Health impact assessment of the 2012 London Olympic transport plans

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Background: Transport is a structural determinant of health. We have assessed the potential of transport plans for the 2012 London Olympic Games to achieve the sustainability commitment of ‘encouraging healthy living’—for the Olympics to inspire people to take more physical exercise, and contribute to reducing obesity. Methods: We compared national and London-wide policies against developments described in the Transport Assessment, a public planning document, for the period of the Games and the aftermath legacy. Results: National and London policies recommend modal shift in travel—more walking and cycling for health benefits, and fewer motor vehicles journeys to reduce harm and risks. For the Games, most spectators will use public transport, with low pollution and injury impacts and some are predicted to attend by cycling or walking. Redevelopment of the Olympics site after the Games will provide green areas for cycling and walking and better public transport, but road traffic is predicted to increase and noise and air pollution will persist above recommended levels. Conclusions: Transport planning for the London Olympic Games is contributing to sustainability. The impact on population health should be measured prospectively.

Keywords: cycling, Health Impact Assessment, Olympic, transport, walking

Introduction

The 2012 Olympic Games and Paralympic Games will be held from July to September in London, UK. The main site for London Olympics will be in the Lea Valley in East London,¹ which is currently derelict industrial land. On the south east corner of the site is the main public transport interchange, at Stratford. A main-line railway forms the southern boundary, while two motorways connecting to national arterial roads form the west and northern boundaries. The Olympics development has three linked phases: construction of the site, holding of the Games in 2012 and regeneration (demolition, new infrastructure and redevelopment) up to 2021 to form the Legacy.

Through its winning bid, London is committed to achieving a high level of sustainability. One of the five sustainability aims is ‘encouraging healthy living’—for the Olympics to inspire people to take more physical exercise, and contribute to reducing obesity.² The UK Government, in its report ‘Before, during and after: making the most of the Olympic Games’, has stated: ‘this is a significant opportunity for walking and cycling to contribute to health, and also to cleaner, safer communities.’³ Increasing exercise within daily routines could benefit a sector of the population, particularly people of middle and older age, who undertake little sport. The national Obesity Strategy proposes ‘seizing the opportunity of the London 2012 Olympic Games and Paralympic Games’,⁴ and recommends built environments that promote ‘active travel’, community engagement and leadership through local authorities.

Literatures

Health studies of Olympic Games

Studies of Atlanta (1996)⁵ and Sydney (2000)⁶ suggest that there are not likely to be exceptional acute health issues during the games if normal event security and planning are ensured. Studies of Athens (2004)⁷ and Beijing (2008)⁸ considered the possibility of air pollution impacting on athletes’ performance: although the effect of air pollution on athletes’ has never been measured in real conditions, London’s current levels of air pollution should not pose a hazard to performance.

Health impact assessment

Health impact assessment is a process that addresses a planning or policy development, predicts population health with and without the development, consults public opinion and proposes beneficial action.⁹ It is related to environmental and other forms of impact assessment and has become an internationally accepted part of public health practice.¹⁰ Health impact assessment can serve a range of stakeholders, including the development proposers, the decision-makers and people affected. While both qualitative and quantitative methods are used, the underlying discipline is epidemiology—understanding how identified factors promote health or cause ill-health in a specified population. There have been assessments of the impacts of transport on health in London broadly¹¹ and locally,¹² and a rapid health impact assessment was made for the initial London Olympic bid.¹³
Physical activity
At least moderate physical activity of 30 min for 5 days a week can reduce cardiovascular disease risks by one-third in comparison with a sedentary lifestyle.14 Public health initiatives to promote physical activity in England include ‘Connect2’15 (local cycling initiatives) and ‘Walking into Health’ (‘getting a third of England walking at least 1000 more steps daily by 2012’).16 Three Sustainable Travel Towns (Darlington, Peterborough, Worcester) are noted to have increased walking by around 20% and cycling by almost 50% in 2 years,17 while a Cycling City (Bristol) and 11 Cycling Towns have also been established.18

Transport and health
Research on transport and health has identified the harm to health from motor vehicles and the benefits of active transport (walking and cycling),19,20 while the links to climate change and the obesity epidemic are also recognized now.21 International policy encourages ‘modal shift’ from motor transport to active travel, along with reducing road injuries.22 The UK Department of Transport says ‘Walking and cycling are good for our health…we need to persuade more people to choose to walk and cycle more often’.23 The London Mayor and Transport for London have presented targets to reduce the proportion of car journeys in London from 41% in 2006 to 32% in 2025, and to increase cycling from 1% to 5% of journeys.24

The UK National Institute for Health and Clinical Effectiveness (NIHCE),25 following a systematic literature review, recommends that: ‘all those responsible for all strategies, policies and plans’ should ‘ensure pedestrians, cyclists and users of other modes of transport that involve physical activity are given the highest priority, through: re-allocating road space to support physically active modes of transport; restricting motor vehicle access (for example, by closing or narrowing roads to reduce capacity); traffic-calming schemes to restrict vehicle speeds; and planning a comprehensive network of routes for walking, cycling and using other modes of transport involving physical activity.’

Methods
Consultation
The Olympic Development Authority (responsible for the construction and holding of the Games), the London Development Agency (responsible for the transformation of the Olympics site and its redevelopment) and the local boroughs have all been active in consulting with communities. Consultation engages the perspectives of people being affected, and can be a step towards behaviour change through community engagement.26 Health issues, including walking and cycling, are part of the proposals and responses. We consulted with professional officers at London and local borough levels, and in the NHS, on transport, planning and health.

Materials and methods
The Transport Plan1 published in 2007, set out a strategy for managing transport of spectators and Olympic teams and officials for the Games themselves to all the Olympic venues, and the infrastructure improvements proposed. Public and private transport is heavily used in London in normal times, and transportation during the Games will depend on the spectators moving as a ‘counter-flow’ to the main flow of commuters. Quantitative information, both about planning for the Games and the Legacy period up to 2021, was drawn from Volumes 13A, 12C and 6B of the Environmental Statement (a series of documents presented in 2007 in support of the planning application for the Olympic main site).27–29

This report assesses the Transport Plan and Environmental Statement using epidemiological criteria20,30 and the transport and health policies described above.

Results

Populations

Seven million tickets will be sold for 16 days of the Games. It is estimated that >80% of spectators will arrive by public transport, including up to 120 000 travelling daily through Stratford station. There will also be up to 75 000 people designated as the ‘Games family’—team participants, officials, media and ‘marketing partners’—using daily transport.

The four boroughs surrounding the Olympic Park have approximately 850 000 residents, from a total for London (32 boroughs) of 7.2 million.31 Life expectancy (77.2–78.3 years) is lower than that for London (79.7 years). As a result of migration, these boroughs have a high proportion of young families, and only 16% of people are aged over 55 years (national average of 27%). The proportion self-reporting black and Asian in the four boroughs ranges from 23% to 47% (London, 18%). The proportion passing five English school-leaving exams (in different subjects) at age 16 ranged from 43% to 56% (London, 58%). Car ownership is lower than average for London.

Transport and health assessment

Transport

The Environmental Statement for planning the Olympic Games site gave greatest attention to road vehicles. It made predictions for individual street traffic flows, using a computer model previously developed for a proposed road bridge across the Thames. No equivalent modelling was available for walking and cycling, either flows or trips, and it was therefore not possible to determine the predicted pattern of travel in the communities surrounding the development.

Olympic transport. Most spectators for the Games at the main Olympic site will arrive by public transport, either trains or coaches. Trains and stations will be lengthened and vehicle frequencies increased. Initial planning predicted that ~1% of spectators would arrive by walking and bicycle, range of interventions are proposed to raise this to up to 5%. The Olympic teams and elite officials, however, will move (to all venues) by road transport, using cars and coaches (Section 1.2.4632) and road junctions will be altered to ensure their traffic flow.

For the Legacy, the Environmental Statement states that ‘a new highway hierarchy is provided across the area with improved pedestrian and cyclist facilities, plus better connectivity with public transport modes.’ However, predicted levels of cycling and walking for the main morning transport flows within Olympic Park area are very low (walking 5%, cycling 2%). The emphasis of construction in the regeneration phase is to create a road system for the new uses, to building new bridges connecting the Park with the surrounding main road network and to further improve road junctions for vehicle traffic.
Table 1: Estimated hourly (am) peak flows by private and public transport at selected years over the Olympic site development

<table>
<thead>
<tr>
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<th>2006</th>
<th>2012</th>
<th>2014</th>
<th>2021</th>
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<tbody>
<tr>
<td>Private transport</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do minimum baseline</td>
<td>14796</td>
<td></td>
<td></td>
<td>18810</td>
</tr>
<tr>
<td>With scheme scenario</td>
<td>16267</td>
<td>16871</td>
<td>30022</td>
<td></td>
</tr>
<tr>
<td>Public transport</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do minimum baseline</td>
<td>29596</td>
<td></td>
<td></td>
<td>40682</td>
</tr>
<tr>
<td>With scheme scenario</td>
<td>31497</td>
<td>32870</td>
<td>60063</td>
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</table>

Source: Tables 6.15, 6.19, 7.10, 7.11, 8.1, 8.2.

Roads system. Guidance for planning around the Olympic site includes ‘reducing severance, improved public transport accessibility, enhancing road transport links (including walking and cycling), adoption of a restraint-based parking system and the use of rail and water for freight.’

Landowners, developers, funding and delivery agencies . . . will be expected to incorporate these principles.

The Olympic Park will have an encircling service ‘loop’ road and central walking areas. For the Legacy, the central area will be revised to form a park straddling the River Lea and roads will be re-built connecting the sports venues and the new development areas. There will be public transport (buses) and encouragement for cycling and walking through design and employers’ travel plans. However, there are no actual predictions of journeys (by any mode), traffic danger or emissions, and over the full planning period (2006–2021) substantial rises in motor vehicle flow on roads are predicted (table 1). Private transport rises by 10% up to 2012, by 14% in 2014 and by a further 60% by 2021 (105% from original baseline). Up to an extra 9000 resident parking spaces (Section 1.2.72) are acknowledged, although borough baselines). Up to an extra 9000 resident parking spaces (Section 1.2.72) are acknowledged, although borough baselines).

Congestion. The Environmental Statement notes that ‘The existing highway network is subject to high traffic volumes and subsequent congestion on a number of roads during peak periods,’ and ‘The PM peak suffers from the worst congestion with average speeds of less than 14kph on 83% of routes.’ (Section 8.4.12)

Nevertheless, the final modelled morning peak traffic flows at 2021 show mainly increased levels of traffic.

Health

Noise. Predicted 18-h road traffic noise currently and at 2021, including the motorways surrounding the Olympics site, significantly exceeds WHO recommended upper limits guidelines. In the post-Games period, the park area will have some areas of low noise, but levels for some proposed main roads are above WHO guidelines.

Road accidents. In the four boroughs for the period 2003–2005 (Table 4.15), the proportion of accidents was: car occupants 51%, pedestrians 22%, powered two-wheelers 16% and pedal cyclists 12%. Pedal cyclists are currently only 1–2% of road users by journey, and the hazard to active road users posed by motor vehicles is evident.

Walking and cycling. For the Games, only 0.5% of spectators will travel by foot alone (i.e. without public transport). Additional walking may be expected through travel from the public transport facilities to the sports facilities (much of the open space of the Olympic Park is planned to be paved walkways), but there is currently no estimate of journey lengths. There will be Transport Assessment describing 5000 cycle parking spaces (Section 1.2.75–77), of which 2000 are at the Northern Coach Park and 2000 in Victoria Park (both separated from the Olympic Park by motorways) and 500 each outside two rail/tube stations. Using this modal split, peak demand is estimated at 3175 cyclists. Estimates of cycle use by Olympics staff are being developed. For the Legacy, the Environmental Statement (Section 3.3.18) recognizes that Transport for London ‘is committed to delivering infrastructure to encourage walking and cycling across Greater London’, but says ‘The actual scheme details of these programmes have not yet been prioritised’.

The Olympic Park is designed to have green spaces which will promote cycling, and link to other developing cycling networks in the neighbourhood (Sections 9.6.9 and 9.6.13). There are proposals to ‘incentive’ sustainable travel, including information (maps, timetables), financial schemes (vouchers) and mutual (‘buddy’) support schemes. There is also a substantial list of proposals for subsequent ‘occupiers of buildings’ that reflect current policies for active travel plans to work in London, but no predictions or targets for implementation.

Modal share. The Environmental Statement included a ‘benchmarking exercise’ for sustainability in the Legacy period (Section 3.8.4). It proposed that the modal split of journey-to-work trips of high sustainability would be >30% cycle or walking, and for low sustainability <15%. For education trips, the proportions are >70% compared with <50%, and for retail trips >50% compared with <25%. These indices would be available to design different parts of site during the regeneration period. However, although the actual modal splits proposed for ‘high’ and ‘low’ access areas varied in the proportions of journeys by cars and buses, predicted travel rates for walking were ~5%, and cycling ~2%, and these do not change between the high and low accessibility models. Thus, the planned modal shift would not create active travel.

Socio-economic impacts. The Environmental Statement says that ‘the area is currently dominated by urban communities that contain a high proportion of residents trapped in a poverty cycle of low skills and educational attainment, poor health, a high incidence of unemployment and limited prospects of breaking out of this cycle of deprivation.’ Impacts identified as most significant are considered in table 2.

Synthesis

Current London levels, predictions after the Olympics and expected impacts on health of transport-related health factors are summarized in table 3.35–37 During the Games, almost all spectators will arrive by public transport, which may include walking to the transport as well as at the games between transport hubs and sport destinations (a period of exercise for each spectator). The proportion of spectators planned to arrive by cycle and walking is lower than the combined use of these modes for all journeys in London at present, but of course the distances to travel to the Olympics as a spectator are greater except for the local population.

Improvements in public transport in anticipation of the Games can have longer term benefits to the local population, including better experience in their journeys (less crowding, more frequency of services) and also increased access to facilities which may be health-beneficial, such as sports facilities, health services and potentially also educational and employment opportunities. Transport for London has made proposals for journey travel modes, comparing 2006 with 2025, with a marginal increase in walking, from 21% to 22%; (relative) substantial increase cycling, 1% to 5%;
Table 2 Transport assessment statements on social factors and health impact considerations

<table>
<thead>
<tr>
<th>Transport assessment (Section 1.159)</th>
<th>Health considerations</th>
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<tbody>
<tr>
<td>Displacement of existing population (e.g. from Clays Lane residential estate) to accommodation elsewhere.</td>
<td>Moving people is usually avoided on social grounds, but may be successfully achieved.</td>
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<tr>
<td>The growth in population, which would be considerably greater than under the No-Scheme Baseline;</td>
<td>Actual numbers of population are not provided.</td>
</tr>
<tr>
<td>The displacement of existing economic activity, requiring businesses to be relocated.</td>
<td>Continued access to employment and income is a necessity for health.</td>
</tr>
<tr>
<td>The generation of employment (direct and indirect, during construction, operation and in Legacy) and the associated training benefits.</td>
<td>Work with good wages and employment conditions can contribute to health.</td>
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<td>The generation of a ‘feel good factor’, social cohesiveness and community pride.</td>
<td>This will depend on good community relations. It could contribute to mental health.</td>
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<tr>
<td>Encouragement for the local population to participate in sporting and other healthy activities.</td>
<td>Welcome, but methods and means for ‘encouragement’ are not stated.</td>
</tr>
<tr>
<td>Enhanced provision of educational, health and other community facilities within the Legacy developments.</td>
<td>Welcome, but transport issues not described.</td>
</tr>
</tbody>
</table>

Table 3 Health issues for transport, environment and health in London: baseline and planned post-Olympics positions

<table>
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<tr>
<th>Health issue</th>
<th>Baseline</th>
<th>Planned</th>
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<tr>
<td>Air pollution affects respiratory health. Some air pollution limits regulated by WHO concern industrial settings. In free air, Nitrogen oxides (NOx) pollution can exacerbate existing respiratory disease, and increase GP and hospital attendances. Small particles (PM10), differently, have long-term effects, such as contributing to bronchitis, and cause around 2000 premature deaths each year in London.</td>
<td>Annual mean NOx level at London roadsides was 72 µg/m³ in January 2007 compared with the Air Quality Standard upper objective 40 µg/m³. Measures of kerbside air particulates in London exceeded EU upper on 46 days in January 2007 (EU limit value 35 days).</td>
<td>The Environmental statement uses standard air modelling techniques, making comparisons between modelled and observed. In general, NOx levels were all above the UK limits, while PM10 were below. There was very little change as a result of the scheme. However, there are inaccuracies in the modelling. For example, in Mile End Road, measured NOx was 58 µg/m³, while modelled it was 49 µg/m³. These are much larger differences than the ‘effects’ of the Games schemes that have been modelled. Much of the new road network of the Olympic Park area at 2021 will continue to have noise levels above the recommended upper limit. No noise reduction projects are proposed for existing roads.</td>
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<tr>
<td>Noise at high levels (mostly industrial settings) can damage hearing. Traffic noise is an important cause of annoyance. There are possible links to increased blood pressure, and therefore heart disease, but this is not yet established. In children, aircraft noise has been shown to be related to concentration at school, and academic performance.</td>
<td>In 2003, 46% of Londoners surveyed by MORI considered noise a problem (13% a major problem); and 24% put noise among top priorities for improving London’s environment. ‘The Mayor wishes to promote exemplary monitored noise reduction projects in each part of London.’ ‘It is vital that attention is not distracted from the need for continued reductions at source.’</td>
<td>Direct CO₂ emissions from transport within the modelled area predicted to rise from 122 000 tonnes per year in 2006 to 134 000 tonnes in 2021. Although proportionately small, will nevertheless contribute to global warming.</td>
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<td>Energy use in relation to climate change is a primary concern for sustainability. The health consequences of climate change, including droughts, flooding, migration and warfare, will be greater in the equatorial poorer countries, but diseases such as malaria will be a hazard for Europe.</td>
<td>Energy use in 2006, 42% men and 29% women participated in 30 min or more of moderate or vigorous activity on at least 5 days a week (i.e. sufficient to contribute cardiovascular protection). Rates are highest at age 16–24, and lowest for people age ≥65 years.</td>
<td>No contribution to transport injury reduction is demonstrated by the Olympic Transport Assessment. The increased traffic flows by 2021 could proportionately increase deaths and injuries. Support is given in the Transport Assessment for walking and cycling, but no predictions of changed rates. No benefit is presented.</td>
</tr>
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<td>Road injuries are caused by vehicle drivers, but the majority of injured are pedestrians, passengers and cyclists. Rail and train transport have much fewer injuries per journey.</td>
<td>In 2006, there were 231 people killed on roads in London, 3715 people seriously injured and 25 864 slightly injured.</td>
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<td>Physical exercise at adequate levels will reduce diseases including heart disease and diabetes. Other benefits to health from exercise include mental health, promoting stronger bones (preventing osteoporosis and fractures) and—through reducing obesity—contributing to reduced incidence of cancer.</td>
<td>In London in 2006, 42% men and 29% women participated in 30 min or more of moderate or vigorous activity on at least 5 days a week (i.e. sufficient to contribute cardiovascular protection). Rates are highest at age 16–24, and lowest for people age ≥65 years.</td>
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Discussion

The population surrounding the Olympic park has both worse health, on average, than for London as a whole, and is likely to take less exercise. The benefits of exercise would particularly
come to those currently not taking enough exercise—especially older adult men. However, there is no prediction of change in the walking or cycling journeys of these populations, in contrast to the substantial increases in traffic, so it is not clear that the public works of the park and road junctions will bring health benefits to the local population from the Games.

The Olympic Delivery Authority’s Environmental Statement recognizes the role of walking and cycling, and describes ‘Active Neighbourhoods (local communities to encourage walking and cycling and more sustainable patterns of travel as a legacy of the Games)’ (Section 1.2.72). The UK Department of Health, in its Obesity Strategy for England, ‘Healthy Weight, Healthy Lives’ makes a commitment to work with planners to achieve health gain through transport, and the London Mayor has also provided leadership in promoting a more active and healthier London. Transport is an acknowledged social determinant of health, and impact assessments contribute to public support for planning decisions. The transport plan for the 2012 London Olympic Games must respect the sustainability commitment by the London Olympic Games, including ‘improving healthy living’, and also contributing to the UK Obesity Strategy. Indeed, as an international exemplar for achievement, the Olympics might be expected to surpass existing plans and policies. International, national, London and local policies for transport and health all point in the same direction—a modal shift away from road motor vehicles and towards active travel through walking and cycling as well as more use of public transport.

Changes resulting from the transport plan

For the Games themselves, preparations include better public transport (including bringing forward improvements previously planned for area) and developing ‘green’ areas for walking and cycling within the Olympic Park. In the post-Games period, however, large areas of the development area will be converted for housing and business, to be sold as a financial return on land and development costs, and a new road network built. The Transport Assessment commends facilities for cycling within the redevelopment area, but the overall car trips through and around the Park are predicted to rise rather than fall, and the existing excess levels of air and noise pollution, community severance, road danger and carbon emissions may not be reduced. Also, while the population living around the Olympic Park are noted for relatively high levels of need and poorer health than the London average, there are currently no predictions of, or targets for, the future travel patterns of residents.

Considerations for action

Planning responsibility within London is shared between authorities at different tiers of government. Subsequent to the Health Impact Assessment reported here, the Olympic Delivery Authority has set out its plans to enhance the cycle routes from surrounding areas into the Games area, and which will also provide access to the green spaces remaining in the Legacy. A new organization, the Olympic Park Legacy Company, will take on the post-Games development and detailed plans are expected in early 2010. There is an opportunity for transport planners and decision-makers to review proposals for roads and to support for healthier travel modes in line with the Olympic Games sustainability objectives, and with national and local transport and health policies. Engagement with the local population and other stakeholders as part of the planning process will improve decision-making.

At the same time, a prospective impact study should be established. The National Audit Office review of the Olympic Legacy says ‘the Government Olympic Executive should set baselines against which it will measure whether the expected legacy benefits are achieved. The evaluation framework should set out how the effects of the Games will be disentangled from the effects of, for example, other regeneration activities already taking place in East London.’ Scientific methods, including surveys of travel patterns and intentions, modelling of the impact of transport measures on local populations and assessment through surveys of whether these changes have been translated into better population health are needed so as not to lose knowledge from this unique experience of London.

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Conflicts of interest: None declared.

Key points

- Policy documents for London recommend modal shift in travel, from cars to walking and cycling to promote physical activity
- For the Olympic Games, spectators will mainly use public transport and some walking and cycling.
- Redevelopment of the Olympic site after the Games will provide green spaces for physical activity and cycling.
- However, current planning submissions do not predict fewer motor vehicles in the area around the Olympic site in the years after the Games.
- Travel patterns of the population in neighbouring areas will need to change for the London Olympics to contribute to public health.

References
