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# Developing a Health System Approach to Disaster Management: A Qualitative Analysis of the Core Literature to Complement the WHO Toolkit for Assessing Health-System Capacity for Crisis Management

JANUARY 21, 2015 RESEARCH ARTICLE

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BACKGROUND: The World Health Organisation's (WHO) Kobe-hyogo World Health Assembly in May 2011 adopted a resolution on strengthening national health emergency and disaster management capacities and resilience of health systems. Disaster management is a logical issue globally and countries are being encouraged to develop a health system approach to disaster management. Comprehensive guidance is emerging in health systems, science and disaster management literature but evidence-based conceptual models are lacking.

METHODS: This paper describes the evidence-base for the worldwide experience of disasters through a health systems approach. A systematic review of the core literature from January 2001 until January 2014 was undertaken using the Medline database. Search terms for health system capacity, disaster preparedness and response (before-during-after) were combined with WHO's six health system building blocks (governance, finance, workforce, information, medical products and technologies, service delivery) and the literature allowing the identification of emerging themes and concepts. The research questions for the literature review were then compared with the topics covered by the new expert consensus derived Toolkit to assess health system capacity for crisis management (Bourton et al, PLoS Currents Disasters, 2013).

FINDINGS: 132 publications identified from a literature search were analysed and appraised. Themes and examples from the literature demonstrate how health system strengthening should contribute to disaster management. Lessons from recent outbreaks/pandemics in the WHO Toolkit are identified as relevant and discussed.

INTERPRETATION: Collation and analysis of the disaster management literature identifies lessons and evidence-based examples of how health system strengthening can contribute to disaster management and complement the WHO Toolkit. Countries can use the Bourton conceptual model to develop a health system approach to disaster management capacities and identify priorities for strengthening their health system.

CONCLUSIONS: Disasters are a global issue and countries are being encouraged to develop a health system approach to disaster management. A qualitative analysis of the core literature is complemented by the WHO Toolkit for assessing health system capacity for crisis management. PLoS Currents Disasters. 2015 Apr 22. doi: 10.1371/currents.dis.f7f0f0ccc7ee1e6f7f7f0ffc0f0ffc0f.

## INTRODUCTION

### Why health system for disasters?

Disasters are a global issue with different, yet many, shared stories: health sector vulnerabilities and how countries and disaster management practitioners and policies can be built up in the health system to create resilience and to become approved. Four recent disaster-illustrations conceptually focus on health system vulnerabilities:

The earthquake in Haiti, 12th Jan 2010, left 1.3 million homeless and killed 100,000 people of which 4000 were in a particular concentration in the quake-collapsed school of Christ-the-Redeemer. Haiti's disaster management capacity was overwhelmed and the health system was crippled. Lessons from Haiti highlight the necessity priorities when the disaster occurred.[1] Government structures were destroyed and the required response was "beyond the capacity of the Haitian government and its health system and required almost completely by international organisations, creating for over all of international aid, ongoing investments into the health system."[2]

Typhoon Haiyan, 8th November 2013, affected 20 million people and developed health facilities. In spite of the public health challenges, previous disaster management investments in the Philippines "were upon-placed for effective evacuations and saved lives."[3]

Ebola in West Africa, 2014, affected 10 million 10 million people across several countries. Large populations displacement created additional public health challenges to areas that were overwhelmed health systems and lack disaster preparedness. Immediate priorities included: provision of water, sanitation, and shelter; provision of medical care; and prevention of transmission of Ebola. Lessons from Ebola include: "Ebola preparedness, preventable diseases, testing, and other agency constituents." These reflect the different components of the health system.

Hurricane Sandy and tsunami in Japan, 11th March 2011, caused destruction of health facilities, initial shortages of blood, water, fuel, and medicine and rescue teams to the affected rural populations. 300,000 people were evacuated to shelters with no heating or freezing temperatures. However, Japan had invested in disaster preparedness and "Japan's well-resourced health system coped with the immediate medical needs of the challenges."[4]

WHO describes public health threats as: "wars or needy emerging diseases, the accidental release or deliberate release of chemical, biological or radiological agents, or natural disasters such as earthquakes, complex emergencies, conflicts and other events with a potentially catastrophic impact on human health."[5] Public health emergency preparedness has been described as "the capability of the public health and health-care systems to respond to a wide spectrum of adverse events, including those that are the result of natural disasters and emergencies, particularly those whose scale, timing, or unpredictability threaten to overwhelm routine capabilities."[6] Disasters are a global issue and countries are being encouraged to develop a health system approach to disaster management. Disasters are "a crisis or emergency, or 'emergency management' is the term used in the actions to anticipate and build capacity to respond to and recover from emergencies."[7]

Health system can be defined as: "consisting of the resources, organizations and institutions that are devoted to producing interventions/services aimed principally at improving, maintaining or restoring health."[8] WHO's conceptual framework for health system strengthening includes six building blocks: service delivery, health workers, ill health services, ill health information, ill medical products, technology and medicines, finance, and governance and leadership. This paper describes these components as 'levers' to encapsulate the complex nature of health system strengthening and disaster management, and to avoid the mechanistic connotation.

Historically, different aspects of disaster management have been conceptualised and discussed in isolation. Previous. For multi-disciplinary health systems' approach to disaster management suggests that each component of the health system contributes to disaster management. The WHO Toolkit for assessing health system can be strengthened to meet the demands of any type of disaster, emergency, public health and effective response and recovery.

The Ebola outbreak and recent Ebola crisis indicated health system strengthening as the approach to support emergency preparedness and international crisis management capacities of member states. In response to international requests, a practical, action-oriented Toolkit was developed and refined in a series of expert consultations.

The Toolkit for assessing health system capacity for crisis management was piloted in 2013 and refined in an earlier version in multidisciplinary country missions to Armenia, Azerbaijan and the Republic of Moldova.[9] The Toolkit was then tested in a multi-country pilot in 2013 in 10 ECA countries. Based on the feedback of experience, the Toolkit was adapted and finalized.

The Toolkit consists of a "core indicator" and the "assessment tool" and is structured using the WHO health system building blocks (service delivery, health workforce, health information, medical products, finance, governance and leadership) components of the health system. The Toolkit's "core indicator" is a "yes/no" question and "assessment tool" is a "yes/no" question with comments.

The final revised version, published in January 2012, was used to prepare a country report for Turkey.[10] and Ukraine.[11] The Toolkit was also used in a multi-country assessment of health system capacity for crisis for an increased effect of magnitude following North Africa Crisis in assessment missions to Malta,[12] the Lampedusa[13] and Greece (Crisis Region).[14] The scope of the application of the assessment tool has been extended to include the health system response to the Ebola crisis in West Africa, the Ukraine crisis in Europe and to measure progress towards indicators.

A report using the WHO Toolkit to evaluate England's health system arrangements to deal with crisis, has identified the need for a conceptual framework to guide the Toolkit's use. The report highlights the advantages of the largely integrated nature of the National Health Service (NHS) in England in regard to disaster management, working in conjunction with the structured response system that involves multi-sector and multi-agency partnerships.

In spite of the progress from workers a lack of evidence or collated evidence-based model of a health system-wide approach to disaster management. It has not yet received attention in the disaster-related core literature. The Toolkit's "core indicator" and "assessment tool" have been developed and refined through experience being together. Structured frameworks such as public disaster management, such as the Cross-Sector Safety and Security Communications (CSSC) Framework, developed by the Pan American Health Organization/ Regional Office for Europe Toolkit, which are developed through expert consultation to create a consensus document, are a logical approach to guide the Toolkit's use. The Toolkit's "core indicator" and "assessment tool" actual worldwide experience of disasters in the published in the literature. A review of disaster experience of the health system drawn for an all-inclusive approach to disaster management.

## METHODS

### Review of the worldwide experience of disasters drawn from the core literature. A systematic review

was undertaken of the core literature in Medline and Embase (Ovid) for the period between 1st January 2001 and 15th November 2011. Search terms comprised of disaster terms combined with the components of the health system (WHO's six building blocks) and the phases of disaster (before, during, and after/recovery). Content analysis and evidence assessment using Hawker's quality appraisal tool[15] was completed on each of the 132 documents identified by the search. An additional qualitative analysis identified the strategies and lessons from the literature that could be used to develop a health system approach to disaster management. Lessons from recent outbreaks/pandemics in the WHO Toolkit are identified as relevant and discussed.

An initial content analysis was conducted on each document identified by the systematic review[16] using a meta-coordinating tool WHO's six health system building blocks (service delivery, health workforce, health information, medical products, finance, governance and leadership) and the phases of disaster (before, during, and post-disaster/recovery).

Further in completing the content analysis matrix, a grounded theory qualitative analysis approach was used to identify emerging themes and concepts. The research questions for the literature review were compared with the components drawn from WHO's Toolkit: lessons – each lens of the matrix acting as an 'anchor' from which to identify emerging themes and concepts. The research questions for the literature review were compared with the components drawn from WHO's Toolkit: lessons – each lens of the matrix acting as an 'anchor' from which to identify emerging themes and examples – the collated worldwide experience thus indicating how health system strengthening can contribute to disaster management.

The large scale-and-scope of the literature review was conducted to ensure the risk of any disaster management topic being overlooked was minimized. The research questions for the literature review were compared to the core indicators and the assessment tool. Lessons from recent outbreaks/pandemics in the WHO Toolkit are identified and discussed. Are review encompasses a range of materials, including case reports. Three-quarters of the 132 documents were case reports, and the remaining documents were a mixture of "low quality and good for each paper." By including a range of documents the analysis identifies lessons from actual disaster experience. Each disaster is different, and these experiences may be most useful for planning purposes. The lessons from the literature review are compared with the Toolkit's content.

The results section presents the findings from the literature analysis are compared to the components of the expert consensus-derived WHO Toolkit. Topics that are under-represented are discussed using the literature evidence.

## FINDINGS

### Results from a selection of health system priority areas drawn from the analysis of the core literature.

These topics have been compared with the WHO Toolkit and the Ukraine Expertise Without reference to the Toolkit's identified, areas that are under-represented by the Toolkit are underlined and discussed in the next section.

**Focal + health system priorities in all-hazards disaster management – with illustrations**

Ex – Essential reference literature from the Toolkit for assessing health systems capacity for crisis management (1 to 7 WHO Regional Office for Europe)[17] underlined/bold/capitalized and in red are under-represented by Toolkit, and are discussed further below.

**1 Leadership and governance**

1 International, national and cross-boundary systems of governance, coordination and response for all-hazards disaster. Health sector leadership and governance. [18,19,20,21,22,23]

1 Governance culture of the broad system – ethical decision-makers and disaster management. [24,25,26,27,28,29,30]

1 Disaster management as a political issue: requiring strong leadership skills [31,32 and 33 &a]. [34,35]

**2 Health workforce**

1 Public health training in disaster management and preparedness. [36,37,38,39]

1 Guidelines for commission, settings and volunteer mobilisation in health sectors [39, 40a]. [41,42]

**3 Medical products, vaccines and technology**

1 Stockpiling disaster-related medicines and equipment, and their distribution [24-17b, 43 & a, 43,44 b, 45 & a]. [46,47]

1 Personal preparedness for mass vaccination and contraceptive emergency contraceptive. [48, 49a, 50,51]

1 Public health communications of decision-makers and impact on healthcare facilities [52-54b & a, 53b, 54b]. [55,56]

**4 Health information**

1 Requirement to continue the performance of health information in all stages of disaster planning [57-2 by 5, 6-17, 17-24 b, c, 25-32 b, c, 33-40 b, c, 41-48 b, c]. [58,59,60,61,62,63,64]

1 Importance of research and developments in health information system

1 Interoperability – data sharing – the sum of the whole and the use of the whole as part of disaster management. [65,66,67,68,69,70,71,72,73]

**5 Health financing**

1 Health finance system compensation on disaster management effectiveness and contingency. [74,75,76,77,78,79]

1 Disaster management funding issues, implications for national public – and global – health. [80-81 & 82 b]. [83,84,85,86]

**6 Service delivery**

1 Disaster preparedness (DA 32), acute response (DA 33) and recovery (DA 34 & 35). [87,88,89,90,91,92,93,94]

1 Community-compassionate strategies to increase community resilience. [95,96,97,98,99,100]

1 Some specific disasters/ [101-102, 103 and] [104] and healthcare facilities. [105,106,107,108]

1 Needs in attention to some disaster-prone and emergency-complex. [109, 110 & 111-114 & 115, 116]

1 Pathogenic/radiation/chemical exposure and medication needs. [117, 118] and [119 disaster]

Ex – Essential reference literature from the Toolkit for assessing health systems capacity for crisis management (1 to 7 WHO Regional Office for Europe) – underlined/bold/capitalized and in red are under-represented by Toolkit, and are discussed further below.

The Toolkit's "core indicator" and "assessment tool" are structured using the WHO health system building blocks (service delivery, health workforce, health information, medical products, finance, governance and leadership) components of the health system. The Toolkit's "core indicator" and "assessment tool" actual worldwide experience of disasters in the published in the literature. A review of disaster experience of the health system drawn for an all-inclusive approach to disaster management.

**Focal + health system priorities in all-hazards disaster management – with illustrations**

**1 Leadership and governance**

1 International, national and cross-boundary systems of governance, coordination and response for all-hazards disaster. Health sector leadership and governance. [120,121,122,123]

1 Governance culture of the broad system – ethical decision-makers and disaster management. [124,125,126,127,128,129,130]

1 Disaster management as a political issue: requiring strong leadership skills [131 &a and 32 &a]. [132,133]

**2 Health workforce**

1 Public health training in disaster management and preparedness. [134,135,136,137]

1 Guidelines for commission, settings and volunteer mobilisation in health sectors [138, 139a]. [140,141]

**3 Medical products, vaccines and technology**

1 Stockpiling disaster-related medicines and equipment, and their distribution [24-17b, 43 & a, 43,44 b, 45 & a]. [142,143]

1 Personal preparedness for mass vaccination and contraceptive emergency emergency contraceptive. [144, 145a, 146,147]

1 Public health communications of decision-makers and impact on healthcare facilities [52-54b & a, 53b, 54b]. [148,149]

**4 Health information**

1 Requirement to continue the performance of health information in all stages of disaster planning [57-2 by 5, 6-17, 17-24 b, c, 25-32 b, c, 33-40 b, c, 41-48 b, c]. [150,151,152,153]

1 Importance of research and developments in health information system

1 Interoperability – data sharing – the sum of the whole and the use of the whole as part of disaster management. [154,155,156,157,158,159,160]

**5 Health financing**

1 Health finance system compensation on disaster management effectiveness and contingency. [161,162,163,164,165,166]

1 Disaster management funding issues, implications for national public – and global – health. [167-81 & 82 b]. [168,169,170,171]

**6 Service delivery**

1 Disaster preparedness (DA 32), acute response (DA 33) and recovery (DA 34 & 35). [172,173,174,175,176,177,178,179,180,181,182,183,184,185,186,187,188,189,190,191,192,193,194,195,196,197,198,199,200,201,202,203,204,205,206,207,208,209,210,211,212,213,214,215,216,217,218,219,220,221,222,223,224,225,226,227,228,229,230,231,232,233,234,235,236,237,238,239,240,241,242,243,244,245,246,247,248,249,250,251,252,253,254,255,256,257,258,259,260,261,262,263,264,265,266,267,268,269,270,271,272,273,274,275,276,277,278,279,280,281,282,283,284,285,286,287,288,289,290,291,292,293,294,295,296,297,298,299,300,301,302,303,304,305,306,307,308,309,310,311,312,313,314,315,316,317,318,319,320,321,322,323,324,325,326,327,328,329,330,331,332,333,334,335,336,337,338,339,340,341,342,343,344,345,346,347,348,349,350,351,352,353,354,355,356,357,358,359,360,361,362,363,364,365,366,367,368,369,370,371,372,373,374,375,376,377,378,379,380,381,382,383,384,385,386,387,388,389,390,391,392,393,394,395,396,397,398,399,400,401,402,403,404,405,406,407,408,409,410,411,412,413,414,415,416,417,418,419,420,421,422,423,424,425,426,427,428,429,430,431,432,433,434,435,436,437,438,439,440,441,442,443,444,445,446,447,448,449,450,451,452,453,454,455,456,457,458,459,460,461,462,463,464,465,466,467,468,469,470,471,472,473,474,475,476,477,478,479,480,481,482,483,484,485,486,487,488,489,490,491,492,493,494,495,496,497,498,499,500,501,502,503,504,505,506,507,508,509,510,511,512,513,514,515,516,517,518,519,520,521,522,523,524,525,526,527,528,529,530,531,532,533,534,535,536,537,538,539,540,541,542,543,544,545,546,547,548,549,550,551,552,553,554,555,556,557,558,559,560,561,562,563,564,565,566,567,568,569,570,571,572,573,574,575,576,577,578,579,580,581,582,583,584,585,586,587,588,589,590,591,592,593,594,595,596,597,598,599,600,601,602,603,604,605,606,607,608,609,610,611,612,613,614,615,616,617,618,619,620,621,622,623,624,625,626,627,628,629,630,631,632,633,634,635,636,637,638,639,640,641,642,643,644,645,646,647,648,649,650,651,652,653,654,655,656,657,658,659,660,661,662,663,664,665,666,667,668,669,670,671,672,673,674,675,676,677,678,679,680,681,682,683,684,685,686,687,688,689,690,691,692,693,694,695,696,697,698,699,700,701,702,703,704,705,706,707,708,709,710,711,712,713,714,715,716,717,718,719,720,721,722,723,724,725,726,727,728,729,730,731,732,733,734,735,736,737,738,739,740,741,742,743,744,745,746,747,748,749,750,751,752,753,754,755,756,757,758,759,760,761,762,763,764,765,766,767,768,769,770,771,772,773,774,775,776,777,778,779,780,781,782,783,784,785,786,787,788,789,790,791,792,793,794,795,796,797,798,799,800,801,802,803,804,805,806,807,808,809,810,811,812,813,814,815,816,817,818,819,820,821,822,823,824,825,826,827,828,829,830,831,832,833,834,835,836,837,838,839,840,841,842,843,844,845,846,847,848,849,850,851,852,853,854,855,856,857,858,859,860,861,862,863,864,865,866,867,868,869,870,871,872,873,874,875,876,877,878,879,880,881,882,883,884,885,886,887,888,889,890,891,892,893,894,895,896,897,898,899,900,901,902,903,904,905,906,907,908,909,910,911,912,913,914,915,916,917,918,919,920,921,922,923,924,925,926,927,928,929,930,931,932,933,934,935,936,937,938,939,940,941,942,943,944,945,946,947,948,949,950,951,952,953,954,955,956,957,958,959,960,961,962,963,964,965,966,967,968,969,970,971,972,973,974,975,976,977,978,979,980,981,982,983,984,985,986,987,988,989,990,991,992,993,994,995,996,997,998,999,1000,1001,1002,1003,1004,1005,1006,1007,1008,1009,1010,1011,1012,1013,1014,1015,1016,1017,1018,1019,1020,1021,1022,1023,1024,1025,1026,1027,1028,1029,1030,1031,1032,1033,1034,1035,1036,1037,1038,1039,1040,1041,1042,1043,1044,1045,1046,1047,1048,1049,1050,1051,1052,1053,1054,1055,1056,1057,1058,1059,1060,1061,1062,1063,1064,1065,1066,1067,1068,1069,1070,1071,1072,1073,1074,1075,1076,1077,1078,1079,1080,1081,1082,1083,1084,1085,1086,1087,1088,1089,1090,1091,1092,1093,1094,1095,1096,1097,1098,1099,1100,1101,1102,1103,1104,1105,1106,1107,1108,1109,1110,1111,1112,1113,1114,1115,1116,1117,1118,1119,1120,1121,1122,1123,1124,1125,1126,1127,1128,1129,1130,1131,1132,1133,1134,1135,1136,1137,1138,1139,1140,1141,1142,1143,1144,1145,1146,1147,1148,1149,1150,1151,1152,1153,1154,1155,1156,1157,1158,1159,1160,1161,1162,1163,1164,1165,1166,1167,1168,1169,1170,1171,1172,1173,1174,1175,1176,1177,1178,1179,1180,1181,1182,1183,1184,1185,1186,1187,1188,1189,1190,1191,1192,1193,1194,1195,1196,1197,1198,1199,1200,1201,1202,1203,1204,1205,1206,1207,1208,1209,1210,1211,1212,1213,1214,1215,1216,1217,1218,1219,1220,1221,1222,1223,1224,1225,1226,1227,1228,1229,1230,1231,1232,1233,1234,1235,1236,1237,1238,1239,1240,1241,1242,1243,1244,1245,1246,1247,1248,1249,1250,1251,1252,1253,1254,1255,1256,1257,1258,1259,1260,1261,1262,1263,1264,1265,1266,1267,1268,1269,1270,1271,1272,1273,1274,1275,1276,1277,1278,1279,1280,1281,1282,1283,1284,1285,1286,1287,1288,1289,1290,1291,1292,1293,1294,1295,1296,1297,1298,1299,1300,1301,1302,1303,1304,1305,1306,1307,1308,1309,1310,1311,1312,1313,1314,1315,1316,1317,1318,1319,1320,1321,1322,1323,1324,1325,1326,1327,1328,1329,1330,1331,1332,1333,1334,1335,1336,13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