Proactive HIV testing strategies in primary care
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HIV prevention starts with GIS-work: Geographic Information Systems and their value for prevention and control of HIV/AIDS.

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CHAPTER 6

ABSTRACT

Objective To identify areas in the Netherlands with high HIV prevalence for purposes of surveillance and prevention.

Methods Geographic Information System (GIS) techniques were used to display HIV diagnoses at the municipality level (the Netherlands) and at the level of city neighbourhoods (three largest cities).

Results The geographical maps show that ten municipalities in the Netherlands have an HIV prevalence of 2 or more per 1,000 inhabitants (aged 15 to 60 years), including Amsterdam (8.1) and its peripheral municipalities, Rotterdam (3.4), The Hague (2.7) and Arnhem (2.5). In the three large cities, there are significant differences between various neighbourhoods; particularly in Amsterdam, HIV is highly concentrated in two city districts: Amsterdam-Centre (9-28) and Amsterdam-Southeast (5-20). In Rotterdam and The Hague, HIV prevalence rates are lower and there are smaller differences between neighbourhoods.

Conclusion Geographical analyses reveal differences in HIV prevalence rates in Dutch municipalities and neighbourhoods in large cities. These data can be used for devising new interventions to detect HIV in a more targeted manner.
INTRODUCTION

Early detection and prompt treatment of HIV is a proven and effective strategy both for achieving individual health gains as well as for preventing transmission to sexual partners and hence reducing spread in the population. Recently, the Joint United Nations Programme on HIV/AIDS (UNAIDS) and the World Health Organization (WHO) published a number of reports advising authorities to identify the main risk groups and pinpoint geographical ‘hotspots’ of the HIV epidemic to allow for more targeted prevention efforts. Partly due to the concentration of HIV in large cities globally, this approach led to new initiatives worldwide such as the ‘Fast-Track Cities Initiative’ – a worldwide collaboration between cities that are making an extra effort to reduce HIV. With a targeted approach aimed at checking the spread of HIV epidemics in large cities, it is expected that the UNAIDS targets for 2020 – namely, ‘Ending the urban AIDS epidemic’ and ‘90-90-90’ (90% diagnosed, 90% on treatment and 90% undetectable) – can be achieved in multiple countries.

In the Netherlands, at the end of 2014, there were a total of 19,382 HIV patients in medical care; this is 88% of the estimated number of people with HIV. Of the patients in medical care, 87% had started treatment, and among 92% of the treated patients the viral load was undetectable. In other words, though the 90-90-90 targets of the HIV care continuum have not yet been achieved, they appear to be attainable by 2020. It is notable that there is still a high percentage (44%) of HIV patients who start treatment late, i.e. after developing AIDS or with a CD4 count <350/mm³. For men who have sex with men (MSM), this percentage is lower (36%), but among women and heterosexual men, the percentages are 53% and 66% respectively, and this mostly concerns patients from HIV-endemic areas. Although the percentage of late diagnoses is decreasing for MSM, this is rarely the case for other groups. Additional measures are necessary with respect to the current HIV testing policy.

Since HIV prevalence rates can vary by municipality or neighbourhood, partly due to socio-economic and cultural factors, a targeted local approach can help detect HIV in a timely manner. This is also in line with recent initiatives for a neighbourhood-based approach undertaken by primary healthcare and the municipality. An example of a neighbourhood-based approach to HIV has been published by the National Institute of Health and Care Excellence (NICE) in England. This recommends routine HIV testing as part of primary healthcare in neighbourhoods with an HIV prevalence of >2 per 1,000 inhabitants aged between 15 and 60 years. This can be done, for example, by advising general practitioners to proactively offer HIV tests when new patients register at their practice or to patients who are giving blood samples. Here, the diagnosed HIV prevalence is considered as a ‘proxy’ for undiagnosed prevalence. The 2/1,000 standard is based on a cost-effectiveness threshold of 1/1000 for HIV screening.

Pinpointing high-prevalence areas using distribution maps is a first step towards the implementation of this HIV testing strategy. Even today, such visual techniques are rarely used in the Netherlands in the fight against HIV, in contrast to the United States (http://hivcontinuum.org/) and England.
This article describes how Geographic Information System (GIS) software was used to identify Dutch municipalities and neighbourhoods (in three cities) with a high HIV prevalence, with the ultimate objective of using these data in the fight against HIV.

METHODS

With the help of GIS technology, information from different sources can be integrated and displayed in the form of geographical maps. For the task of identifying HIV prevalence rates in Dutch municipalities and 4-digit postal code areas (PC4 areas) in three large cities (Amsterdam, Rotterdam, The Hague), the number of HIV patients in clinical care per PC4 area as of 31 December 2014 was requested from the Dutch HIV monitoring foundation (Stichting HIV Monitoring, SHM). ‘In clinical care’ meant that the patient was alive and had not relocated abroad, and that follow-up data for the patient were available for 2014. The patients were selected by SHM and linked to the PC4 area of their last known residential address by an SHM employee who was authorised to access registration data. The linking procedure yielded an anonymised dataset with aggregated numbers of patients (aged 15 to 60 years) per PC4 area. These numbers were linked to the number of inhabitants aged between 15 and 60 years per municipality (Figure 1) or PC4 area (Figure 2) in 2014 (Statistics Netherlands, https://www.cbs.nl/).

ArcGIS software was used to display the numbers of HIV patients per 1,000 inhabitants (HIV prevalence rates) as shades of colour on geographical maps (from light to dark for low to high HIV prevalence). Absolute numbers of HIV patients were displayed as blue circles. For the purposes of ensuring reliability and privacy, municipalities with <300 inhabitants aged between 15 and 60 years and <5 HIV patients were omitted.

The steps were repeated in the same manner for the number of new HIV diagnoses in the last five years as a proxy for HIV incidence. The incidence maps are not shown because they correspond very closely to the HIV prevalence maps.

Since the cost-effectiveness threshold of HIV screening in the Netherlands is not known exactly, the NICE guideline of 2/1,000 (15 to 60 years old) was retained as an indication of a high-prevalence area where screening can be cost-effective.8,9

RESULTS

It was possible to link a valid PC4 area to the PC4 areas defined by Statistics Netherlands for 17,690 (91%) of the 19,382 HIV patients. Of this group, 15,102 (85%) patients were aged between 15 and 60 years; these were included in the analyses.
The cities particularly stand out, having the largest numbers of HIV patients in both absolute and relative terms (Figure 1). Ten municipalities have an HIV prevalence rate of >2/1000 inhabitants, including large cities such as Amsterdam (8.1) and its peripheral municipalities, Rotterdam (3.4), The Hague (2.7) and Arnhem (2.5), as well as some of the smaller municipalities such as Laren, Hilversum and Zandvoort. The cities of Utrecht, Almere, Groningen, Haarlem and cities in the province of Brabant are notable for their high absolute

Figure 1. Number of HIV patients in medical care per 1,000 inhabitants (15 to 60 years old) per municipality in the Netherlands as of 31 December 2014.
numbers, although they are below the 2/1,000 standard. The cities with a high five-year HIV incidence/1,000 are also Amsterdam (2.5), Rotterdam (1.6), Arnhem (1.2) and The Hague (1.0) (not shown).

Since 44% of all HIV patients in the Netherlands come from the three large cities, we have 'zoomed in' on the PC4 level ('neighbourhoods') for these cities (Figure 2). Here we see large differences between neighbourhoods, especially in Amsterdam. Although all neighbourhoods with >300 inhabitants (aged between 15 and 60 years) in Amsterdam (n = 67) meet the >2/1,000 standard, neighbourhoods in the Amsterdam-Centre and Amsterdam-Southeast city districts stand out, having HIV prevalence rates between, respectively, 9 to 28 and 5 to 20 per 1000 inhabitants. In Amsterdam, 63% of all neighbourhoods have an HIV prevalence rate of >5/1,000.

**Figure 2.** Number of HIV patients in medical care per 1,000 inhabitants (15 to 60 years old) per PC4 area as of 31 December 2014 in the municipalities of Amsterdam (A), The Hague (B) and Rotterdam (C).

In Rotterdam and The Hague, the differences between neighbourhoods in terms of HIV prevalence are smaller and HIV incidence is more spread out throughout the city. Eleven (19%) of the 59 neighbourhoods in Rotterdam have HIV prevalence rates of >5/1,000, with the top five being Cool, CS-Kwartier, Oude Westen, Stadsdriehoek and Dijkzigt; for the last
neighbourhood, this is presumably because of the use of the hospital postal code for patients whose code was not known. In The Hague, four (7%) of the 57 neighbourhoods have HIV prevalence rates of >5/1,000, namely Kortenbos, Zorgvliet, Zuidwal and Huygenspark.

The neighbourhoods with the highest HIV prevalences in these cities also generally have the highest five-year HIV incidences. This varied between 8.3 and 3.5/1,000 in Amsterdam, between 5.2 and 2.4 in Rotterdam, and between 4.2 and 1.4 in The Hague.

To better understand the extent to which HIV prevalence rates in a neighbourhood are related to its demographics, the HIV prevalence rates for the city districts of Amsterdam-Centre and Amsterdam-Southeast and other Amsterdam neighbourhoods ('Others') have been mapped against the percentage of non-Western immigrants in those neighbourhoods. Figure 3 shows that the high HIV prevalence rates in Amsterdam-Centre neighbourhoods (blue circles) correspond to low percentages of non-Western immigrants (10-20%), while in the Amsterdam-Southeast neighbourhoods (green circles), high HIV prevalence rates correspond to high percentages (70-80%) of non-Western immigrants. Other city neighbourhoods in Amsterdam (orange circles) with relatively lower HIV prevalence rates fall between these two extremes.

**Figure 3.** HIV prevalence (15 to 60 years old) and percentages of non-Western immigrants in Amsterdam neighbourhoods.

**DISCUSSION**

The HIV distribution map for the Netherlands shows that the HIV epidemic is highly concentrated in large cities, with the highest prevalence rates in Amsterdam, Rotterdam and The Hague respectively. The maps of these cities show clear differences at the neighbourhood
level, which provides important information for a neighbourhood-based approach to the fight against HIV.

To achieve the 90-90-90 targets for all at-risk groups in the Netherlands, there is a need to strictly retain the focus on the aspects of prevention, early detection, proper guidance to medical care, quick start of treatment and treatment adherence.11-13

Since a few years now, more attention has been focused on offering an HIV test to patients with HIV indicator diseases.14-18 The benefit of this approach is that the test is not linked to high-risk sexual behaviour or to ethnicity but to patient symptoms, which can contribute to the normalisation of testing.19 However, some healthcare professionals find it difficult to broach the topic of HIV due to cultural differences and language barriers, especially when this is accompanied by questions about sexuality.20-22 This is possibly why the guideline entitled Het SOA consult (‘The STD Consultation’) issued by the Dutch College of General Practitioners (NHG), which advises general practitioners to offer at-risk groups an HIV test, turns out to be difficult to implement in practice.23 Testing for HIV indicator diseases also has its limitations, as many disorders are non-specific and not all of them are equally predictive for HIV.24

There is also scope for improvement in HIV testing in secondary healthcare. The guideline recommending that all tuberculosis (TB) patients in the Netherlands are tested for HIV has not been implemented. According to the 2016-2020 National Tuberculosis Control Plan, approximately 40% of TB patients do not have a registered HIV status, while TB is an obvious indicator disease, partly because TB is an AIDS-defining clinical condition.25

The NICE guidelines recommend that, in addition to testing for indicator diseases, HIV testing should also be offered routinely, e.g. in primary healthcare, in areas with an HIV prevalence rate of >2 HIV patients/1,000 inhabitants aged between 15 and 60 years.8, 9 In the Netherlands, ten municipalities, including the large cities, meet this standard, but prioritisation at the neighbourhood level seems advisable. In city districts such as Amsterdam-Centre or Amsterdam-Southeast, HIV prevalence rates are, on average, five times the standard for cost-effectiveness. The operationalisation of this policy remains a challenge, partly due to certain obstacles among GPs, such as a lack of time, fear of harming the relationship of trust with patients and financial barriers.24 GPs indicated that combining HIV tests with other blood tests could be an option. Another option is to organise training programmes for GPs about HIV prevention in these high-prevalence neighbourhoods, for example, educational strategies that integrate feedback of test performance in primary care. The prevalence maps can be used for these refresher training activities. Another option is to strengthen the cooperation with STI outpatient clinics, including the possibility of outreach testing by trained volunteers in certain neighbourhoods or social networks.7, 26

A limitation of this study is that the exact cost-effectiveness threshold for HIV screening in the Netherlands is unknown, for which reason the NICE guideline of 2/1,000 has been applied.8, 9 Cost-effectiveness can be improved by setting a higher standard, e.g. 5/1,000,
and by evaluating this properly before advising a wider implementation of the strategy. Therefore, a pilot for evaluating the feasibility of implementation and the cost-effectiveness in neighbourhoods with the highest prevalence rates is advisable.

An assumption underlying the NICE guideline is that areas with a high HIV prevalence also have a proportionally high HIV incidence. To test this out, maps were also prepared for new HIV diagnoses in the last five years as a proxy for incidence; these turned out to correspond very closely to the prevalence maps. Unfortunately, no information was available regarding the total amount of HIV testing offered per municipality or neighbourhood, which may also have had an effect on prevalence and incidence rates. We do not know whether the high prevalence rates simply occur because HIV testing is more frequent in certain neighbourhoods, as a result of which more HIV is detected. Another explanation for high prevalence rates in large cities such as Amsterdam is that people with HIV may have relocated here from other places.

Two other limitations of the study are that some neighbourhoods show a high prevalence on the map but have a relatively small number of inhabitants, and that patients with an unknown postal code have been registered under the postal code of the HIV treatment centre (Erasmus MC, AMC).

Finally, the study does not take into account the background characteristics of HIV patients, such as age, gender, sexual orientation and ethnicity, as a result of which it is not possible to identify with certainty the sub-groups contributing to a higher prevalence in the neighbourhood. To gain some level of insight, an alternative analysis was made for Amsterdam based on the percentages of non-Western immigrants per neighbourhood as provided by Statistics Netherlands. We have shown that in some Amsterdam city districts, such as Amsterdam Southeast, high HIV prevalence rates correspond to high percentages of non-Western immigrants in these city districts, while this is not the case in other city districts (Amsterdam-Centre). We need to gain a better insight into the relationship between HIV prevalence, HIV testing behaviour, and social, cultural and economic differences in municipalities and neighbourhoods. Additional studies, in which the background characteristics of patients are included in GIS analyses, can help us gain this insight and contribute to a neighbourhood-based approach.

At the end of July 2016, the Amsterdam HIV care continuum was presented at the International AIDS Conference in Durban, South Africa, in the context of the Fast-Track Cities Initiative. Amsterdam emerged as one of the leaders among the cities that are currently part of this collaboration. In order to support the ambition of eliminating HIV, the 'HIV Transmission Elimination Amsterdam' programme (H-TEAM, www.hteam.nl) was set up in 2014. This is an extensive Amsterdam-based programme focused on providing information on HIV and the prevention, testing and treatment of HIV. The neighbourhood-based approach we have presented here fits in well with these plans, which can also benefit other cities in the Netherlands.
REFERENCES

1. van Bergen JE. Earlier case finding and immediate treatment of HIV: TIME2ACT. Ned Tijdschr Geneeskd. 2015; 159:A9487. [In Dutch]


17. Joore IK, Arts DL, Kruijer MJ, et al. HIV indicator condition-guided testing to reduce the number
of undiagnosed patients and prevent late presentation in a high-prevalence area: a case-control study in primary care. Sex Transm Infect. 2015;91(7):467-72


