

1 **Improving Olympic health services: what are the common health care planning**
2 **issues?**

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6

7 **Abstract**

8 *Introduction:* Due to its scale The Olympic and Paralympic Games have the potential to place
9 significant strain on local health services. Sydney 2000, Athens 2004, Beijing 2008,
10 Vancouver 2010 and London 2012 Olympic host cities shared their experiences by publishing
11 reports describing health care arrangements.

12 *Hypothesis:* Olympic planning reports were compared to highlight best practice, to
13 understand whether and which lessons are transferable and to identify recurring health care
14 planning issues for future hosts.

15 *Methods:* A structured critical qualitative analysis of all available Olympic health care reports
16 was conducted. Recommendations and issues with implications for future Olympic host cities
17 were extracted from each report.

18 *Results:* The six identified themes were:

- 19 • the importance of early planning and relationship building:
- 20 ○ clarifying roles early to agree responsibility and expectations.
- 21 ○ engaging external and internal groups in the planning process from the start.
- 22 • the development of appropriate medical provision:
- 23 ○ most health care needs are addressed inside Olympic venues rather than by
24 hospitals which do not experience significant increase in attendance during the
25 Games.
- 26 • preparing for risks:

- 27 ○ gastrointestinal and food-borne illnesses are the most common communicable
28 diseases experienced during the Games but the incidence is still very low.
- 29 ● addressing the security risk:
- 30 ○ security arrangements are one of the most resource demanding tasks.
- 31 ● managing administration and logistical issues:
- 32 ○ arranging staff permission to work at Games venues (‘accreditation’) is the
33 most complex administrative task that is likely to encounter delays and errors.
- 34 ● planning and assessing health legacy programmes:
- 35 ○ no previous Games were able to demonstrate that their health legacy initiatives
36 are effective.

37 Although each report identified similar health care planning issues, subsequent Olympic host
38 cities did not appear to have drawn on the transferable experiences of previous host cities.

39 *Conclusion:* Repeated recommendations and lessons from host cities show that similar health
40 care planning issues occur despite different health systems. To improve health care planning
41 and delivery, host cities should pay heed to the specific planning issues that have been
42 highlighted. It is also advisable to establish good communication with organisers from
43 previous Games to learn first-hand about planning from previous hosts.

44 *Keywords:* Olympic and Paralympic Games, mass gatherings, health services administration,
45 health services planning and delivery.

46 **Abbreviations:**

47 HPA: Health Protection Agency;

48 LOCOG: London Organising Committee of the Olympic and Paralympic Games;

49 NHS: National Health Services;

50 SitRep: Situation Report.

51 **Introduction**

52 The most recent Summer Olympic Games held in London attracted a record number of 8.8
53 million spectators (see **Error! Reference source not found.**).³³ This visitor volume makes
54 the Games one of the largest mass gathering events in the world. Major adaptations are
55 therefore required to host city infrastructure, including the health system, in order to ensure
56 that both routine services are maintained and that specially designated Olympic hospitals are
57 established for athletes and Olympic officials during the Games period.

58 Sydney, Athens, Beijing, Vancouver and London Games organisers have published
59 reports describing their health care planning and delivery. Evidence from other literature is
60 limited to specific health care issues experienced by athletes, medical services provision in
61 the Olympic polyclinic where all health care is provided in the Olympic park, analysis of
62 public health issues relating to surveillance development or health promotion.²⁻⁵ To the
63 authors' knowledge, there are no studies that have attempted to examine the reoccurring
64 health care planning issues before. The aim was to systematically identify and describe
65 common planning issues and recommendations, based on the content of the reports from the
66 five most recent host cities, for the benefit of future host city organisers.

67 This work was undertaken as part of a wider evaluation of the health care planning
68 and delivery programme of the National Health Service (NHS) in London for the 2012
69 Olympics.

70 **Methods**

71 *Study design and data sources:*

72 A structured critical qualitative analysis of all Games health planning reports was undertaken
73 to explore commonalities and differences in the planning process and outcomes. These
74 reports include four Summer Olympic and Paralympic Games (from Sydney 2000¹ Athens
75 2004,⁶ Beijing 2008⁷ and London 2012)⁸⁻¹³ and the Vancouver 2010 Winter Olympic and
76 Paralympic Games report.¹⁴ All publicly available reports were included in the analysis. All
77 reports were written in English language. These reports were voluntarily published by host
78 cities. The IOC does not require Olympic host cities to produce these reports. The reports
79 were written by local organising committees except the London 2012 Games where National
80 Health Services in London and Public Health England were the authors. Reports were
81 written by senior planners and organisers but reliability of the results cannot be verified
82 because they were not independently assessed. Reports included differing data and
83 definitions. This made comparison difficult. These reports were not written as scientific
84 documents because they were written for future Olympic planners. The analysis focused on
85 the following categories:

- 86 a. ‘Issues’: occurrences, processes or events that have implications for future
87 Olympic host cities.
- 88 b. ‘Recommendations’: planning strategies proposed for future Games’ health
89 planners.

90 ‘Issues’ denotes an aspect of planning or delivery that was described but no advice
91 was given for the future organisers on how to tackle similar situations in the future. In
92 contrast, ‘recommendations’ describes the authors’ proposal for a preferable outcome in
93 future Olympic and Paralympic Games. A combination of fixed (deductive) and flexible
94 (inductive) coding techniques were employed.¹⁵ Each document was coded using ‘issues’ and

95 'recommendations' categorisation with the qualitative data analysis software NVivo 10 (QSR
96 International, Burlington, MA, USA). These categories were then explored further in
97 discussion between members of the research team. Flexible coding techniques were applied
98 in response to the report content in order to group identified information into larger themes.
99 In discussions a theme was defined as a specific message or recommendation that was
100 mentioned in one or several reports. When analysing the themes, the context in which they
101 were presented was taken into account (e.g. relating to the host city and nation), and its
102 importance and transferability to other host cities.

103 **Results**

104 **Content of reports**

105 All issues and recommendations were classified into six broad themes as described below.
106 The report content was almost exclusively focussed on Olympic health care planning within
107 the venues, except London 2012 reports, and thus our analysis was also mainly focused on
108 medical planning inside Olympic venues. There was little explicit description of
109 arrangements for the Paralympic Games. All identified themes were prevalent in all analysed
110 reports except for the legacy theme which was not described in the Sydney 2000 report.
111 Themes are not hierarchically ordered in order by 'importance' to avoid any subjectivity and
112 bias to issues.

113 **Theme 1: Early planning and relationship building**

114 *Timing*

115 All host city reports stressed that timely preparation for the Games is essential.⁹ The
116 early development of effective relationships to clarify roles with national organizations,
117 including emergency and security services, national government ministries and law

118 enforcement authorities is vital.^{7, 9, 14, 16, 17} The Beijing health care planning report referenced
119 the need to be transparent about potentially competing interests and organizational cultures
120 between different governmental departments, health care providers outside and inside the
121 Olympic venues and the police.¹⁸ The London report noted that early planning allowed
122 enough time to test plans as well as develop and prepare for different scenarios.⁹ Although
123 planning also started early in Vancouver, it was acknowledged that it was not taken seriously
124 by some hospital staff until close to the Games.¹⁴ All reports noted that the relationship with
125 the medical team of the host city's Olympic Organising Committee was of particular
126 importance.^{7, 9, 19}

127 *Communication issues*

128 The Beijing, Vancouver and London reports emphasised the need for effective internal
129 and external communications to ensure a co-ordinated health care response.^{9, 14, 20} In
130 Vancouver poor communication was experienced initially in the Olympic polyclinic when
131 staff were not included in appropriate communication routes.¹⁴

132 **Theme 2: Establishing general medical provision for the Games**

133 *Addressing minor medical needs*

134 Evidence from all health care planning reports suggests that most of the health care
135 needs of athletes and visitors were minor and were met through provision of primary care
136 services (e.g. a Polyclinic) within Olympic venues. Very few polyclinic attendances resulted
137 in referrals to hospitals (see Table 1 and 2).

138 *Medical services users*

139 In Athens, Beijing, Vancouver and London the majority of health care demand both
140 for primary care (at the Olympic Polyclinic) and for hospital care came from the Olympic

141 technicians and media staff. Both Athens and Beijing organisers noted that this probably
142 happened due to fatigue and stress.^{21,22} The Vancouver and Athens reports recommended that
143 appropriate support should be provided to the Olympic workforce, including health care staff,
144 to minimise anxiety during Games time and ‘post-event blues’ after the Games have ended.^{14,}
145 ¹⁷ Athens organisers proposed measures to manage the potential post-Games increase in
146 requests for annual leave, including staggered vacation planning, so that local health service
147 capacity was not affected.¹⁷ Despite these recommendations, the demand for
148 healthcare/primary care from the Olympic workforce still remains higher during and after the
149 Games than for athletes or any other individuals involved in the Olympic Games.

150 *Presentation types*

151 Amongst all Games family members (athletes, country officials, technicians, media
152 workers and VIPs) orthopaedic problems and injuries, digestive and respiratory
153 complications accounted for the greatest number of patient presentations to the Olympic
154 polyclinic, with dental and ophthalmology services also in high demand.^{22, 23} The athletes
155 themselves primarily required medical attention for orthopaedic injuries,²² but they
156 comprised the minority of presentations to primary and secondary care. Media and technical
157 workers comprised the largest group of presentations in the Olympic Polyclinic and
158 designated hospitals. The same pattern of use of medical care followed in all analysed
159 reports, suggesting that specific services were correctly established in the Olympic polyclinic
160 and hospitals according to previous Games experience. Public injuries and first aid figures
161 were not published in the reports.

162 **Theme 3: Managing risks**

163 *Prevalence of gastrointestinal and food-borne diseases*

164 The Athens, Beijing and London reports emphasised that the Games pose a major risk to
165 the spread of communicable diseases due to the number of visitors congregating in the host
166 city during the event.^{10, 36, 37} Gastrointestinal and food-borne diseases were among the most
167 commonly reported incidents in recent summer Olympics, although the numbers involved in
168 every Games were very small compared to the total number of visitors.^{9, 38, 39} All organisers
169 prepared to monitor and respond to possible threats of communicable diseases. Measures
170 included enhanced syndromic surveillance and mandatory notification systems,^{14, 36, 39} a
171 cruise ship inspection programme,³⁶ food and water safety programmes and environmental
172 surveillance,^{1, 14, 39-41} plus targeted vaccination programmes (for migrant workers in Beijing³⁹
173 and H1N1 influenza immunization in Vancouver.¹⁴ In response to recommendations from
174 previous Games, the Health Protection Agency (HPA) established their team in the Olympic
175 Polyclinic to support the London Organising Committee.¹² The London 2012 Chief Medical
176 Officer also received a daily public health Situation Report (SitRep).¹²

177 *Sexually transmitted infections*

178 The Athens and Beijing reports also identified sexually transmitted infections (STIs) as a
179 potentially important risk during Games time. This was addressed through condom
180 distribution schemes combined with sexual health education campaigns.^{42, 43} Following the
181 review of lessons from previous Games, NHS in London established a sexual health
182 promotion and prevention programme to disseminate information about potential risks and
183 safety measures.⁹

184 *Multi-agency planning*

185 The importance of pre-Games multi-agency planning for a range of public health
186 emergencies, including non-communicable disease incidents (such as heat-related illness and
187 severe weather events), was also emphasised in the three most recent reports prior to 2012.⁷

188 ^{14, 28} NHS London reports also described how sun-safe advice and free sunscreen were
189 provided to spectators during the Games.⁹

190 **Theme 4: Planning and managing the security risk of the Games**

191 *Prioritisation of security planning*

192 The Games held after the ‘9/11’ attacks in 2001 prioritised planning for natural or
193 deliberate release of hazardous chemical, biological, radioactive substances and to the
194 management of associated health risks,^{14, 16, 17} They paid considerable attention to establishing
195 sophisticated multi-agency emergency response plans, at significant cost to the host nation.

196 *Cost of security arrangements*

197 In Athens (2004), security costs amounted to €1 billion out of the entire Olympic budget
198 of €7 billion.¹⁷ After the Athens Games, concerns were raised about whether the response
199 was proportionate to the threat, and there were criticisms that security plans may have been
200 activated too frequently and de-activated too slowly.¹⁷ Subsequent Olympic and Paralympics
201 Games also spent significant resources to implement sophisticated security systems.

202 **Theme 5: Administration and logistical issues**

203 *Accreditation*

204 Common problems identified in relation to administration and logistics include difficulties
205 in obtaining permission for health care staff to work in Olympic venues (referred to as
206 accreditation),^{14, 22} appropriate procedures required for athletes’ anti-doping testing⁴⁴ and the
207 need for efficient procurement of medical products.¹⁴ For example, in Beijing too few National
208 Olympic Committees’ health care teams received accreditation, forcing those who were
209 accredited to work extra hours in order to provide adequate cover.⁷ In Vancouver, accreditation
210 was reported to be a laborious exercise, due to the complex and time-consuming technical
211 processes involved.¹⁴ Accreditation continued to be problematic in London 2012 Games.¹²

212 **Theme 6: Assessing the development and success of health legacy programmes**

213 *Establishment of health legacy programmes*

214 Recent Games sought to achieve a range of public health goals, including raising
215 awareness about risky behaviours (e.g. smoking and sexually transmitted diseases including
216 HIV/AIDS),^{14, 45-47} improving exercise and dietary habits,^{45, 46} as well as building local health
217 and public health service capacity.⁴⁵ The Athens report noted that security and emergency
218 planning took priority, depleting available resources for health promotion activities.⁴⁶ The
219 report also suggested separating departments for health legacy planning from other aspects of
220 Games planning in order to balance out resources.¹⁹ Health legacy organisers in London did
221 not take into account that other parts of planning may prevail health legacy admitting that
222 their programme struggled to compete with health services planning and delivery
223 programmes in order to get appropriate parity.¹¹

224 *Recommendations to support health legacy*

225 In order to improve health legacy efficiency, the Vancouver and Beijing reports
226 recommended the development of close working relationships with relevant national and
227 international partners from the outset (including the World Health Organization, the
228 International Olympic Committee and the local Olympic organising committee),^{14, 45} early
229 and long-term planning of legacy initiatives during and beyond Games time,^{14, 22} together
230 with improved methods for longitudinal data collection to enable the evaluation of specific
231 legacy initiatives.⁴⁸ London organisers heeded those recommendations and encouraged health
232 legacy initiatives to conduct evaluations to assess the quality of their work after the Olympic
233 Games.¹¹

234 **Discussion**

235 **Six reoccurring healthcare planning and delivery themes**

236 The analysis of past Olympic health care planning reports identified the following key issues:
237 1) All reports recognised that early development of effective relationships to clarify roles
238 with national organizations, including emergency and security services, national government
239 ministries and law enforcement authorities is vital.^{7, 9, 14, 16, 17} 2) Despite recommendations to
240 address demand for healthcare/primary care from the Olympic workforce, usage from this
241 group remains higher during and after the Games than for athletes or any other individuals
242 involved in the Olympic Games. However, the same pattern of use of medical care followed
243 in all analysed reports, suggesting that specific services were correctly established in the
244 Olympic polyclinic and hospitals according to previous Games experience. 3) Despite
245 available evidence⁵¹ that STIs are uncommon in the Olympic Games, health care planners in
246 the Beijing, Athens and London Olympic Games established specific programmes to fight
247 STIs. 4) Emergency preparedness demands significant resources and there is a significant
248 risk that this can reduce capability for other parts of planning, and particularly health legacy.
249 After the Athens Games, concerns were raised about whether the response was proportionate
250 to the threat, and there were criticisms that security plans may have been activated too
251 frequently and de-activated too slowly.¹⁷ 5) Accreditation continues to be the most commonly
252 experienced administrative issue despite warnings from previous Games reports. 5) Despite
253 growing interest to use the Olympics to create sustainable long-term health impacts for the
254 host city and country, there is very limited evidence of long-term improvement in population
255 health as a result of hosting the Olympics. 6) The analysed reports did not describe
256 adjustments that were likely to have been needed to address Paralympians' specific
257 disabilities. 7) All Olympic reports can be more helpful if they were scientifically rigorous
258 including standardisation of data reported and standardisation of definitions. 8) As the
259 Paralympic Games are significantly smaller than the Olympic Games and the Paralympic

260 athletes have special medical needs due to their disabilities, it would be useful for future
261 organisers to know what adjustments were made to address these aspects.

262 **Strengths and limitations of this analysis**

263 This is the first study to identify common health planning issues in preparation for the
264 Olympic and Paralympic Games. Published research on health services planning for mass
265 gatherings is limited, often covering non-sporting events such as the Hajj which have
266 different attending populations to typical Olympic Games spectators. By focusing on post-
267 Games reports, authors have focused on evaluating the first hand, in-depth insights of those
268 who led the planning process from inception to delivery.

269 Each report was idiosyncratic in terms of the type and content of information
270 presented. This made it difficult to make direct comparisons of similar topics. For example,
271 all reports included some denominator data on the amount of tickets sold but these data were
272 too incomplete to provide an indication of the population who may be in need of health care
273 because the same spectator may have purchased several tickets for different events. These
274 differences made it difficult to compare data provided in all reports. London 2012 reports
275 focused on local health services in the city, while previous Games reports limited their
276 discussions to health care planning and delivery inside Olympic venues specifically.

277 This analysis was limited to medical planning reports in order to highlight the
278 potential usefulness of this resource; however, a wider range of academic literature would
279 provide stronger evidence of recurrent issues.

280 **Conclusion**

281 There are significant differences between Olympic host city health care systems.
282 Despite this, the recommendations made to future hosts were similar. Difficulties with

283 communication, accreditation and health legacy assessment after the Games tended to be
284 experienced by each host city. Challenges faced by Olympic host cities in attempting to
285 generate a tangible health legacy have also been documented in other mass gatherings. There
286 is a growing recognition of the need for more robust evaluation methods to measure the
287 longer term impact.^{49, 50} The identification of recurrent issues suggest that existing
288 information and opportunities to learn could be used more effectively to improve Olympic
289 health care planning.

290 The use of existing evidence is crucial in ensuring that the planners establish good
291 healthcare for the Olympic and Paralympic Games. A combined approach to presenting
292 information both inside and outside the Olympic venues in one report would also help future
293 host cities to improve coordination and communication, as public health, local health services
294 and Olympic planners often work in collaboration.

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304 **References**

- 305 1. Visotina M, Hills M. *NSW Health Services for the Sydney 2000 Olympic and*
306 *Paralympic Games*. New South Wales Health Department: Sydney; 2000.
- 307 2. Abubakar I, Gautret P, Brunette GW, et al. *Global perspectives for prevention of*
308 *infectious diseases associated with mass gatherings*. *Lancet Infect Dis*.
309 2012;12(3):175.
- 310 3. Varon J, Fromm RE, Chanin K, et al. *Critical Illness at Mass Gatherings is*
311 *Uncommon*. *J Emerg Med*. 2003;25(4): 409-413.
- 312 4. Tsitsimpikou CH, Tsiokanos A, Tsarouhas K, et al. *Medication Use by Athletes at the*
313 *Athens 2004 Summer Olympic Games*. *Clin J Sport Med*. 2009;19(1):33-38.
- 314 5. Engebretsen L, Steffen K, Alonso JM, et al. *Sports injuries and illnesses during the*
315 *Winter Olympic Games 2010*. *Br J Sports Med*. 2010;44(11):772–780.
- 316 6. Tsouros AD, Efstathiou PA. *Mass gatherings and public health: The experience of the*
317 *Athens 2004 Olympic Games*. Copenhagen, Denmark: World Health Organization
318 Europe; 2007.
- 319 7. Dapeng J, Ljungqvist A, Troedsson H. *The Health Legacy of the 2008 Beijing*
320 *Olympic Games: Successes and Recommendations*. Manila, Philippines: World Health
321 Organization Western Pacific Region; 2010.

- 322 8. NHS London. *The NHS in London supporting the 2012 London Olympic and*
323 *Paralympic Games. Programme overview (no. 1 in a series of four reports)*. London,
324 UK; 2012.
- 325 9. NHS London. *Health service planning and delivery (no. 2 in a series of four reports)*.
326 London, UK; 2012.
- 327 10. NHS London. *Health emergency preparedness, resilience and response (no. 3 in a*
328 *series of four reports)*. London, UK; 2012.
- 329 11. NHS London. *Go London! The legacy of better health for Londoners (no. 4 in a series*
330 *of four reports)*. London, UK; 2012.
- 331 12. Health Protection Agency. *London 2012 Olympic and Paralympic Games. Summary*
332 *Report of the Health Protection Agency's Games Time Activities*. London, UK;
333 2012:1-42.
- 334 13. McCloskey B, Endericks T. *Learning from London 2012: a practice guide to public*
335 *health and mass gatherings*. London, UK: 2013.
- 336 14. Vancouver Coastal Health. *Vancouver Coastal Health 2010 Concept of Operations:*
337 *Planning for the Vancouver 2010 Olympic and Paralympic Winter Games. Lessons*
338 *Learned*. Vancouver, Canada: 2010.
- 339 15. Fereday J, Muir-Cochrane E. *Demonstrating rigor using thematic analysis: A hybrid*
340 *approach of inductive and deductive coding and theme development*. Int J Qual
341 Methods. 2008;5(1):80-92.

- 342 16. Xing G, Wuchun C, Hezuo J, et al. Public health preparation for potential nuclear,
343 biological, chemical and explosive terrorist attacks. In: Dapeng J, Ljungqvist A,
344 Troedsson H, eds, *The Health Legacy of the 2008 Beijing Olympic Games: successes*
345 *and recommendations*. Manila, Philippines: World Health Organization Western
346 Pacific Region;2010:62-77.
- 347 17. Baka A, Isaakidis P, Ferentinos G, et al. Public health preparedness for incidents
348 involving the potential deliberate use of biological and chemical agents or
349 radionuclear material. In: Tsouros AD, Efstathiou PA, eds, *Mass Gatherings and*
350 *Public Health: the experience of the Athens 2004 Olympic Games*. Copenhagen,
351 Denmark: World Health Organization Europe; 2007:97-127.
- 352 18. Xing G, Hua B, Jun X, et al. Health emergency preparedness and international
353 cooperation. In: Dapeng J, Ljungqvist A, Troedsson H, eds, *The Health Legacy of the*
354 *2008 Beijing Olympic Games: successes and recommendations*. Manila, Philippines:
355 World Health Organization Western Pacific Region; 2010:116-125.
- 356 19. Tsourous AD, Efstathiou PA. *Mass Gatherings and Public Health: The Experience of*
357 *the Athens 2004 Olympic Games*. Copenhagen, Denmark: World Health Organization
358 Europe; 2007.
- 359 20. Dongming, L. and L. Zhengmao, *Ensuring health security*, in *The Health Legacy of*
360 *the 2008 Beijing Olympic Games: successes and recommendations*. In: Dapeng J,
361 Ljungqvist A, Troedsson H, eds, *The Health Legacy of the 2008 Beijing Olympic*
362 *Games: successes and recommendations*. Manila, Philippines: World Health
363 Organization Western Pacific Region; 2010:22-25.

- 364 21. Xiaohong D, Dalong Q, Jing Ch, et al. Medical services in the city. In: Dapeng J,
365 Ljungqvist A, Troedsson H, eds, *The Health Legacy of the 2008 Beijing Olympic*
366 *Games: successes and recommendations*. Manila, Philippines: World Health
367 Organization Western Pacific Region; 2010:35-41.
- 368 22. Renström P, Jiyong G, Jianping D, et al. *Medical service for athletes*. In: Dapeng J,
369 Ljungqvist A, Troedsson H, eds, *The Health Legacy of the 2008 Beijing Olympic*
370 *Games: successes and recommendations*. Manila, Philippines: World Health
371 Organization Western Pacific Region; 2010:42-52.
- 372 23. Parisis C, Pyrros D, Ditsios K, et al. Health Services Department of the Athens 2004
373 Olympic Games Organizing Committee. In: Tsouros AD, Efstathiou PA, eds, *Mass*
374 *Gatherings and Public Health: the experience of the Athens 2004 Olympic Games*.
375 Copenhagen, Denmark: World Health Organization Europe; 2007:237-252.
- 376 24. International Olympic Committee. Sydney 2000 Summer Olympics.
377 <http://www.olympic.org/sydney-2000-summer-olympics>. Published 2000. Accessed
378 16 July, 2012.
- 379 25. SOCOG, *Official report of the XXVII Olympiad. Preparing for the Games.*, 2001,
380 Sydney Organising Committee for the Olympic Games.
- 381 26. International Olympic Committee. Marketing Report Athens 2004. Published 2004.
382 <http://www.olympic.org/marketing/documents-reports-studies-publications>. Accessed
383 16 July, 2012.
- 384 27. International Olympic Committee. Athens 2004 Summer Olympics.
385 <http://www.olympic.org/athens-2004-summer-olympics>. Published 2004. Accessed 16
386 July 2012.

- 387 28. Efstathiou PA, Tsouros AD, Knebel A, et al. Health sector command, coordination
388 and communication. In: Tsouros AD, Efstathiou PA, eds, *Mass Gatherings and*
389 *Public Health: the experience of the Athens 2004 Olympic Games*. Copenhagen,
390 Denmark: World Health Organization Europe; 2007:269-284.
- 391 29. International Olympic Committee. Beijing 2008 Summer Olympics.
392 <http://www.olympic.org/beijing-2008-summer-olympics>. Published 2012. Accessed
393 16 July, 2012.
- 394 30. PricewaterhouseCoopers. The Games Effect. Report 7: Global summary of the impact
395 of the 2010 Olympic and Paralympic Games on British Columbia and Canada 2003 to
396 2010.
397 http://www.fin.gov.bc.ca/reports/PwC_The_Games_Effect_Summary_Report_7_2010_EN_FINAL.PDF. Published 2011. Accessed 20 September, 2012.
- 399 31. International Olympic Committee. Vancouver Winter Olympics 2010.
400 <http://www.olympic.org/vancouver-2010-winter-olympics>. Published 2010. Accessed
401 16 July, 2012.
- 402 32. Taunton, J. Vancouver 2010 Medical Services.
403 <http://www.bcsls.net/pages/documents/Taunton-MedicalServices.pdf>. Published 2010.
404 Accessed 20 September, 2012.
- 405 33. The London Organising Committee of the Olympic and Paralympic Games. London
406 2012 Media fact pack. [http://cdn.londonandpartners.com/l-and-p/assets/travel-](http://cdn.londonandpartners.com/l-and-p/assets/travel-trade/london-2012-travel-trade-media-pack.pdf)
407 [trade/london-2012-travel-trade-media-pack.pdf](http://cdn.londonandpartners.com/l-and-p/assets/travel-trade/london-2012-travel-trade-media-pack.pdf) . Published 2012. Accessed 11
408 October 10, 2013.

- 409 34. London Paralympics: What next for 2012 Games Makers? British Broadcasting
410 Corporation. <http://www.bbc.co.uk/news/uk-19512993>. Accessed 20 November,
411 2012.
- 412 35. NHS London, *The NHS in London supporting the 2012 London Olympic and*
413 *Paralympic Games. Programme overview (no. 1 in a series of four reports)*. 2012.
- 414 36. Mavroidi N, Mavroidi T, Mavroidi X et al. Preparing epidemiological surveillance
415 and response for communicable diseases. In: Tsouros AD, Efstathiou PA, eds, *Mass*
416 *Gatherings and Public Health: the experience of the Athens 2004 Olympic Games*.
417 Copenhagen, Denmark: World Health Organization Europe; 2007:49-66.
- 418 37. Tao Z, Xinghuo P, Ting G, et al. Risk assessment. In: Dapeng J, Ljungqvist A,
419 Troedsson H, eds, *The Health Legacy of the 2008 Beijing Olympic Games: successes*
420 *and recommendations*. Manila, Philippines: World Health Organization Western
421 Pacific Region; 2010:126-134.
- 422 38. Panagiotopoulos T, Mavroidi N, Spala G, et al. Experience of epidemiological
423 surveillance and response for communicable diseases. In: Tsouros AD, Efstathiou PA,
424 eds, *Mass Gatherings and Public Health: the experience of the Athens 2004 Olympic*
425 *Games*. Copenhagen, Denmark: World Health Organization Europe; 2007:67-80.
- 426 39. Chunhui Z, Tao Zh, Ying D, et al. Prevention and control of communicable diseases.
427 In: Dapeng J, Ljungqvist A, Troedsson H, eds, *The Health Legacy of the 2008 Beijing*
428 *Olympic Games: successes and recommendations*. Manila, Philippines: World Health
429 Organization Western Pacific Region;2010:53-61.
- 430 40. Hadjichristodoulou C, Mouchtouri V, Kourea-Kremastinou J. Environmental health
431 surveillance and management of food and water safety. In: Tsouros AD, Efstathiou

- 432 PA, eds, *Mass Gatherings and Public Health: the experience of the Athens 2004*
433 *Olympic Games*. Copenhagen, Denmark: World Health Organization Europe;
434 2007:131-160.
- 435 41. Vassiliadou D, Apostolopolous Ch, Panteleaki D, et al. *Food safety and the role of the*
436 *Hellenic Food Authority*. In: Dapeng J, Ljungqvist A, Troedsson H, eds, *The Health*
437 *Legacy of the 2008 Beijing Olympic Games: successes and recommendations*. Manila,
438 Philippines: World Health Organization Western Pacific Region; 2010:161-176.
- 439 42. Stergachis A, Tsouros AD. Overview and framework. In: Tsouros AD, Efstathiou PA,
440 eds, *Mass Gatherings and Public Health: the experience of the Athens 2004 Olympic*
441 *Games*. Copenhagen, Denmark: World Health Organization Europe; 2007:3-28.
- 442 43. Htun-Hansen OS, Shamasch P, Mascagni K, et al. The HIV Campaign. In: Dapeng J,
443 Ljungqvist A, Troedsson H, eds, *The Health Legacy of the 2008 Beijing Olympic*
444 *Games: successes and recommendations*. Manila, Philippines: World Health
445 Organization Western Pacific Region;2010:153-163.
- 446 44. Ljungqvist A, Catlin A, Wu M, et al. Anti-doping activities. In: Dapeng J, Ljungqvist
447 A, Troedsson H, eds, *The Health Legacy of the 2008 Beijing Olympic Games:*
448 *successes and recommendations*. Manila, Philippines: World Health Organization
449 Western Pacific Region;2010:164-173.
- 450 45. Troedsson H, Ljungqvist A, Wei W, et al. Towards a healthier city with an Olympic
451 health legacy. In: Dapeng J, Ljungqvist A, Troedsson H, eds, *The Health Legacy of*
452 *the 2008 Beijing Olympic Games: successes and recommendations*. Manila,
453 Philippines: World Health Organization Western Pacific Region; 2010:04-08.

- 454 46. Tsouros AD, Lekka M, Minogiannis P, et al. Disease prevention and health promotion
455 activities. In: Tsouros AD, Efstathiou PA, eds, *Mass Gatherings and Public Health:
456 the experience of the Athens 2004 Olympic Games*. Copenhagen, Denmark: World
457 Health Organization Europe; 2007:253-268.
- 458 47. Zejun L, Xianli S, Xiaobo C, et al. Tobacco control, in *The Health Legacy of the 2008
459 Beijing Olympic Games: successes and recommendations* In: Dapeng J, Ljungqvist A,
460 Troedsson H, eds, *The Health Legacy of the 2008 Beijing Olympic Games: successes
461 and recommendations*. Manila, Philippines: World Health Organization Western
462 Pacific Region; 2010:135-143.
- 463 48. O'Leary M, Laiying F, Tunon C, et al. Public health achievements and lessons for the
464 future. In: Dapeng J, Ljungqvist A, Troedsson H, eds, *The Health Legacy of the 2008
465 Beijing Olympic Games: successes and recommendations*. Manila, Philippines: World
466 Health Organization Western Pacific Region; 2010:186-191.
- 467 49. Murphy NM, Bauman A. *Mass sporting and physical activity events: are they bread
468 and circuses or public health interventions to increase population levels of physical
469 activity?* J Phys Act Health. 2007;4(2):193-202.
- 470 50. Weed M, Coren E, Fiore J et al. *A systematic review of evidence base of developing a
471 physical activity and health legacy from the London 2012 Olympic and Paralympic
472 Games*. Canterbury, UK; 2007.
- 473 51. Deering K N, Chettiar J, Chan K, Taylor M, Montaner, J S G, Shannon K. *Sex work
474 and the public health impacts of the 2010 Olympic Games*. Sexually Transmitted
475 Infections, 2012;88(4): 301-303.