

# Evolving epidemiology of HIV/AIDS in Campania region, 2011–2018: Is HIV/AIDS population in Campania different?

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## Abstract

**Objectives:** Data on HIV/AIDS cases in Italy are collected using a standardised form. Regional epidemiology may vary. We described the epidemiological and clinical characteristics of newly diagnosed persons with HIV in the ‘Cotugno’ hospital in Naples during 2011–2018 and compared them with national data to identify similarities and differences.

**Methods:** Data source for the Campania region is the data collection forms sent to the national surveillance system. The data source for the national data is from the periodic annual bulletins on HIV/AIDS published by the National Institute of Health.

**Results:** In all, 1149 persons with HIV were diagnosed in ‘Cotugno’ (69.7% of those diagnosed in Campania). Persons with HIV in Campania showed many similarities with the Italian population: men were in the majority in both groups (about 75%), foreign origin was about 30%, heterosexuals were the most represented risk group, followed by men who have sex with men and injecting drug use in both samples. Some notable differences are also present. Among the risk factors for HIV acquisition, injecting drug use is significantly more common in Campania. Among the reasons for testing, significant differences are evident for almost all reasons, with screening activities (testing for concurrent diseases, for diagnosis of sexually transmitted diseases, screening in hospital during maternity care and screening in drug-addiction services or prisons) being more common at the national level. The Campania population has a more severe disease pattern, with a significantly higher proportion of patients diagnosed with less than 200 CD4 cells/ $\mu$ L and AIDS. For each variable, we compared trends in the Campania region and in Italy using Spearman’s correlation coefficient. Almost all trends show a weak correlation.

**Conclusion:** In conclusion, the prevalence of injecting drug use is still consistent, and requires specific campaigns. The reasons for testing are different: screening activities work less in Campania than in Italy. This untimely approach contributes to a more severe clinical picture in Campania.

## Keywords

HIV/AIDS epidemiology, time trends, injective drug users, HIV testing

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## Introduction

Since the beginning of the HIV/AIDS pandemic, the epidemiology in Italy has changed continuously. Trends in the demographic and clinical characteristics of HIV/AIDS cases have been regularly collected at regional and national levels since 2008, when Italian national HIV surveillance was introduced. Data collection is based on 21 regional surveillance systems that have adopted a common data collection form with a unique data flow.<sup>1,2</sup> These

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data provide an accurate and constantly evolving picture of HIV/AIDS in Italy.

There are some regional differences in Italy due to different social and economic determinants. These determinants can affect risk behaviour and access to care. Consequently, these differences may have an impact on HIV/AIDS epidemiology. Understanding specific regional epidemiology and trends is important as it can guide targeted public health interventions and resource allocation.

The aim of this article is to describe trends in the epidemiological characteristics of newly diagnosed HIV/AIDS cases in the 'D. Cotugno' hospital in Naples, the largest clinical centre in the Campania region, responsible for approximately 70% of prevalent HIV/AIDS cases in 2011–2018. We compared these data with national data to identify significant differences in regional epidemiology. We compared epidemiological trends over the study period to measure the strength of association between national and regional trends in newly diagnosed HIV/AIDS cases.

## Method

### Study design

This is a retrospective observational study of the evolution of demographic and clinical characteristics of patients newly diagnosed at the 'D. Cotugno' hospital, the largest centre for patients with HIV/AIDS in the Campania region, compared with contemporaneous national data.

### Setting

The study setting is the 'D. Cotugno' hospital, a monospecialised referral centre for infectious diseases in Naples, Campania, southern Italy. Campania is the most populous region in southern Italy with 6 million inhabitants. The hospital 'D. Cotugno' has a long tradition in HIV/AIDS treatment. Three medical departments are mainly dedicated to the inpatient and outpatient treatment of people with HIV (PLWH). Specific HIV diagnoses are carried out in the hospital laboratory. Facilities dealing with HIV/AIDS include an open, low-threshold counselling and testing service where tests for HIV and other sexually transmitted diseases (STD) can be carried out anonymously and free of charge. At the 'D. Cotugno' hospital, about 2500 HIV-infected and AIDS patients are currently being cared for on a regular basis, accounting for about 70% of the HIV/AIDS cases in the Campania region.<sup>3</sup> For this reason, in this article we refer to the data from the 'D. Cotugno' hospital as data from Campania, as it is a large sample of the entire regional population.

### Participants and data source

All patients with HIV/AIDS newly diagnosed in 2011–2018 at the hospital D. Cotugno were included in the study. No exclusion criteria were applied. We assumed that these

patients were representative of the entire population of the Campania region in terms of HIV/AIDS cases. The data source for the Campania region is the data collection forms that are regularly sent to the national surveillance system on an annual basis. The data source for the national data is from the periodic annual bulletins on HIV/AIDS in Italy published by the National Institute of Health.<sup>2</sup> No sample sizes were calculated as all newly diagnosed patients were included.

### Variables

The variables included in the study were those included in the standardised data collection form and in the national bulletins: demographic data (age, sex, origin); behavioural factors (risk of acquiring HIV, reasons for HIV testing); and clinical data (initial CD4 count, AIDS at diagnosis).

### Statistical methods

Continuous variables were compared using the two-tailed Student's *t*-test. Categorical variables were compared using the chi-square test. Comparison of trends was done using Spearman's correlation coefficient (Spearman's Rho) for nonparametric data, as there were few observations. The data were analysed with the free software StatCalc, version 9.

## Results

During the study period 2011–2018, 1149 PLWH were newly diagnosed in 'D. Cotugno' hospital. These patients represent 69.7% of all newly diagnosed PLWH in the Campania region during the same period, changing from 85% in 2016 (the highest proportion of PLWH diagnosed in the 'D. Cotugno' hospital compared with the entire Campania region) to 54.6% in 2017 (the lowest). Demographic, exposure categories and clinical factors are summarised in Table 1.

The total population is 73.4% male, and the mean age is 38 years for both males and females. Non-Italian patients make up 34% of the study population. In the Campania region population, heterosexual contact is the predominant risk factor in 50.2% of cases, followed by men who have sex with men (MSM) and injecting drug users (IDU) in 35.8% and 12.3%, respectively. The remaining patients have other/unknown risk factors. Of the reasons for HIV testing, 42.6% are related to risk behaviour and 40% to the presence of symptoms, accounting for more than 80% of the total reasons for testing. The third reason is screening in drug addiction services and prisons in 6% of cases.

Clinical data from the study population in the Campania region show a CD4 mean at diagnosis of 303 cells/uL. The largest proportion has a CD4 count of less than 200 cells/uL, in 44.7% of cases. Patients with a CD4 count of 200–350 cells/uL and more than 350 cells/uL account for 17.3% and 37.5% of the population, respectively. Viral load is higher than 100,000 copies at diagnosis in 56% of cases (data not shown in table). The incidence of AIDS at diagnosis is 24.3%.

**Table 1.** Demographic, HIV exposure categories and clinical data about 30,391 patients newly diagnosed in Italy and Campania region, in 2011–2018.

	Italy			Campania			p (referred to column, %)
	No. of patients	Column, %	Row, %	No. of patients	Column, %	Row, %	
Incident cases (n)	29,242		96	1149		4	
Gender (% of males)	22,665	78	96	842	73	4	<b>0.0007</b>
Median age at diagnosis (males)	39			37			0.2000
Median age at diagnosis (females)	36			37			0.2000
Non-Italian (% of foreign patients)	8620	29	96	354	31	4	0.3000
HIV exposure category (%)							
MSM	11,207	38	96	410	36	4	0.0700
Heterosexuals	13,068	45	96	577	50	4	<b>0.0002</b>
IDU	1143	4	89	140	12	11	< <b>0.0001</b>
Other/unknown	3860	13	99	21	2	1	< <b>0.0001</b>
Reasons for testing (%) <sup>a</sup> :	12,778		93	994		7	
Symptoms	4149	32	91	396	40	9	<b>0.0080</b>
Test for concurrent diseases	1503	12	99	17	2	1	< <b>0.0001</b>
STD diagnosis	542	4	97	16	2	3	<b>0.0005</b>
Screening during hospital admission	417	3	99	4	0	1	< <b>0.0001</b>
Maternal services	517	4	97	16	2	3	<b>0.0001</b>
Partner HIV+	376	3	93	28	3	7	0.8000
Screening in Drug Addiction services/jails	1560	12	96	61	6	4	< <b>0.0001</b>
Screening for blood donation	216	2	89	26	3	11	<b>0.0300</b>
At-risk behaviour	3498	27	89	430	43	11	< <b>0.0001</b>
CD4 count at diagnosis (mean)	302			303			0.2600
CD4 category at diagnosis (%)							
>350	13,074	45	97	430	37	3	< <b>0.0001</b>
200–350	5481	19	96	199	17	4	0.2500
<200	10,691	37	95	513	45	5	< <b>0.0001</b>
AIDS at diagnosis (%) <sup>b</sup>	2183	7	94	149	13	6	< <b>0.0001</b>

HIV: human immuno-deficiency virus; IDU: injecting drug use; AIDS: acquired immune-deficiency syndrome.

<sup>a</sup>Reasons for testing not collected or classified in different way in 2011–2013. Data are from patients in 2014–2018, excluding those with unknown reasons, because over-represented at National level since two regions do not collect data.

<sup>b</sup>AIDS at diagnosis available in 2015–2018 only.

p < .05 are in bold.

Table 1 shows the comparison between demographic, behavioural and clinical factors of patients newly diagnosed with HIV/AIDS in the Campania region and also in Italy. The ratio of reported cases between the Italian population and the Campania population is very high, with the Italian study population being 25 times more numerous. Nevertheless, there are many similarities: Males were in the majority in both groups of reported cases (about 75%), and foreign origin was about 30% in both Campania and the rest of Italy. Heterosexuals were the most represented risk group, followed by MSM and IDUs in both samples.

On the other hand, there are also some differences. In the Campania region, the female population is significantly more represented. Among the risk factors for HIV acquisition, heterosexual contact and injecting drug use are significantly more prevalent in Campania. Among the reasons for testing, significant differences are found for almost all reasons, with symptoms, risk behaviours and blood donation

being more common in Campania, while testing for concurrent diseases, testing for diagnosis of STD, screening in hospital during maternity care and screening in drug addiction centres or prisons are more common nationally. The Campania population has a more severe disease pattern, with a significantly higher proportion of patients diagnosed with less than 200 CD4 cells/ $\mu$ L and AIDS at diagnosis.

The comparison between the Campania population and the national data for each year is summarised in Table 2. For each variable, we compared trends in the Campania region and in Italy using the Spearman correlation coefficient. Almost all trends show a weak correlation. The weak correlation is to be expected given the large differences in sample sizes at the national and regional levels. A stronger correlation is found for the proportion of foreign individuals (the proportion in Campania increases similarly to Italy, Spearman's Rho 0.74); for those reporting injection drug use as a risk factor (the proportion in Campania decreases

**Table 2.** Demographical, behavioural and clinical characteristics of newly diagnosed HIV/AIDS patients in Campania Region and in Italy, 2011–2018.

	2011	2012	2013	2014	2015	2016	2017	2018	% difference (2017–2018 mean vs previous years' mean)	Spearman's Rho	<i>p</i> (referred to Spearman's Rho)
Incident cases ( <i>n</i> )	Italy 3,895	4,155	3,832	3,823	3,598	3,649	3,443	2,847	-17.1	-0.11	0.79
	Campania 139	155	132	128	155	159	124	157	-2.9		
Gender (% of males)	Italy 75.0	79.0	72.2	79.6	77.4	76.9	76.2	85.6	+5.5	-0.42	0.28
	Campania 77.7	76.1	80.3	70.3	63.9	69.8	73.4	75.8	+2.2		
Median age at diagnosis (males)	Italy 38.0	38.0	39.0	39.0	39.0	39.0	39.0	39.0	+0.9	0.55	0.15
	Campania 37.0	37.0	38.0	37.0	39.0	39.0	39.0	37.0	+0.4		
Median age at diagnosis (females)	Italy 34.0	36.0	36.0	36.0	36.0	36.0	34.0	38.0	+0.9	-0.28	0.49
	Campania 37.0	37.0	38.0	37.0	38.0	39.0	39.0	37.0	+0.9		
Origin (% of foreign patients)	Italy 31.5	25.7	24.0	27.1	28.8	35.8	34.3	29.7	+11	0.74	<b>0.03</b>
	Campania 32.4	33.5	30.3	29.7	34.2	42.1	37.1	33.8	+5.2		
HIV exposure (%):	Italy										
MSM	33	38	39	41	41	38	38	39	+0.4	0.46	0.25
Heterosexual	46	43	45	43	45	48	46	41	-3.3	0.31	0.44
IDU	5	5	4	4	3	3	3	4	-12.5	0.87	<b>0.004</b>
Other/unknown	16	14	12	12	11	12	13	16	+50	0.01	0.97
HIV exposure (%):	Campania										
MSM	29	30	35	44	33	37	40	39	+13.9		
Heterosexual	45	50	50	48	58	52	50	48	-3		
IDU	25	20	11	8	9	6	7	11	-31.6		
Other/unknown	1	0	4	0	0	5	3	2	-17.5		
Reasons for testing (%) <sup>a</sup> :	Italy										
Symptoms	Not reported	Differently classified	Differently classified	26.4	25.3	23	24.6	25.3	+0.2	0.41	0.49
Concurrent diseases				10.1	9.9	8.5	7.8	8.8	-12.6	0.50	0.39
STD diagnosis				2.8	3.2	3.4	3.8	3.1	+10.1	-0.02	0.94
Hospital admission				1.5	2.6	3.8	2.5	2.2	-10.2	0.33	0.34
Maternal services				2.7	3.3	3	4	2.5	+8.3	0.10	0.77
Partner HIV+				2.1	2.5	2.3	1.9	2.6	-2.2	0	1.00
Screening in DAS <sup>b</sup> /jails				6.5	9.6	9.2	11.2	11	+31.6	-0.01	0.98
Screening for blood donation				1.4	1.9	1.2	1	1	-33.3	-0.24	0.49
At-risk behaviour				21.6	22.9	20.6	20.2	19.7	-8.1	0.72	<b>0.01</b>
Unknown				24.9	19.7	24.9	22.9	24.7	+2.7	-0.31	<b>0.37</b>

(Continued)

Table 2. (Continued)

Reasons for testing (%):	2011	2012	2013	2014	2015	2016	2017	2018	% difference (2017–2018 mean vs previous years' mean)	Spearman's Rho	<i>p</i> (referred to Spearman's Rho)
Campania											
Symptoms	29.5	34.2	55.3	41.4	37.4	35.8	39.5	33.8	-4.1		
Concurrent diseases	0	0	0	0	3.2	3.8	2.4	1.9	-7.9		
STD diagnosis	0	1.9	3.8	0	1.9	1.9	0.8	0.6	-44.7		
Hospital admission	0	0	0	0	1.3	0.6	0	0.6	-52.6		
Maternal services	1.4	2.6	2.3	1.6	0.6	0.6	1.6	1.9	+87.5		
Partner HIV +	0	0	0	0	5.2	6.9	3.2	3.2	-20.7		
Screening in DAS <sup>b</sup> /jails	20.9	14.2	10.6	3.1	2.6	6.3	0	4.5	-43.8		
Screening for blood donation	2.9	1.3	3.0	3.1	5.2	0.6	3.2	1.9	-14		
At-risk behaviour	42.4	44.5	23.5	48.4	42.6	40.9	47.6	49.7	+10.7		
Unknown	2.9	1.3	1.5	2.3	0	2.5	1.6	1.9	+9.4		
CD4 count at diagnosis (mean)	310	310	302	324	358	305	305	298	-5.2	-0.16	0.68
Campania											
Italy											
CD4 cat. at diagnosis (%)	336	337	268	296	243	289	346	320	+12.9		
>350	46.9	44.2	42.4	46.6	45.6	44.4	44.2	42.9	-3.3	0.78	<b>0.002</b>
200–350	17.8	18.3	20.0	18.5	17.9	18.7	19.7	19.3	+5.2	0.64	<b>0.004</b>
<200	35.3	37.5	37.6	34.9	36.6	36.9	36.1	37.8	+1.3	0.71	<b>0.001</b>
Campania											
CD4 cat. at diagnosis (%)	41.7	45.8	33.3	35.2	24.5	37.1	45.2	37.6	+14.2		
>350	22.3	12.3	16.7	22.7	21.3	18.2	11.3	14.0	-33.1		
200–350	35.3	41.3	50.0	42.2	53.5	44.0	42.7	47.1	+1.2		
<200	Not reported	Not reported	Not reported	Not reported	16.3	16.3	15.3	16.7	-1.8	Not applicable	
AIDS at diagnosis (%)	17.3	20.6	29.5	27.3	27.1	28.3	29.8	15.9	-17.5		
Campania											

HIV: human immunodeficiency virus; IDU: injecting drug use; AIDS: acquired immune-deficiency syndrome.

<sup>a</sup>Reasons for testing at national level not available for 2011, and classified in a different manner in 2012–2013. Data 2014–2018 available on 12,778 patients only.

<sup>b</sup>DAS: drug addiction services.

*p* < .05 are in bold.

similarly to Italy, Spearman's Rho 0.87); and for those with risk behaviour as a reason for testing (the proportion in Campania decreases similarly to Italy, Spearman's Rho 0.72). Furthermore, the distribution of CD4 categories at diagnosis shows a concurrent positive trend, with similar changes at national and regional levels over the years (Spearman's Rho 0.78; 0.64; 0.71 for CD4 > 350, between 200 and 350, <200, respectively). To summarise the temporal trends, we analysed the percentage changes over the past 2 years (2017–2018) compared with the mean of previous years: Incidence cases are decreasing faster in Italy (−17.1%) than in Campania (−2.9%).

## Discussion

This study compares demographic, behavioural and clinical data of patients newly diagnosed with HIV/AIDS in the Campania region and Italy in 2011–2018. Despite a large difference in sample size, there are many similarities. On the contrary, some differences are interesting and should be highlighted. In Campania, there is a higher proportion of patients with IDU as a risk factor. This population group is declining both at national and regional level, but to a very different extent. At the national level, this population group is marginal, while in Campania it is still significant. It is noteworthy that the decline in Campania has been faster in the past 2 years (−31% in 2017–2018 compared to the 2011–2016 mean) than in Italy (−12.5% in the same period), suggesting that this difference is gradually narrowing in recent years. Despite this decrease, it is important to emphasise that this population group in the Campania region needs specific, targeted information and screening campaigns, which remain necessary and urgent. We recommend regional HIV screening, case finding and linkage to care initiatives to be implemented in services used by IDUs.

Other important differences emerge in the reasons for testing. In the Campania region, most screening activities are less effective in case finding compared with Italy. This could be due to poor attitudes towards HIV screening in non-specialist settings. In contrast, the proportion of patients seeking HIV testing in the presence of suggestive symptoms is higher in Campania (Italy 32% vs Campania 40%), supporting the hypothesis of limited awareness of preventive screening options. These data suggest that initiatives to educate non-specialist health workers are needed at the regional level. We recommend the implementation of information campaigns for general practitioners, drug support workers and other non-specialist caregivers to improve HIV screening in the general population.

This premature diagnosis has contributed to the clinical picture of patients newly diagnosed with HIV/AIDS in Campania being more severe than in Italy. This trend was already evident in another national report on patients diagnosed in southern Italy, which is a risk factor for late diagnosis.<sup>4</sup> Fortunately, these clinical severity indicators have improved in recent years: the percentage changes in 2017–2018 compared with the

2011–2016 mean show a +12.9% increase in the mean CD4 count at diagnosis (vs −5.2% in Italy), +14.2% of PLWH with > 350 CD4 at diagnosis (vs −3.3% in Italy) and an overall decrease of AIDS at diagnosis (−17.5% in Campania vs −1.8% in Italy). According to these data, the difference in severity between patients from Campania and other Italian patients is gradually decreasing.

Other papers analysed the regional epidemiology of HIV/AIDS in Italy. The studies from southern Italy showed a similar picture to our study,<sup>5,6</sup> while the studies from northern Italy showed a different population with a higher proportion of MSM and a lower proportion of late presenters.<sup>7,8</sup> None of these studies compared regional data with national data.

The study has some limitations. It is a hospital-based, monocentric study, which may partially affect the generalisability of the results. Despite this limitation, we consider the generalisability of the results to the Campania region to be reasonable, as the study hospital is the regional referral centre where about 70% of new diagnoses are made in the whole region. Nevertheless, we cannot exclude that some subpopulations with specific epidemiological characteristics may be under- or over-represented among the 'D. Cotugno' patients.

In addition, the data from Campania may be affected by dual diagnoses: Especially in the case of foreign individuals, it is possible that a patient may be considered as a new diagnosis several times over the years because the patient was 'lost-to-care' or received further treatment in his or her country of origin or in another Italian region. This potential duplication of data is corrected at national level, but not at regional level. Instead, national data may be affected by late reporting bias, as explained in the ISS annual bulletins.

## Conclusion

In summary, this study suggests that the population of patients newly diagnosed with HIV/AIDS in Campania differs in some characteristics from the Italian population. The Campania population is clinically more severe and has a higher rate of late diagnosis. The main reason for this could be the lower attention to screening activities in the high-risk and general population. In addition, in the Campania region, special attention should be paid to injecting drug users, who are still highly represented among those newly diagnosed with HIV/AIDS. According to our data, these differences have gradually decreased in recent years.

## Author contributions

F.M.F. conceived the study, analysed data, and drafted the paper; N.S. collected the data, contributed to draft the paper and to data analysis; S.M., M.A.C., M.S., R.V., G.P., O.T., V.I. and G.D.F. contributed to data collection and analysis; A.M., A.G., A.L., A.M. and M.D.C. contributed to data collection; E.M., V.E., A.C. and V.S. coordinated the study. All authors gave their contribute for important intellectual contents and all authors saw and approved the final version of the manuscript.

### Availability of data

The original dataset is available for sharing, if required. The authors declare that the data are original and that the current publication is not under consideration by another journal. Data were partially already disseminated at the 12th ICAR congress, 12–16 October 2020, as Online Paper No. OP43.

### Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

### Ethical approval

In Italy, the treatment and protection of personal data are regulated according to different laws and guidelines. According to our legislation, in case of any use of data that can be connected, in any way, to a person, the Ethical Committee should be involved, and informed consent should be obtained (see <https://www.garanteprivacy.it/web/guest/home/docweb/-/docweb-display/docweb/1671330>). In the current study, no personal data were used, but only aggregate, anonymised data, with no possibility to be connected with the person. Indeed, data from Italy are public data published in a public bulletin on yearly basis (see <https://www.epicentro.iss.it/aids/notiziario-coa>), while data from Cotugno hospital derived from the yearly collective reports sent to National Surveillance System, in which data are already presented in aggregate and anonymous matter. Consequently, laws and indications about treatment and protection of personal data are not applicable, since these data cannot be connected in any way with the person.

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### Informed consent

Informed consent was not sought for the present study because it is an epidemiological study including only general data from regional

and national databases, presented in a general matter. The identity of the subjects included in the study cannot be derived by the authors themselves, because the data source is already anonymised.

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