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ABSTRACT

Objective

The goal of the International Association of National Public Health Institutes (IANPHI) is to increase global public health capacity by developing and strengthening national public health institutes (NPHIs) and creating linkages among them. IANPHI is comprised of 47 NPHIs from around the world. To inform IANPHI's work and provide a baseline for measuring increases in NPHI capacity over time, we conducted a survey of IANPHI members and analyzed publicly available information about their countries.

Methods

A written survey, based on concepts described in the NPHI Framework released by IANPHI in 2007, was distributed to Directors of NPHIs that are members of IANPHI. Survey questions addressed NPHI infrastructure and activities. Questions about activities were structured to correspond to the NPHI Core Functions (*CF*s) described in the Framework. Information from the survey was supplemented by information from the World Bank and World Health Organization about IANPHI member countries.

Results

Thirty of 47 IANPHI members (64%) completed the questionnaire. Over half of respondents were from high-income countries, and nearly half were from Europe. Respondents varied greatly in resources, with full-time-equivalent positions ranging from 23 to 15,000 and budgets ranging from $32,920 to $8,500,000,000. Respondents most commonly reported substantial activities in *CF 1* (evaluation and analysis of health status), *CF 2* (surveillance, problem investigation, and control of risks and threats to health), and *CF 10* (research). However, finer evaluation of the data illustrates that, within each Core Function, the scope and kinds of activities undertaken by NPHIs vary greatly. For example, 26 of 30 respondents (87%) reported conducting substantial amounts of surveillance, which is one of the four components of *CF 2*. Ten of these conduct surveillance for infectious diseases only, and four conduct surveillance for non-communicable conditions only. Of the 16 NPHIs that have substantial activities in non-communicable condition surveillance, only one NPHI conducts surveillance for all seven exposures and conditions queried about in the survey, and well less than half of NPHIs conduct surveillance for such important causes of death and morbidity as chronic diseases and injury. Based on the survey data, the economic ranking of an NPHI's country does not have an obvious relationship to the areas in which the NPHI has capacity.

Conclusions

The NPHIs of the world vary greatly in resources and functions. Given the heterogeneity of NPHIs, developing programs, materials, and supports that are specific enough to be useful and flexible enough to be relevant will be an ongoing challenge for IANPHI.

BACKGROUND

National public health institutes (NPHIs) are critical parts of the world's public health infrastructure. The goal of the International Association of National Public Health Institutes (IANPHI) is to increase global public health capacity by developing and strengthening NPHIs and creating linkages among them. To characterize existing NPHIs and measure changes in capacity over time, IANPHI conducts annual surveys of members. For purposes of this and previous reports, an NPHI is defined as an IANPHI member.

An initial survey conducted in 2006 demonstrated that NPHIs vary markedly and that countries have used many approaches to develop functioning public health networks or agencies. The 2007 survey was designed to be consistent with the NPHI Framework released in 2007,[1] including requesting data related to the NPHI Core Functions (*CF*s) described in the Framework. This report describes the findings of the 2007 survey.

METHODS

The 2007 survey was distributed in March 2007 by email to all IANPHI members and was also made available during the 2nd Annual IANPHI Meeting in April 2007. Twenty-three responses were received by email and seven additional responses were collected at the Annual Meeting.

Survey data were entered into SPSS and then exported into Excel. Data entries were checked for errors by a second individual. Country economic rankings were determined by the World Bank list of economies.[2] World Health Organization (WHO) regions were determined by the WHO global burden of disease regional classification system.[3] Country population data were from 2006 and came from the World Development Indicators database.[4]

Work on immunizations, such as surveillance for immunization rates, was considered to be part of infectious disease work for purposes of reporting on *CFs 2, 3,* and *10*, which encompass surveillance, epidemiology, prevention programs, and research. For some analyses, laboratory work was divided into the categories of "microbiology" and "other." Entomology and insecticide resistance were grouped into "other."

Because of small numbers in some categories and to reduce misclassification, for purposes of analysis of the Core Functions, responses were grouped into two categories: "Limited" (comprised of the categories "None/Minimal" and "Some" on the questionnaire) and "Substantial" (comprised of the categories "A lot" and "Comprehensive"). Although most respondents answered every question, a few respondents left some responses blank. Since results are largely described in terms of the numbers of NPHIs reporting substantial activity, blanks are counted as the equivalent of a response of "None or limited" or "Some" for purposes of analysis. Unless otherwise specified, the denominator used in calculating percentages of NPHIs that have substantial activities in a Core Function or a portion of a Core Function is the 30 NPHIs that returned questionnaires.

1. Framework for the creation and development of national public health institutes. IANPHI, 2007. Available at: *http://www.ianphi.org/?action=arkisto&RYHMA=47&ID=&valittu=8*
2. World Bank list of economies. World Bank, July 2007. Available at: *http://siteresources.worldbank.org/DATASTATISTICS/Resources/CLASS.XLS*
3. Global burden of disease regional classification system. World Health Organization. Available at: *http://www.who.int/choice/demography/regions/en/index.html*
4. World Development Indicators database: Population 2006. World Bank, July 2007. Available at: *http://siteresources.worldbank.org/DATASTATISTICS/Resources/POP.pdf*

RESULTS

Respondent characteristics

Thirty of 47 IANPHI members provided survey data, for a response rate of 64%. The World Bank economic rankings of responders and non-responders are shown in **Table 1**. Slightly less than half of IANPHI members are ranked as high income by the World Bank, and 17% are low income. Responses were received from countries in all economic groups. However, consistent with the distribution of IANPHI membership, respondents tended to be from high-income countries.

Table 1. Characteristics of responding and non-responding IANPHI members, by World Bank economic ranking

Economic ranking	Respondents (%)	Non-respondents (%)	Total (% of total members)
Low income	4 (13%)	4 (24%)	8 (17%)
Lower-middle income	5 (17%)	2 (12%)	7 (15%)
Upper-middle income	4 (13%)	6 (35%)	10 (21%)
High income	17 (57%)	5 (29%)	22 (47%)
Total	**30**	**17**	**47**

Although IANPHI members come from all WHO regions, nearly 50% are from the European region. Responses were received from NPHIs in all regions, with 100% participation by the three NPHI members from the Eastern Mediterranean Region.

Table 2. Characteristics of responding and non-responding IANPHI members, by WHO region

WHO region	Respondents (%)	Non-respondents (%)	Total (%)
Africa	3 (10%)	3 (18%)	6 (13%)
Americas	5 (17%)	4 (24%)	9 (19%)
Eastern Mediterranean	3 (10%)	0 (0%)	3 (6%)
Europe	14 (47%)	8 (47%)	22 (47%)
Southeast Asia	2 (7%)	1 (6%)	3 (6%)
Western Pacific	3 (10%)	1 (6%)	4 (9%)
Total	**30**	**17**	**47**

In terms of organizational location, respondents most commonly reported being part of the Ministry of Health (43%) or being an autonomous government agency (37%). One NPHI is part of another Ministry (Ministry of Social Affairs). The remaining five NPHIs reported a variety of governmental, quasi-governmental, or other arrangements.

Two IANPHI respondents did not report budget or full-time-equivalent staff (FTE) data. Numbers of FTEs range from 23 to 15,000 (**Table 3**). Reported IANPHI member budgets ranged from $32,920 to $8.5 billion—budgets that differ by a factor of nearly 260,000. The median budget for responding NPHIs from lower-income countries was $4.17 million, and the median budget for NPHIs from high-income countries was $43.8 million, an order of magnitude difference.

Among the 25 NPHIs that reported usable data on sources of funds, a median of 68% of funds came from the government budget. The remainder derived from donations, fees-for-service, private sources, endowments, and grants and other sources. Two NPHIs were 100% federally funded. The NPHI receiving the least amount of federal funds received only 10% of its budget from the federal government, with 40% fee-for-service.

The ratio of budget to FTEs, which may bear a relationship to the amount of money available for projects (as opposed to staff and indirect costs), varied from $523 per FTE to $566,667 per FTE.

NPHIs from high-income countries and countries with larger populations tended to have bigger budgets. Overall, reporting NPHIs had a median budget of $2.14 per person living in the country.

Table 3. NPHI budgets, FTEs, budget-to-FTE ratios, population, and budget-to-population ratios, by World Bank economic ranking (only NPHIs that provided budget data are included)

Characteristic	Low income	Lower-middle income	Upper-middle income	High income	Overall
Provided data	4	4	3	17	28
Range of FTEs	63–576	110–400	205–4,457	23–15,000	23–15,000
Median number of FTEs	320	176	307	600	369
Range of NPHI budgets	$32,920–$13,000,000	$1,300,000–$5,000,000	$4,000,000–$22,296,239	$4,900,000–$8,500,000,000	$32,920–$8,500,000,000
Median NPHI budget	$4,170,000	$1,500,000	$11,744,622	$43,800,698	$15,908,926
Range of budget-to-FTE ratios	$523–$22,569	$3,750–$45,455	$5,003–$38,256	$30,646–$566,667	$523–$566,667
Median budget-to-FTE ratio	$9,231	$8,608	$19,512	$145,333	$69,749
Range of populations (thousands)	39,459–159,002	30,497–223,042	3,284–104,221	299–298,988	299–298,988
Range of budget-to-thousand population ratio	Approximately 0–$155	$19–$49	$214–$1,218	$171–$30,292	Approximately 0–$30,292
Median budget-to-thousand population ratios	$152	$23	$248	$9,274	$2,137

Most NPHIs reported having telephone, internet, electrical, and water service over 95% of the time. Six NPHIs (20%) reported that less than 80% of their staff have computers at their desk; these same NPHIs reported that less than 80% of staff have internet access at their desks. Three of these are from low-income countries, two are from lower-middle income countries, and one is from an upper-middle income country. Budget data were available for five of the six. These NPHIs have among the lowest budgets, representing the NPHIs with five of the nine lowest budgets in the survey, and the lowest dollar-to-FTE ratios, representing the NPHIs with five of the eight lowest ratios in the survey.

Core functions

Overview

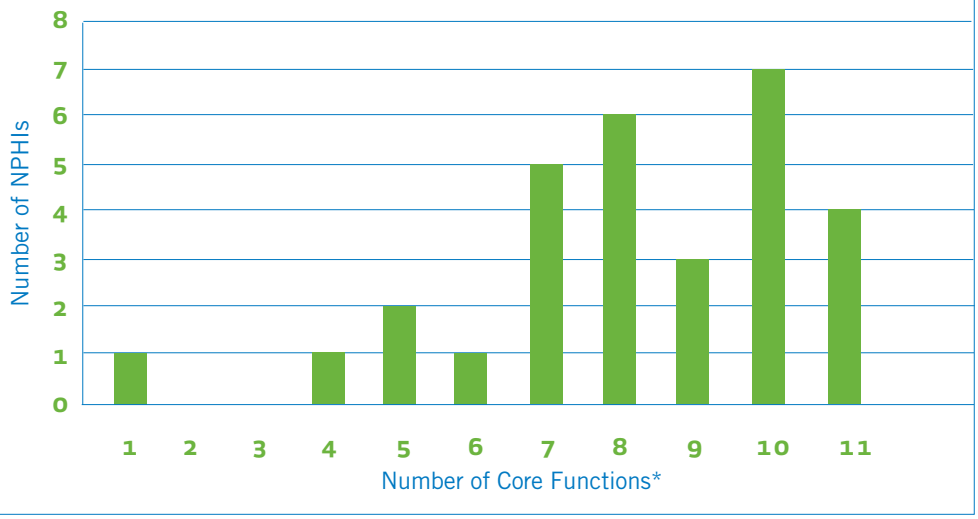
Table 4 provides data on the number of NPHIs reporting substantial activities in at least one aspect of each of the Core Functions. Over half the NPHIs have substantial activity in some aspect of each of the Core Functions except for *CF 7*, ensuring equitable access to health care. NPHIs are most likely to have substantial capacity in the Core Functions related to evaluation and analysis of health status (*CF 1*); surveillance, problem investigation, and control of risks and threats to health (*CF 2*); and research (*CF 10*), and least likely to have substantial capacity in the those related to health care (*CFs 7* and *9*) and regulation (*CF 6*).

Table 4. Number and percentage of NPHIs reporting substantial activities, by Core Function (CF)

CF	Issues covered by CF	Number (% of respondents to that question) reporting substantial activities
CF 1	Evaluation and analysis of health status	26 (87%)
CF 2	Surveillance, problem investigation, and control of risks and threats to health	29 (97%)
CF 3	Health promotion and prevention programs	25 (83%)
CF 4	Social participation and citizen empowerment	21 (70%)
CF 5	Planning and management	24 (80%)
CF 6	Regulation and enforcement	18 (60%)
CF 7	Equitable access to necessary health services	14 (47%)
CF 8	Human resources development and training	21 (70%)
CF 9	Quality assurance in health services	17 (57%)
CF 10	Research	27 (90%)
CF 11	Reducing the impact of disasters	21 (70%)

Four NPHI respondents reported substantial capacity in at least one aspect of all 11 Core Functions, and 20 respondents (67%) reported substantial capacity in eight or more (**Chart**). One NPHI reported substantial capacity for only one Core Function (*CF 10*, which focuses on research). NPHIs with limited capacity in the Core Functions were not necessarily in lower-income countries. Of the 10 NPHIs that did not report substantial capacity in at least eight Core Functions, four are in high-income countries, four are in lower- or upper-middle income countries, and two are in low-income countries.

Chart. Number of Core Functions for which NPHIs reported substantial activity



* An NPHI was defined as having "substantial activity" in a Core Function if it reported substantial activity in at least one aspect of that Core Function.

Individual Core Functions

Consolidation of the responses to questions about the many aspects of some of the Core Functions, as was done to create **Table 4**, obscures important differences among NPHIs. Within each Core Function, the scope and kinds of activities undertaken by NPHIs vary greatly.

CF 1: Evaluation and analysis of health status

CF 1 includes evaluation and analysis of population health status, risk factors for disease and injury, and health status of groups of special interest. Twenty-six respondents (87%) reported substantial efforts in at least one of the three aspects of *CF 1*. Eighty-one percent of those with substantial efforts in at least one aspect had substantial activities in all three.

CF 2: Surveillance, problem investigation, and control of risks and threats to health

This section of the survey included questions on surveillance, epidemiology, laboratory capacity, and assistance during outbreaks. All but one NPHI (97%) reported substantial amounts of activity in at least one of the four aspects of *CF 2*. Sixty-seven percent reported substantial amounts of activity in all four aspects.

Eighty-seven percent of NPHIs conduct substantial amounts of surveillance for at least one condition. More NPHIs conduct substantial surveillance for infectious disease-related issues (73%) than for non-communicable conditions (53%). Four NPHIs, all in the European region, conduct substantial non-communicable disease surveillance but not infectious disease surveillance, and ten NPHIs conduct infectious disease surveillance but not non-communicable. Four NPHIs report that they do not conduct substantial amounts of surveillance of any kind. Two of these are in high-income countries.

Information about numbers of NPHIs conducting surveillance for specific conditions is included in **Table 5**. Although 16 NPHIs (53%) report conducting surveillance for at least one non-communicable condition, only one NPHI conducts surveillance for all of the conditions queried. Although non-communicable condition surveillance is most often conducted for nutritional status, tobacco use, and chronic diseases, the percentage of NPHIs that conduct surveillance for each of these was less than 50%. Surveillance for injuries and for occupational health is even less common among NPHIs.

Eighty-seven percent of NPHIs conduct substantial amounts of epidemiologic investigations for at least one condition. More respondent NPHIs conduct substantial epidemiologic work for infectious disease-related issues (80%) than for non-communicable conditions (60%). Two NPHIs, both in the European region, conduct substantial non-communicable disease epidemiologic investigations but not infectious disease investigations, and eight NPHIs conduct infectious disease epidemiologic investigations but not non-communicable disease investigations. Three of the four NPHIs that have limited capacity to conduct epidemiologic investigations are in high-income countries. Information about numbers of NPHIs conducting epidemiologic investigations for specific conditions is included in **Table 5**.

Table 5. Number and percentage of NPHIs reporting substantial surveillance or epidemiologic investigations for various conditions

Condition	Number (%) with substantial activities in surveillance	Number (%) with substantial activities in epidemiologic investigations
Any infectious disease	22 (73%)	24 (80%)
HIV/AIDS	21 (70%)	Not asked
Malaria	15 (50%)	Not asked
Tuberculosis	16 (53%)	Not asked
Immunizations	16 (53%)	17 (57%)
Any non-communicable condition	16 (53%)	18 (60%)
Nutritional status	12 (40%)	9 (30%)
Tobacco use	11 (37%)	8 (27%)
Chronic diseases	11 (37%)	11 (37%)
Maternal and child health	10 (33%)	10 (33%)
Injuries	7 (23%)	8 (27%)
Mental health	5 (17%)	6 (20%)
Occupational health	2 (7%)	6 (20%)

All NPHIs with substantial laboratory capacity (77%) have substantial capacity in microbiology. Sixty-seven percent of NPHIs report substantial capacity in testing for exposure to environmental chemicals, nutritional status, pharmaceuticals, or other areas (see **Table 6**).

Table 6. Number and percentage of NPHIs reporting substantial laboratory capacity, by type of testing

Type of laboratory capacity	Number (%) of NPHIs
Microbiologic	23 (77%)
Exposure to environmental chemicals	14 (47%)
Nutritional status	8 (27%)
Pharmaceuticals	7 (23%)

Both microbiologic and other laboratory capacities are distributed among NPHIs from countries in all economic rankings (**Table 7**). Over half the NPHIs without substantial laboratory capacity are in high-income countries.

Table 7. Laboratory capacity, by World Bank economic ranking

Economic ranking	Microbiologic capacity	Other laboratory capacity	No reported capacity
Low income (n=4)	3	2	1
Lower-middle income (n=5)	4	4	1
Upper-middle income (n=4)	3	3	1
High income (n=17)	13	11	4
Total	**23**	**20**	**7**

Eighty percent of NPHIs provide substantial assistance during outbreaks. Two NPHIs provide substantial epidemiologic but not laboratory assistance. No country provides substantial laboratory assistance without also providing substantial epidemiologic help.

Several NPHIs have capacity in one aspect of *CF 2* but not another. **Table 8** illustrates patterns of overlap among the different aspects of *CF 2*. NPHIs with substantial capacity in infectious disease-related surveillance tend to have capacity in infectious disease epidemiology and microbiologic laboratories. They also tend to provide substantial amounts of epidemiologic assistance, and laboratory assistance if they have laboratories, during outbreaks.

Table 8. Number of NPHIs reporting substantial capacity in areas covered by questions about *CF 2*

CF 2 area (number of NPHIs reporting substantial capacity)	Infectious disease surveillance (n=22)	Non-communicable condition surveillance (n=16)	Infectious disease epidemiologic investigations (n=24)	Non-communicable condition epidemiologic investigations (n=18)	Microbiology laboratories (n=23)	Other laboratories (n=20)	Epidemiologic assistance in outbreaks (n=24)	Laboratory assistance in outbreaks (n=22)
Infectious disease surveillance (n=22)		12	21	13	20	17	21	19
Non-communicable condition surveillance (n=16)	12		11	12	10	10	12	10
Infectious disease epidemiology (n=24)	21	11		16	23	20	23	21
Non-communicable condition epidemiology (n=18)	13	12	16		15	10	16	14
Microbiology laboratories (n=23)	20	10	23	10		20	22	21
Other laboratories (n=20)	17	10	20	15	20		19	18
Epidemiologic assistance in outbreaks (n=24)	21	12	23	16	23	19		22
Laboratory assistance in outbreaks (n=22)	19	10	21	14	21	18	22	

Countries that conduct epidemiologic investigations for a condition are likely to conduct surveillance as well (**Table 8**). Twenty-one of the 24 NPHIs that conduct substantial infectious disease-related epidemiologic investigations also conduct substantial surveillance related to infectious diseases. Similarly, 12 of 18 NPHIs conducting substantial epidemiology for at least one non-communicable condition also reported conducting substantial surveillance for non-communicable conditions.

Twenty of 22 (91%) NPHIs conducting substantial infectious disease surveillance and 23 of 24 NPHIs conducting infectious disease epidemiologic investigations (96%) have substantial microbiologic laboratory capacity (**Table 8**). Twenty-three NPHIs with substantial capacity for epidemiologic investigations of infectious diseases (96%) provide epidemiologic assistance and 21 of 23 NPHIs with microbiologic laboratory capacity (91%) provide laboratory assistance in outbreaks.

CF 3: Health promotion and prevention programs

Twenty-five NPHIs (83%) conduct substantial health promotion and prevention programs. Almost the same number of NPHIs conduct health promotion and prevention programs for infectious conditions as for non-communicable conditions (**Table 9**); however, seven NPHIs conduct programs only for infectious disease-related issues and six NPHIs conduct programs only for non-communicable conditions. Four of the six NPHIs with only non-communicable condition programs are in Europe, and four of the six are in high-income countries. NPHIs conducting only infectious disease programs are from many regions. Only one NPHI reported substantial programs in all of the categories queried.

Table 9. Number and percentage of NPHIs reporting substantial health promotion and prevention programs, by condition addressed

Condition addressed	Number (%) of NPHIs
Infectious diseases	19 (63%)
Immunizations	15 (50%)
Non-communicable conditions	18 (60%)
Nutritional status	11 (37%)
Tobacco use	10 (33%)
Chronic diseases	10 (33%)
Maternal and child health	11 (37%)
Injuries	5 (17%)
Mental health	3 (10%)
Occupational health	5 (17%)

CF 4: Social participation and citizen empowerment

Seventy percent of NPHIs reported substantial efforts to provide information or other resources to individuals and communities or provide technical assistance to community-based organizations.

CF 5: Planning and management

Twenty-four of the respondents (80%) have substantial strategic planning efforts, including all but one of the 14 NPHIs that consider themselves to be part of the Ministry of Health or another Ministry (**Table 10**). Of the 24 NPHIs with planning efforts, all but two reported links between their plans and those of the Ministry or other government agency. Neither of these two NPHIs is a part of a Ministry.

Table 10. Strategic planning among NPHIs, by organizational placement of the NPHI

Organizational placement	Number of NPHIs	Number (%) that conduct substantial strategic planning	Number (% of those conducting planning) that link plans to those of the Ministry
Part of a Ministry	14	13 (93%)	13 (100%)
Autonomous government agency	11	8 (73%)	7 (88%)
Non-government or other	5	3 (60%)	2 (67%)
Total	**30**	**24 (80%)**	**22 (92%)**

CF 6: Regulation and enforcement
Although 60% of NPHIs report substantial activity in regulation or enforcement, most of these have activity in only one or two areas. Eight will have substantial powers during public health emergencies, six in water quality, six with illicit substances, and lesser numbers for testing of pharmaceuticals or nutritional status.

CF 7: Evaluation and promotion of equitable access to necessary health services and *CF 9: Quality assurance in personal and population-based health services*
Seventy-three percent of NPHIs have substantial activities in the healthcare-related Core Functions, with 47% reporting substantial activities related to *CF 7* and 57% reporting activities related to *CF 9*. Twelve NPHIs (40%) do both, and nine (30%) do not have substantial activities in either.

CF 8: Human resources development and training
Seventy percent of NPHIs have substantial activities in human resources development and training. Eighteen NPHIs (60%) have substantial activities related to evaluating the capacity of or filling the gaps in the country's public health workforce, and 18 (15 of those that have substantial activities related to the country's public health workforce) have substantial efforts to train workers in the NPHI.

Twelve NPHIs (40%) offer training leading to graduate degrees (**Table 11**). Ten NPHIs offer masters and ten offer doctoral degrees.

Table 11. Number of NPHIs offering graduate degrees, by World Bank economic ranking and WHO region

NPHI country characteristics	Ph.D. only (n=2)	Masters only (n=2)	Both Ph.D. and Masters (n=8)	Any graduate degree (n=12)
Economic ranking				
Low income	0	1	1	2
Lower-middle	0	0	2	2
Upper-middle	0	0	2	2
High income	2	1	3	6
Region				
Africa	0	0	1	1
Americas	0	0	2	2
Eastern Mediterranean	0	1	1	2
Europe	2	1	1	4
Southeast Asia	0	0	1	1
Western Pacific	0	0	2	2

CF10: Research

Almost all NPHIs (90%) conduct substantial research related to at least one of the conditions identified in the survey. (See **Table 12** for a list of conditions addressed in the survey and the number and percentage reporting substantial activities in each.) Equal percentages (77%) conduct research on infectious disease-related and non-communicable conditions. Four NPHIs (one from a low-income and three from lower- or upper-middle income countries) conduct substantial amounts of research for infectious disease-related conditions but not non-communicable conditions. Four NPHIs, three of which are from high-income countries, conduct substantial amounts of non-communicable condition research but not research on infectious disease-related issues.

Table 12. Number and percentage of NPHIs reporting substantial health research activities, by condition addressed

Condition addressed	Number (%) of NPHIs
Infectious diseases	23 (77%)
Immunizations	16 (53%)
Non-communicable conditions	23 (77%)
Nutrition	14 (47%)
Tobacco use	12 (40%)
Chronic diseases	16 (53%)
Maternal and child health	15 (50%)
Injuries	8 (27%)
Mental health	8 (27%)
Occupational health	7 (23%)

Only three NPHIs conduct substantial amounts of research related to all of the conditions listed in the survey. These NPHIs are from three different economic rankings. The distribution of numbers of conditions for which NPHIs conduct research is described in **Table 13**. Although no lower-income country conducts research on more than three conditions, many NPHIs from high-income countries conduct research on only a limited number of conditions, and two do not have any substantial research activities.

Table 13. Number of conditions for which NPHIs are conducting substantial amounts of research, by World Bank economic ranking

Number of conditions	Low income	Lower-middle income	Upper-middle income	High income	Total
0	1	0	0	2	3
1–3	3	3	4	4	14
4–6	0	1	1	4	6
7–9	0	2	1	4	7

CF11: Reducing the impact of disasters

Seventy percent of NPHIs have been involved substantially with emergency planning or response. Sixty percent of NPHIs report that they have already been involved in responding to a major disaster.

CFs highlighted in the Framework: CFs 1, 2, and 10

The 2007 NPHI Framework highlighted three Core Functions (*CFs 1, 2*, and *10*) that stand out as those for which the NPHI will often be in the lead for the country and will be the major national repository of infrastructure and expertise. Twenty-four NPHIs report substantial capacity in at least one aspect of each of these three Core Functions, five report substantial capacity in two Core Functions, and one reports that it does not have substantial capacity in any. The five NPHIs with substantial activities in two of the three highlighted Core Functions all have substantial activities in *CF 2*. Two have limited research activities (*CF 10*), and three have limited activities in evaluation of health status (*CF 1*).

DISCUSSION

This survey provides a snapshot of the characteristics and capacities of responding IANPHI members. Although we would have preferred a higher response rate, respondents came from all regions of the world and all economic strata, suggesting that our data are somewhat representative. Future surveys should endeavor to obtain response rates closer to 100%.

Although nearly 50% of members are from high-income countries and nearly 50% of members are from Europe, the economic and geographic distribution of countries represented in IANPHI reflects increased diversity since IANPHI's founding in 2006, when 56% of members were from high-income countries and an identical percentage were from Europe. New members since 2006 include three NPHIs from lower-, four from upper-middle, and one from a high-income country. Three of the new members are from Africa, three from Europe, one from the Americas, and one from Southeast Asia. Continued efforts to recruit members from lower-income countries are essential for achieving IANPHI's goals.

The range in NPHI budgets and amount of money available per FTE (a rough gauge of how much money can be spent on non-salary and overhead costs) is remarkable—varying by a factor of almost 260,000 between the budget of the most- and least-resourced NPHIs. Countries that have very low ratios of dollars to FTEs are unlikely to be able to mount significant programs without additional support, even if they have low wage structures. The five countries with less than 80% of staff having desktop access to computers and the internet are among the NPHIs with the smallest budget-to-FTE ratios. This reinforces the need to help NPHIs with lower resources to garner additional funds.

From the first days of IANPHI, the question of how to define an NPHI and which capacities are most critical for NPHIs has been the subject of debate among IANPHI's members. The data from this survey are consistent with the perspective that IANPHI members are very diverse and that it will not be easy to develop a single definition for an NPHI that takes into account the varied infrastructure, capacities, and activities of IANPHI members.

The debate over the definition of an NPHI informed the development of the Framework as well. The Core Functions that form much of the basis for the Framework, and therefore for the survey, are derived from the Essential Public Health Functions (EPHFs) that have been in use for decades. Debate during the development of the Framework centered around whether the EPHFs, which describe capacities in a country's public health system as a whole, were appropriate to use as a basis for describing capacity of a component of the national public health system (that is, an NPHI), and whether some EPHFs and the Core Functions that derive from them did not apply to NPHIs (for example, those related to health care). Evaluation of the survey data suggests that the Core Functions are a useful way to organize descriptions of NPHI activities and capacities, as at least 50% of NPHIs have substantial work in each of the Core Functions. NPHIs are most likely to have substantial capacity in assessment and evaluation of health status (*CF 1*), surveillance, problem investigation, and control of risks and threats to health (*CF 2*) and research (*CF 10*), and are least likely to have substantial capacity in the Core Functions related to health care (*CFs 7* and *9*) and regulation (*CF 6*).

The 2007 NPHI Framework highlighted three Core Functions (*CFs 1, 2*, and *10*) that stand out as those for which the NPHI will often be in the lead for the country and will be the major national repository of infrastructure and expertise. All but one NPHI address at least one aspect of *CF 2*, and 87% or more of respondents had substantial capacity in at least one aspect of each of the other two highlighted Core Functions. This suggests that most countries see these as priorities for NPHIs.

Nevertheless, the consolidation of the responses to questions about the many aspects of some of the Core Functions, as was done to create **Table 4**, obscures important differences among NPHIs. Within each Core Function, the scope and kinds of activities undertaken by NPHIs vary greatly. For example, all but one NPHI have substantial capacity in *CF 2,* but the areas in which they have strengths differ. Some NPHIs carry out activities for infectious diseases, whereas others focus only on non-communicable conditions. Four NPHIs, all in Europe, conduct surveillance for non-communicable conditions but not infectious disease-related issues, whereas ten NPHIs conduct surveillance for infectious disease-related issues but not non-communicable. Two NPHIs have substantial laboratory capacity but do not conduct surveillance, and six NPHIs conduct surveillance but do not have substantial laboratory capacity.

The diversity in NPHIs cannot be fully explained by differences in economic rankings or regions of the world in which the NPHIs reside. For example, some NPHIs in high-income countries carry out only a limited number of Core Functions, whereas some NPHIs from countries with lesser resources have substantial activities in many Core Functions and in both infectious and non-communicable conditions. There are several probable contributors to this difference. One is that NPHI resources vary even among NPHIs with the same country economic ranking. Another is that NPHIs could have different thresholds for reporting substantial activity levels. A third is that responsibility for Core Functions in some countries may be divided among several agencies; although the country may be addressing all of the Core Functions in a substantial way, many may not be part of the mandate of the country's IANPHI member. This is supported by the finding that some NPHIs in high-income countries have limited capacity to conduct critical functions such as infectious disease surveillance. In these countries, it is more likely that another agency conducts

infectious disease surveillance than that such surveillance is not occurring. In addition, some NPHIs wrote on their survey forms that particular aspects of some of the Core Functions were the domain of other agencies.

This latter factor—that the responsibilities for the most critical Core Functions do not always reside in a single agency—has important implications for IANPHI programs. Rather than focusing on identifying an individual NPHI in each country to participate in IANPHI activities, IANPHI might want to consider identifying the agency or, if appropriate, agencies in each country that are responsible for the most critical Core Functions (currently defined as *CFs 1, 2,* and *10*) as IANPHI partners or members. Similarly, in its programmatic work in support of countries that are developing NPHIs, IANPHI might consider defining target organizations according to those most likely to perform essential NPHI functions, even if it means assisting more than one agency or focusing on linkages among organizations instead of on the capacity of a single organization.

Despite its limitations, this survey contributes important information about NPHIs. There are many successful models for the organization of public health systems in countries and the definition of the role of the NPHI. The diversity of NPHIs, even among economic rankings and WHO region strata, is consistent with the concept that NPHIs develop in particular ways that are determined by a multitude of factors, including the needs of the population, historical and cultural considerations, the political climate, and the other public health resources in the country. It can be inferred from these data that there is not a single model for NPHI development or for which activities become NPHI priorities. Developing programs, materials, and supports that are specific enough to be useful and flexible enough to be relevant will be an ongoing challenge for IANPHI.

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