Fanales-Belasio E, Colucci A, D'Ippoliti A, Luzi AM. Sexual behaviours of clients of sex workers reported within phone calls at HIV/AIDS/STIs Italian Helpline. *Ann Ist Super Sanita.* 2013; **49**(2): 183-9. doi: 10.4415/ANN\_13\_02\_10.
  28. Asamoah BO, Agardh A. Individual- and Family-Level Determinants of Risky Sexual Behavior Among Swedish- and Foreign-Born Young Adults 18–30 Years of Age, Residing in Skåne, Sweden. *Arch Sex Behav.* 2018 Feb; **47**(2): 517-28. doi: 10.1007/s10508-017-0978-5. Epub 2017 May 30.
  29. Mulieri I, Gallo P, Fanales-Belasio E, Colucci A, D'Ippoliti A, Luzi AM. Sexual behaviours of clients of sex workers reported within phone calls at HIV/AIDS/STIs Italian Helpline. *Ann Ist Super Sanita.* 2013; **49**(2): 183-9. doi: 10.4415/ANN\_13\_02\_10.
  30. Simonelli C, Tripodi F, Cosmi V, Rossi R, Fabrizi A, Silvaggi C, et al. What do men and women ask a helpline on sexual concerns? Results of an Italian telephone counselling service. *Int J Clin Pract.* 2010 Feb; **64**: 360-70. doi: 10.1111/j.1742-1241.2009.02269.x.
  31. Dukers-Muijrs NHTM, Evers Y, Widdershoven V, Davidovich U, Adam PCG, Op de Coul ELM, et al. Mpox vaccination willingness, determinants, and communication needs in gay, bisexual, and other men who have sex with men, in the context of limited vaccine availability in the Netherlands (Dutch Mpox-survey). *Front Public Health.* 2023 Jan 5; **10**: 1058807. doi: 10.3389/fpubh.2022.1058807.
  32. Crosato V, Formenti B, Gulletta M, Odolini S, Compostella S, Tomasoni LR, et al. Perception and Awareness about Monkeypox and Vaccination Acceptance in an At-Risk Population in Brescia, Italy: An Investigative Survey. *AIDS Behav.* 2024 Jan 19. doi: 10.1007/s10461-024-04271-9. Epub ahead of print. PMID: 38240947.

## SUPPLEMENTARY MATERIAL S1

### PROGETTO

*Prevenzione e contrasto dell'infezione "Vaiolo delle scimmie – Monkey Pox", mediante un'informazione personalizzata attuata attraverso il Telefono Verde AIDS e Infezioni Sessualmente Trasmesse 800 861061 dell'Istituto Superiore di Sanità (Progetto promosso e finanziato dal Ministero della Salute con responsabilità scientifica dell'UO RCF)*

### QUESTIONARIO SURVEY MONKEY POX (Mpx)

#### PRIMA PARTE

**ID** \_\_\_\_\_

**Data** \_\_\_/\_\_\_/\_\_\_

**Codice Telefonata** /\_\_\_\_\_/\*

#### SECONDA PARTE: CONSENSO

Il presente questionario dovrà essere proposto, al termine dell'intervento di counselling telefonico alle persone-utenti che rispondano ai seguenti criteri:

- età ≥18 anni
- l'intervistato non deve aver telefonato in precedenza (prima telefonata).

La somministrazione del questionario deve essere preceduta dalla seguente dichiarazione:

*"Gentile signore/a prima di concludere la telefonata desideriamo chiederle se può rispondere ad alcune domande. Stiamo, infatti, svolgendo un'indagine telefonica che ci consentirà di chiarire alcuni aspetti inerenti l'infezione da Virus del Vaiolo delle Scimmie/Monkeypox/Mpx. Il questionario che le proponiamo richiede solo qualche minuto del suo tempo ed è anonimo. Se lo ritiene opportuno può interrompere questa intervista telefonica in qualsiasi momento.*

*La ringraziamo, anticipatamente, per la disponibilità".*

Accetta di rispondere al questionario?  Si  No

Se No, per quale motivo \_\_\_\_\_

#### TERZA PARTE: DATI SOCIO-DEMOGRAFICI

##### 1 Sesso

Maschio  Femmina

**2 Età** /\_\_\_/

**3 Provincia** dalla quale la persona chiama /\_\_\_\_\_/

**4 Tipologia della persona che telefona** /\_\_\_\_\_/

**5 Test HIV** /\_\_\_\_\_/

##### 6 Stato Civile:

<input type="checkbox"/> Nubile/Celibe	<input type="checkbox"/> Coniugata/o	<input type="checkbox"/> Convivente	<input type="checkbox"/> Divorziata/o
<input type="checkbox"/> Separata/o	<input type="checkbox"/> Vedova/o	<input type="checkbox"/> Preferisco non rispondere	
<input type="checkbox"/> Altro (specificare) _____			

##### 7 Occupazione:

<input type="checkbox"/> Libero professionista	<input type="checkbox"/> Impiegata/o dipendente	<input type="checkbox"/> Lavoratrice/lavoratore autonoma/o
<input type="checkbox"/> Disoccupata/o	<input type="checkbox"/> Casalinga	<input type="checkbox"/> Studente/ssa
<input type="checkbox"/> Pensionata/o	<input type="checkbox"/> Operaia/o	<input type="checkbox"/> Preferisco non rispondere
Altro (specificare) _____		

##### 8 Livello di istruzione:

<input type="checkbox"/> Scuola Primaria (1-5 anni di studio)	<input type="checkbox"/> Scuola Sec. di I grado (6-8 anni di studio)
<input type="checkbox"/> Scuola Sec. di II grado (9-13 anni di studio)	<input type="checkbox"/> Università o superiore (>14 anni di studio)
<input type="checkbox"/> Preferisco non rispondere	

**QUARTA PARTE: CONSAPEVOLEZZA E CONOSCENZA SUL MPOX****9 Ha sentito parlare di Mpox?** Si       No**9.1 Se Sì, attraverso quale canale:**

<input type="checkbox"/> Internet	<input type="checkbox"/> Televisione	<input type="checkbox"/> Radio	<input type="checkbox"/> Medico di fiducia
<input type="checkbox"/> Parenti/Amici	<input type="checkbox"/> Giornali		<input type="checkbox"/> Social (Facebook, Instagram, YouTube, Twitter...)
<input type="checkbox"/> Siti web Istituzionali			

**10 Come vorrebbe essere informato?**

<input type="checkbox"/> Social (Facebook, Instagram, YouTube, Twitter...)	<input type="checkbox"/> Televisione	<input type="checkbox"/> Radio
<input type="checkbox"/> Medico di fiducia	<input type="checkbox"/> Parenti/Amici	
<input type="checkbox"/> Giornali	<input type="checkbox"/> Siti web Istituzionali	<input type="checkbox"/> Internet

**11 Sa cosa è il Mpox?** Si       No       Non So**12 Conosce i sintomi del Mpox?** Si       No       Non So**12.1 Se Sì, quali sono? \_\_\_\_\_****13 Sa come si trasmette questa infezione?** Sì, con certezza       In maniera non chiara       Per nulla**14 Secondo lei, il Mpox si trasmette attraverso: \_\_\_\_\_****15 Sa cosa fare in caso di sospetta infezione?** Si       No       Non So**16 Ritiene che questa infezione possa interessare:** Tutti       Solo determinati gruppi di persone**16. 1 Se solo determinati gruppi, quali \_\_\_\_\_****17 Il Mpox è prevenibile** Si       No       Non So**17. 1 Se Sì, come? \_\_\_\_\_****18 Sa se esiste una vaccinazione contro il Mpox?** Si       No      Non so**19 Pensa che in futuro questa infezione:** Sarà un serio problema sanitario       Sarà un problema non rilevante       Sarà scomparsa       Non so*Grazie per la collaborazione*