Epidemiology of sexually transmitted infections in visitors for the London 2012 Olympic Games: a review of attendees at sexual health services.

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Summary

This first multi-site study examining the impact of the Olympic Games on STIs diagnosed and STI services utilised found no evidence for an increased burden on local STI services.

Abstract

Background: Mass gatherings and large sporting events, such as the Olympics, may potentially pose a risk of increased sexual transmitted infection (STI) transmission and increase burden on local STI services. The objective of this analysis was to assess whether the STI profile of Olympic visitors differed from that of the local STI clinic population and investigate what impact these visitors had on local STI services. **Methods:** Self -administered questionnaires (completed by 29,292 patients) were used to determine the visitor status of patients attending 20 STI clinics, between 20/07/2012 and 16/09/2012, in the host cities, London and Weymouth. Using routine surveillance data from the Genitourinary Medicine Clinic Activity Dataset (GUMCADv2), Olympic visitors were compared to usual attendees (local residents and non-Olympic visitors) in terms of their demographic characteristics, services utilised, and STIs diagnosed using univariate and multivariate methods. **Results:** Compared to usual attendees, Olympic visitors were more likely to be heterosexual males (56.0% vs 34.9% p=0.001), aged between 15-24 years of age (47.1% vs 34.0% p=0.001), of white ethnicity (81.9% vs 66.4% p=0.001) and born in Australasia, Asia, North America or South America (18.8% vs 12.0% p=0.006). Olympic visitors constituted 1% of new clinic attendances and were less likely to be diagnosed with a new STI (aOR 0.69; 95%CI 0.48-0.98 p=0.040). **Conclusion:** In this first multi-site study to examine the effect of Olympic visitors on local sexual health services, the 2012 Olympic Games was found to have minimal impact. This suggests a ‘business as usual’ approach would have been sufficient.

Key words: Large sporting event, Olympics, sexual health service provision, London 2012.

Introduction

Mass gatherings and large sporting events, such as the Olympics, may pose a potential risk for increased transmission of sexually transmitted infections (STIs) as well as an increased demand on sexual health services in the host city. This is due to the considerable influx of visitors and the 'party atmosphere' some of these events create. The 2012 London Olympic and Paralympic Games (the Games) involved large scale events that took place between mid-July and mid-September 2012 and attracted over 698,000 overseas visitors to the United Kingdom (UK)[1]. Over nine million tickets were available and domestic and international visitors were estimated to increase the population of London by 500,000 people[2]. Most events took place in venues around London, with the sailing events taking place in the coastal town of Weymouth [3].

Prior to the Games, there was limited evidence to robustly inform sexual health service planning regarding the impact of mass gatherings or large sporting events on sexual health services. A literature review identified only one published study from the Sydney Olympics which showed that twice as many of those who attended during the Olympic period were new arrivals to Australia compared to the same period in the previous year[4]. Furthermore, this study found that the diagnosis rate of bacterial STIs was higher during the Olympic period compared to the previous year[4]. This informed the sexual health subgroup of the *2012 Sexual Health Planning Group* to produce a template for sexual health commissioners and service providers in the UK anticipating an approximate 5-10% increase in service activity during to the 2012 Games[5]. In addition to this study on service use, other studies have looked at the impact of large sporting events (not the Olympics) on STI rates, sex work and sex trafficking[6-8].

As a result of the lack of evidence for sexual health service planning, a *Research and Information Needs* committee was set up by the *2012 Sexual Health Planning Group* and given the task of examining the impact of the London 2012 Games on the demand for local sexual health services, to inform planning of future mass gathering and large sporting events. This was measured in several ways. Firstly, patterns in overall clinic attendances and STI diagnoses over the Olympics period were examined using routinely collected data from STI clinics, the main sexual health service providers in England [9]. Secondly, data from five different sources were analysed to describe the use of sexual health advice, contraceptive, sex worker and sexual assault services [10]. Thirdly, all STI clinics in London and Weymouth were invited to use a questionnaire to survey their new clinic registrants to assess whether they were visiting London or Weymouth for the Olympics. This information from survey respondents were combined with routine surveillance data to investigate whether the sexual healthcare needs of Olympic visitors differed from usual attendees and asses what their impact of services was. In this study, we present the findings from this latter analysis.

Materials and Methods

Study design and participants

During the two months of the London 2012 Games, all 35 STI clinics in London (n=34) and Weymouth (n=1) were asked to provide all their new clinic registrants a self-administered, one-page questionnaire upon registration. All surveys were in English. New registrants were asked if they were an Olympic visitor and, if so, whether they had travelled from overseas or other parts of the UK. Survey responses were linked to patients' demographic, STI diagnosis and service records held within

the Genitourinary Medicine Clinic Activity Dataset version 2 (GUMCADv2) at Public Health England (PHE).

Survey participants were categorised into the following groups based on their responses:

i. Olympic visitors: Those who visited London or Weymouth to watch either a ticketed or a non-ticketed event, or who were visiting for Olympic employment purposes.

ii. Local residents: Those who were residents of London or Weymouth, whether or not they had planned to attend the Olympic Games.

iii. Non-Olympic visitors: Those who were visiting London or Weymouth for a purpose other than the Olympic Games.

iv. UK resident-unknown Olympic status: Those who were UK residents, living outside London or Weymouth, but did not provide a reason for visiting these cities.

v. Non-UK resident-unknown Olympic status: Those who were non-UK residents but did not provide a reason for their visit to London or Weymouth.

Data sources

GUMCADv2 is a pseudo-anonymised, patient-level, national, electronic dataset of all diagnoses and services provided by sites providing specialist STI care in England[11]. This dataset also includes patient demographic information and is the main data source for STI surveillance in England.

Study period

The study period was from 20th July 2012 to16th September 2012, inclusive. This period was chosen to cover the Olympic Games (27 July 2012 -12 August 2012) and

the Paralympic Games (29 August 2012 - 9 September 2012), with an additional week on either side of the whole Games period.

Data analysis

In order to exclude clinics with a relatively low survey participation rate, clinics that surveyed less than 20% of their new registrants were excluded from all analyses. This cut off was chosen following a sensitivity analysis that looked at various cut off levels (5%, 20% and 30%) and assessed the number of clinics that would be excluded at each of these cut off levels.

Comparisons of demographic characteristics were made between survey respondents and non-respondents as well as between different visitor types.

For subsequent analyses, data from local residents and non-Olympic visitors were combined to form the comparator group as their demographic characteristics were similar, and would have probably been clinic attendees irrespective of the Olympic Games. This combined group were termed ‘usual attendees’. Patients with unknown Olympic status were excluded from further analyses.

Demographic characteristics and the proportions diagnosed with specific STIs and accessing various STI services were compared between Olympic visitors and the comparator group of usual attendees. These comparisons were performed using the Pearson’s χ^2 test.

Unadjusted and adjusted associations between visitor type and having a new STI diagnosis were determined using binary logistic regression. This outcome variable was defined as a diagnosis of chancroid, chlamydia, donovanosis, epididymitis, genital herpes (first episode), genital warts (first episode), gonorrhoea, HIV (new

diagnoses), lymphogranuloma venereum (LGV), molluscum contagiosum, non-specific genital infection (NSGI), pediculosis pubis, pelvic inflammatory disease, scabies, syphilis (primary, secondary & early latent) or trichomoniasis.

A sensitivity analysis was carried out by restricting the outcome variable to STIs more likely to be recent infections ('new STIs' as defined above excluding syphilis, HIV, herpes and warts).

The final model adjusted for clinic, age group, ethnicity, world region of birth, gender, sexual orientation and whether or not the patient had a full STI screen, as these were all deemed to be potential confounders. Analyses were conducted using STATA v13.0 © (StataCorp LP, College Station, TX, USA) and a P-value of less than 5% was considered statistically significant.

Results

Over the study period, seven (20%) of the 35 STI clinics in London and Weymouth submitted no survey results to PHE, eight (23%) clinics surveyed less than 20% of their new registrants, and 20 (57%) clinics surveyed at least 20% of their new registrants; data from these 20 clinics were considered in this analysis. A comparison between included and excluded clinics showed that a larger proportion of the included clinics served larger populations (50% of the included clinics had an annual attendance level of between 20,000 to 60,000 attendances compared to 33% of the excluded clinics). Furthermore, the geographic distribution of included clinics provided good coverage of the central London area and areas surrounding the Olympic village.

The overall participation rate in the 20 included clinics was 46.0% (29,292 / 64,048) (Table 1).

A comparison of demographic characteristics between those surveyed and those who were eligible but did not complete the survey (Table 1) showed that surveyed participants were more likely to have their ethnicity not recorded (12.8% vs 2.2% p=<0.001). Of those with a recorded ethnic group, those surveyed were less likely to be from the black (15.9% vs 18.2% p<0.001) and mixed (4.9% vs 6.0% p<0.001) ethnic groups (data not shown). Those surveyed were also more likely to be born in the UK (Table 1).

No important differences in gender, sexual orientation and age were observed between those surveyed and not surveyed, however, the large sample size did result in each of these differences reaching statistical significance at p<0.001 (Table1). There were also no significant differences observed in the proportion diagnosed with an STI (Table 1).

Among the 29,292 survey respondents, 1.0% (289) were Olympic visitors, 84.7% (24,813) were local residents and 7.1% (2,079) were non-Olympic visitors. Olympic visitor status was not complete for 1,957 (6.7%) respondents who visited London or Weymouth from other parts of the UK and from 154 (0.5%) who visited from abroad (Table 2).

Compared to usual attendees (i.e. the combined group of local residents and non-Olympic visitors), Olympic visitors were more likely to be heterosexual males (56.0% vs 34.9%; p=0.001), within the 15-24 year age range (47.1 % vs 34.0%; p=0.001), of white ethnicity (81.9% vs 66.4%; p=0.001) and born in ‘other’ world regions; Australasia, Asia, North America or South America (18.8% vs 12.0%; p=0.006)

(Table 3). A marginally smaller proportion of Olympic visitors were born in the UK (64.4% vs 67.2%; p=0.006) (Table 3).

Compared to usual attendees, Olympic visitors were less likely to attend for contraceptive services (4.2% vs 11.3%, p<0.001) and less likely to receive a full sexual health screen (32.5% vs 57.0%, p<0.001). Olympic visitors were less likely to be of known HIV positive status (0.4% vs. 2.1%, p=0.04). However, those of unknown HIV status were less likely to refuse an HIV test once offered (6.9% vs. 13.6%, p=0.001) (Table 3).

A total of 47 new STI diagnoses were made in Olympic visitors including 15 NSGI, eight chlamydia and eight genital warts (first episode) diagnoses. Of the 289 Olympic visitors 40 had neither a STI service nor a diagnosis code recorded. There were no new HIV or syphilis diagnoses made in Olympic visitors (Table 3). Apart from gonorrhoea, which we found less likely to be diagnosed in Olympic visitors (0.7% vs 2.6%, p=0.041), there were no significant differences in the proportions of newly diagnosed individual STIs between Olympic visitors and the usual attendees (Table 3).

On univariate analysis, Olympic visitors were significantly less likely to be diagnosed with any new STI compared to usual attendees (16.3% vs. 24.2%, p<0.009) (Table 3). This association remained after adjustment for clinic, demographic characteristics and whether or not a full sexual health screen was performed (aOR 0.69 95%CI 0.48-0.98 p=0.04) (Table 4).

Being a local resident or non-Olympic visitor, having a full sexual health screen, being a homosexual or bisexual male or a female heterosexual (compared to male heterosexual), being aged between 15 and 24 years, being of black or mixed

ethnicity (compared to white ethnicity) and being born in the Caribbean or 'other' world regions (Australasia, Asia, North America, and South America) were all independently associated with having a new STI diagnosis (Table 4). Additionally, being born in Sub-Saharan Africa was associated with a lower odds of having a new STI diagnosis (aOR 0.72 95%CI 0.61-0.84) (Table 4).

The sensitivity analyses showed that having a full screen, being a homosexual or bisexual male, being aged 15-24 years and being of black or mixed ethnicity were all factors that were significantly associated with having a recent STI diagnosis (i.e. 'all new STIs' excluding syphilis and viral STIs) Univariate analysis showed that Olympic visitors were less likely to be diagnosed with a recent infection compared to usual attendees (OR 0.67 95%CI 0.46-0.97. p=0.028). However, after adjusting for covariates there were no significant differences between the Olympic visitors and usual attendees (aOR 0.76 95%CI 0.50-1.16 p=0.19) (data not shown).

Discussion

Statement of principle findings

To our knowledge, this is the first multi-site study comparing the sociodemographic and STI service use characteristics and STI diagnoses among Olympic visitors and other attendees at STI clinics during the Olympic Games. Olympic visitors did not have a large impact on attendances, accounting for only approximately 1% of all new patients surveyed. Furthermore, the proportion of new STIs diagnosed in Olympic visitors was less than in local residents and non-Olympic visitors. A sensitivity analysis showed no statistically significant difference in the proportion of non-viral, curable STIs diagnosed between Olympic visitors and usual attendees. One of our study aims was to examine whether STI service provision should be increased or

tailored in preparation for large sporting events. Our findings suggest that the impact of the London Olympic Games on STI service use was negligible and a 'business as usual' approach would have sufficed for this type of event.

Strengths and limitations

A major strength of our study is the large sample size, with data from over half of the STI clinics in the Olympic host cities (London and Weymouth).This study provided an opportunity to enhance routine STI surveillance with data on visitor status in order to evaluate the contribution of Olympic visitors to STI service use.

Our findings of a lower proportion of new STI diagnoses among Olympic visitors may be partially explained by the choice of comparator group, which was largely comprised of local residents (92.3%), mainly from London. London is more ethnically diverse than other parts of the UK, has the highest diagnosis rates of new STIs in the country[12] and a relatively high concentration of men who have sex with men. Conversely, our Olympic visitor group, primarily included UK residents from outside London who are considered to be at lower risk of STIs because they have a relatively smaller concentration of core risk groups[13]. It is also likely that there was some residual confounding by unmeasured factors such as deprivation. Deprivation, a known risk factor for STIs, may be relatively higher in London residents, especially if they resided in the East London areas surrounding the Olympic village[14].

A limitation of the study is that we had to exclude 15 London STI clinics from the analysis due to insufficient or missing data on visitor status. However, analyses of the geographical distribution of all eligible clinics suggest that the 19 London clinics included in the study provide good coverage of central London and the areas surrounding the Olympic village.

In terms of patient-level response, this was relatively low which may also have introduced response bias, although a comparison of those who did and did not complete the questionnaire yielded no important differences, at least in terms of their demographic characteristics.

Other limitations include the surveys being administered in English, which may have been a disincentive for completion by non-native English speakers. Indeed, those who were surveyed were more likely to be born in the UK compared to those not surveyed.

Our results suggest that Olympic visitors were less likely to have any code reported; hence there may have been some coding bias. As it is unlikely that Olympic visitors would have attended a clinic unless they required a service, it is possible that Olympic visitors who had attended for a test, condoms or sexual health advice but had no subsequent STI diagnosis were not assigned a code by the clinic.

Meaning of the study

It is difficult to study STI transmission in the context of mass gatherings or large sporting events, or to attribute changes in trends to the event. As many STIs are asymptomatic and have different incubation periods, some individuals may not have developed symptoms until returning to their place of residence. Moreover, overseas visitors may be unaware of the availability of free universal access to National Health Service (NHS) STI clinics and may wait until they return home before attending a clinic. We also had no method of ascertaining whether the STIs diagnosed in our STI clinics were acquired in London/Weymouth or the patient's place of origin.

The results from a parallel study examining STI clinic attendance patterns of the previous four years support our findings [9]. This time series analysis found an overall reduction in the number of new episode STI clinic attendances, during the 3 week London Olympic period [9]. The total number of new STI diagnoses was also found to be significantly less than the expected number during the Olympic and Paralympic periods [9]. Similarly, there was also no evidence of an increases in STIs during the 1996 Atlanta Olympic Games[15] .

Results from studies of other types of large sporting events also support our findings. Although an increase in sex work was postulated as a mechanism for increased spread of STIs during the 2010 FIFA World Cup in South Africa [16] , results from both the 2006 [6] and 2010 [7 8] FIFA World Cups found that the sporting event had no effect on the level of sex work or sex trafficking in the host cities. During the 2010 Winter Olympics in Vancouver, sex workers actually reported a decline in their work due to the disruption caused by road closures and police harassment as well as a decreased availability of local clients [7].

The exception is a study based in a single STI clinic in Sydney during the 2000 Sydney Olympics. This study showed comparable numbers of patients seen during the Olympic and control periods, with patients seen during the Olympic period being more likely to be symptomatic and be diagnosed with a bacterial STI than in the control periods [4].

There are many plausible reasons why there would be a reduction in sexual health service usage and STI diagnoses during large sports events; people avoiding STI clinics due to a perception of overcrowding, local residents leaving the host city, a disruption in sex work and an increase in sexual health campaigns [15 17 18]. Hartley *et*

al found that a health telephone advice line reported a 16% fall in sexual health-related calls during the London 2012 Olympics, but a 33% increase subsequently [10].

Unanswered questions and future research

Further evidence from other large sporting events, in different settings, would be helpful in establishing how this finding from the 2012 Olympic Games can be generalised to other types of event as well as other settings.

Summary

Our study has important implications for planning of sexual health service provision for future large sporting events. It suggests that a 'business as usual' approach during the 2012 Olympic Games would have been sufficient. Planners for future events will need to critically evaluate the likely demand for sexual health services by considering the local context and profile of their visitors.

Ethics

Ethics approval was not required for these analyses. Public Health England has approval to use these surveillance data for public health, infection control and service improvement purposes. Information was given to survey participants explaining the purpose of the study and allowing them to withhold their data if they wished. Personal identifiers were removed from all survey data returns.

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