

## Empowering Canada's workforce for the digital transformation of public health: Recommendations for digital competencies, curricular and training updates.

A final report of from the "Fostering Workforce Capacity to maximize opportunities for the digital transformation of public health in Canada" grant.

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## **Executive summary**

To keep pace with the digital transformation of Canadian society and public health services, public health professionals need new digital skills. Our study used a three-phase approach to identify digital competencies, recommend updates to curricula and training, and explore how to design transdisciplinary programs that prepare public health professionals for real-world challenges.

This report summarizes our findings and provides practical recommendations for public health educators and decision-makers to consider in their own settings.

#### What do we recommend?

#### For digital competencies,

1. Integrate digital competencies into public health and other relevant competency frameworks.

#### Regarding curricular updates,

- 2. Adopt a tiered approach to integrate digital competencies across Canadian public health curricula, using a public health-first lens to enhance basic digital public health (DPH) competencies.
- 3. Beyond basic DPH competencies, offer pathways for specialized DPH for interested Canadian public health professionals.
- 4. Strengthen the public health workforce by beginning with basic digital literacy a foundational yet often overlooked digital competency.

#### On training programs,

- 5. Expand training programs to cover broader digital competencies beyond specialized competencies for public health data science and informatics.
- 6. Build Transdisciplinary DPH training programs with the goal of creating T-shaped professionals who can thrive in contemporary practice.
- Integrate applied training in real-world settings to strengthen digital competencies that public health professionals can translate into public health practice.
- 8. Anticipate and address challenges with implement transdisciplinary DPH training programs through a principles-guided approach to partnership building.

## Why did we do this study?

The public health workforce today faces both opportunities and challenges brought about by the digital transformation of society and public health services.<sup>1,2</sup> This digital transformation was greatly accelerated during the COVID-19 pandemic.<sup>3,4</sup> On the positive side, tools like real-time disease surveillance and reporting have enhanced how quickly we can respond to public health threats.<sup>3,5</sup> However, challenges like the spread of misinformation and disinformation on social media have fueled issues such as vaccine hesitancy.<sup>2,6</sup> Addressing these problems requires new skills and training to ensure public health professionals can continue promoting health and well-being for everyone.<sup>7</sup>

This study builds on our earlier research, which emphasized strengthening workforce capacity as a key strategy for advancing the emerging field of digital public health (DPH).<sup>2,7</sup> DPH involves using digital technology to enhance public health services in ways that prioritize the needs of people and communities, while addressing the modern challenges associated with the widespread adoption of digital tools.<sup>1,8</sup> As these challenges grow more complex, the public health workforce will increasingly need to collaborate across disciplines.<sup>7,9</sup> In her 2021 report, Canada's Chief Public Health Officer emphasized the importance of updating workforce competencies to effectively leverage medical and digital health technologies—key building blocks in transforming Canada's public health systems.<sup>5</sup>

In this study, we partnered with academic leaders from the University of British Columbia's School of Population and Public Health, University of Victoria's School of Public Health and Social Policy, and University of Toronto's Dalla Lana School of Public Health. Our goal was to develop recommendations for updating digital competencies, curricula, and training programs. These updates are intended to help academic directors and public health leaders upskill the current workforce while also preparing the next generation of public health professionals for the realities of the digital age. Additionally, we aimed to develop practical guidance on building the partnerships needed to successfully implement these recommendations.

# How did we develop these recommendations?

We used a well-known method called Thomas' six-step approach, which helps design training programs that are practical, sustainable, and based on the real-world experiences of those who will use them.<sup>10</sup> We focused on the first two steps of this approach to guide our three-phase study aimed at improving digital public health training (Figure 1).

*Step 1: Problem Identification and General Needs Assessment –* In the first step to understand what digital competencies and training approaches are recommended, we conducted two sub-studies:

- 1. A rapid literature review: to identify, consolidate and map current digital competency recommendations to the Core Competencies for Public Health in Canada.<sup>11,12</sup>
- 2. An environmental scan of digital public health training programs and courses: to map DPH training programs and courses, identifying common curricular content, training approaches and characteristics of inter- and transdisciplinary partnerships necessary for such programs and courses.<sup>13</sup>

*Step 2: Targeted Needs Assessment* – In the second step to ensure identified recommendations would be practical and relevant for Canadian public health professionals and their public health systems, we conducted a third sub-study:

3. Focus groups: we talked with Canadian public health professionals to understand their views on digital competencies and how these recommendations could be adapted to their experiences and priorities.





Finally, we refined our recommendations for updating digital competencies, curricula, and training programs based on feedback from public health practitioners in focus groups.

## What do we recommend?

#### On the digital competencies,

1. Integrate digital competencies into public health and other relevant competency frameworks: Based on the literature, we developed 45 distinct digital competency recommendations that spanned all seven categories of the 2007 Core Competencies for Public Health in Canada (Figure 2).<sup>11,15</sup> We also identified a new competency category focused on digital data, data systems management and governance. While not exhaustive and primarily informed by public health informatics literature, these recommendations fall into three broad categories.<sup>11</sup> First, there are general public health competencies that intersect with digital technologies, such as the ability to integrate and analyze multiple data sources to address public health challenges and the capacity to tailor health messaging through trusted community platforms, including social media.<sup>11,13</sup> Second, specialized digital competencies focus on the development and ethical application of modern data analytics, enabling public health professionals to work with large datasets and emerging technologies while upholding ethical and privacy standards.<sup>11</sup> Finally, basic digital literacy competencies emphasize the everyday use of digital tools, ensuring that professionals can effectively communicate and present information using modern software and digital platforms.<sup>11</sup> To maximize impact, these competencies should be tiered based on the anticipated roles of public health practitioners (Appendix 1).<sup>13,14</sup>

## Public health sciences

 Develop and ethically apply research methods including data science, statistical genetics and omic technologies (i.e., exposomes), computational biology, epidemic and infectious disease modelling to public health problems.

## Communication

 Use mass media, electronic technology, and communication methods (e.g., social media) for public health communication, health education and promotion.

## Partnerships, collaboration and advocacy

- Use new media to conduct advocacy e.g., social media.
- Manage Information technology (IT) operations related to project or program and those managed by external organizations.

## Data, data systems management & governance

- Apply policies and security protocols to protect confidential information in electronic files and computer systems while maximizing the benefits to public health.
- Develop public health information systems that are interoperable with other relevant information systems.

We identified a		
preliminary list of	-	-
competency statements		
within the 12 included	-	
articles from the rapid		
review and provide		-
examples here.		

 Use, protect and interpret complex, linked large data sets from multiple sources from administrative, clinical, biologic, environmental, population to social/societal levels, within and outside the health systems.

## Policy and program planning, implementation and evaluation

 Design, implement and evaluate population-based projects, programs or interventions that use social media as a communication platform and a tool for public health education and promotion.

## Leadership

 Support development of strategic directions for public health informatics within the enterprise.

## Diversity and inclusiveness

 Develop team approaches that bring together diverse disciplines and organizations to develop new and creative ways of designing and implementing studies and addressing public health concerns.

Figure 2: A selection of digital competency statements mapped to the 2007 Core Competencies for Public Health in Canada

#### Regarding curricular updates,

- 2. Adopt a tiered approach to integrate digital competencies across Canadian public health curricula, using a public health-first lens to enhance basic DPH competencies: Evidence supports a tiered approach to integrating basic digital public health (DPH) competencies across public health curricula, ensuring practitioners develop a practical understanding of relevant digital technologies for their level of practice.<sup>14</sup> By prioritizing a public health-first lens, this integration ensures that professionals not only develop digital competencies but also understand the public health implications of emerging technologies and their impact on diverse populations. Similar guidelines from the Association of Schools of Public Health in the European Region suggest that this integrated approach helps reduce siloed public health practice.<sup>16</sup> To mitigate curricular overload and duplicating content, consider focusing on core public health skills while strategically integrating digital competencies into existing content and collaborating across existing departments through cross-listed courses.
- 3. Beyond basic DPH competencies, offer pathways for specialized DPH for interested Canadian public health professionals: For public health professionals interested in specialised DPH roles, public health curricula should offer specialized training tracks in areas such as AI-driven data analytics, public health informatics focused on the emerging competency category and other competencies like communication, infodemic management, and human-centered design.<sup>14</sup> While global programs have adapted their curricula to offer these tracks, they are only slowly gaining ground in Canada. Given the need for DPH specialists as central resources in public health organizations, training should emphasize lifelong learning and adaptability to keep pace with emerging technologies. In addition to integrating these advanced competencies into the curricula for degree programs, specialized pathways may be more effectively offered through certifications, micro-credentials, continuing education and professional development initiatives, particularly for midcareer professionals. Demonstrating how these competencies support diverse career paths can drive adoption and help ensure that Canada's public health workforce is equipped to lead digital transformation.
- 4. Strengthen the public health workforce by beginning with basic digital literacy a foundational yet often overlooked digital competency: Wide variability in digital literacy across the public health workforce can hinder effective use of digital tools essential for everyday practice.<sup>14</sup> To bridge this gap, educators can develop short courses, workshops, or micro-credentialing programs that focus on practical, job-specific digital skills relevant to public health professionals at all levels.<sup>14</sup> These flexible learning opportunities can help practitioners effectively use existing digital tools, improving work efficiency and ensuring that digital transformation efforts benefit the entire workforce, not just those with advanced technical skills.

#### On training programs,

5. Expand training programs to cover broader digital competencies beyond specialized competencies for public health data science and informatics: Globally, 70% of identified digital public health (DPH) programs and courses are based in North America, yet only six programs exist in Canada (Figure 3).<sup>13</sup> This limited representation underscores a gap in locally available training opportunities to equip Canada's public health workforce with essential digital competencies.<sup>13</sup>



Figure 3: Geographic distribution of identified programs and course

Currently, 78% of these programs focus on digital data management and governance competencies.<sup>13</sup> Specifically, 50% (29 programs) emphasize public health data science, while 28% (16 programs) focus on public health informatics (Figure 4). However, 28% (13 programs) take a broader approach, covering various digital competencies like digital transformation leadership, project management, communication, design and implementation, and the ability to address digital determinants of health.<sup>13</sup> Expanding DPH training in this direction to move beyond narrow technical skills toward a holistic, practice-oriented approach better prepares public health professionals for the complex challenges of the digital era.<sup>13,14</sup> Given variability in institutional capacity, an open-access and flexible delivery models of digital competency training can support a more equitable implementation across educational settings.



Figure 4: Description of identified programs and courses

6. Build Transdisciplinary DPH training programs with the goal of creating T-shaped professionals who can thrive in contemporary practice: Interviews with transdisciplinary DPH program directors highlight growing demand for graduates with broad digital knowledge and deep disciplinary expertise – a T-shaped professional. (Figure 5).<sup>13,14</sup> While this model is not new to public health training, its importance is heightened in the digital era, where collaboration across disciplines is essential. Training programs adopting this approach can prepare practitioners to work in transdisciplinary teams, tackling complex DPH challenges. To enhance real-world readiness, programs should strengthen transdisciplinary partnerships between the public and private sectors and clearly define graduate roles and skills.<sup>13</sup> Applied training, such as team-based cases, helps students develop problem-solving skills for diverse, collaborative public health settings.<sup>13,14</sup>



## Figure 5: Depiction of a T-shaped professional

7. Integrate applied training in real-world settings to strengthen digital competencies that public health professionals can translate into public health practice: To ensure digital competencies are practical and actionable, applied training in real-world settings should be integrated into public health education.<sup>13,14</sup> Practicum placements, case-based learning, and transdisciplinary project collaborations, allow professionals to apply digital tools in real public health contexts.<sup>13,14</sup> These hands-on opportunities help bridge the gap between theoretical knowledge and practical skills, ensuring that public health professionals can confidently use digital technologies for surveillance, data analysis, health communication, and decision-making. Training institutions without infrastructure or digital systems needed inhouse to support this level of experiential learning can strengthening ties with public health agencies, technology companies, and community organizations. These partnerships can facilitate access to real-world data and digital tools and foster innovation and workforce development in public health.<sup>13</sup>

8. Anticipate and address challenges with implement transdisciplinary DPH training programs through a principles-guided approach to partnership building: Programs working in transdisciplinary digital public health face challenges such as aligning on public health principles, developing a shared vocabulary, balancing depth and breadth in curriculum design, and securing funding.<sup>13</sup> To address this, educators can start by building partnerships with a small, committed core group and expand as needed to meet program goals for T-shaped professionals.<sup>13</sup> Establishing clear partnership principles and a structured evaluation strategy can also help guide collaboration and attract further funding.<sup>13</sup>

## Conclusion

In conclusion, the findings from this study highlight the critical need to build a public health workforce that is equipped with digital skills to meet the challenges of an increasingly technology-driven world. Digital competencies are foundational to public health practice. While current training programs focus heavily on emerging areas like digital data management and governance, there is significant room to expand training to include broader, more diverse skills. This requires a tiered approach where all public health professionals gain basic digital literacy and basic DPH competencies with options for specialization to meet specific needs in areas such as data science, informatics, and other similar DPH sub-specialties. To achieve this, public health educators and organizations will need to embrace transdisciplinary approaches that bridge the gaps between fields like public health, computer science, and social sciences. These programs should be supported by realworld, applied training to ensure skills are practical and relevant. However, this effort will only succeed if Canada's public health systems evolve in tandem with these initiatives, addressing existing challenges like outdated digital infrastructure, fragmented data systems, and inconsistent adoption of digital tools.<sup>14</sup> Without system-wide improvements, even well-trained professionals may struggle to apply their digital skills effectively in practice.

To address these barriers, public health agencies, educators, and policymakers must work together to modernize digital infrastructure, integrate interoperable data systems, and create policies that support digital transformation.<sup>14</sup> Advocating for these changes ensures that training programs align with real-world public health needs, enabling a workforce that is not only skilled but also empowered to use digital tools effectively in their daily work. Together, these strategies can ensure Canada's public health workforce is prepared to harness the potential of digital technologies while upholding core values of health equity, ethics, social justice and action on the social (including digital) determinants of health.

## Interested in learning more?

For a detailed explanation of our methods and findings, please refer to each individual study at: <u>https://digitalpublichealth.med.ubc.ca/projects/core-</u> <u>competencies-and-training-2023/</u>

## **Contact us**



We hope that you found this report useful. You can find out more information about our research team and publications at our Digital & Sexual Health Initiative Website (www.dishiresearch.com).

You can also contact us by email at DiSHIresearch@bccdc.ca.

We look forward to hearing from you!

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## Appendices

Appendix 1 – Original list of competency and training recommendations reviewed and adapted by focus group participants

Competency category	ID	Original Competency statements <sup>\$</sup>	Tier 1 - Expert (Role requires working with competencies in designing, implementing and evaluating digital systems and supervising teams to utilize such systems)	Tier 2 - Proficient (Role requires understanding of digital systems and their connections with core public health functions. May not directly design, implement and evaluate digital systems but leads cross-functional and interdisciplinary teams that have expertise with the systems)	Tier 3 - Competent (Role requires engaging directly with core public health competencies but must understand how digital systems provide opportunities or may influence public health functions and outcomes)
Public Health Sciences	A.1	• Develop and ethically apply research methods including data science, statistical genetics & omics technologies (i.e., exposomes), computational biology, epidemic and infectious disease modeling to public health problem.	• Develop and ethically apply research methods including data science, statistical genetics & omics technologies (i.e., exposomes), computational biology, epidemic and infectious disease modeling to public health problems.	• Understands processes and personnel required to develop and ethically apply research methods including data science, statistical genetics & omics technologies (i.e., exposomes), computational biology, epidemic and infectious disease modeling to public health problem.	• Understands ethical principles guiding research methods including data science, statistical genetics & omics technologies (i.e., exposomes), computational biology, epidemic and infectious disease modeling to public health problem.

	A.2	• Apply systems thinking to public health issues.	<ul> <li>Apply systems thinking to public health issues.</li> </ul>	• Apply systems thinking to public health issues.	<ul> <li>Apply systems thinking to public health issues.</li> </ul>
	A.3	<ul> <li>Use different types of data to answer public health questions.</li> </ul>	• Design, implement, and evaluate the use of diverse data types to answer complex public health questions.	<ul> <li>Lead teams to understand and utilize various data types to address and answer complex public health questions.</li> </ul>	Understands how diverse data types can be used to answer complex public health questions.
	A.4	<ul> <li>Aid public health organizations in thinking through, designing and testing new (digital) systems.</li> </ul>	<ul> <li>Designs, tests and implements new (digital) systems in public health organizations.</li> </ul>	<ul> <li>Leads public health organizations in thinking through, designing, testing and implementing new (digital) systems.</li> </ul>	<ul> <li>Aid public health organizations in thinking through, designing and testing new (digital) systems.</li> </ul>
	A.5	• Conduct education and training in public health informatics.	• Conduct education and training in public health informatics.	• Understands education and training needs for public health informatics and leads training efforts.	<ul> <li>Participates in personal education and training needs for public health informatics.</li> </ul>
Assessment and analysis	B.1	• Use, protect and interpret complex, linked large data sets from multiple sources and across levels of organization from administrative, clinical, biologic, environmental, population to social/societal levels, within and outside the health systems. *	• Use, protect and link large data sets from multiple sources (e.g., administrative, clinical, biologic, environmental, population and social/societal levels) within and outside the health systems.	<ul> <li>Understands processes for linking, using and protecting complex large data sets from multiple sources (e.g., administrative, clinical, biologic, environmental, population and social/societal levels) within and outside the health systems.</li> </ul>	<ul> <li>Is aware about data linkage processes and protocols to protect large data sets from multiple sources (e.g., administrative, clinical, biologic, environmental, population and social/societal levels) within and outside the health systems.</li> </ul>

B.2	• Design, analyze and report health science data using a blend of traditional and modern analytic and computational techniques (e.g., biostatistics, informatics, computer-based programming, and software, as appropriate - Tableau, python, MS-SQL, R).	• Design, analyze and report health data using a blend of traditional and modern analytic and computational techniques (e.g., biostatistics, informatics, computer-based programming, artificial intelligence, and software, as appropriate - Tableau, python, MS-SQL, R).	• Understands the design, analyses and reporting of health data using a blend of traditional and modern analytic and computational techniques (e.g., biostatistics, informatics, computer-based programming, artificial intelligence, and software, as appropriate - Tableau, python, MS-SQL, R).	<ul> <li>Analyze and report health data using a blend of traditional and modern analytic and computational techniques (e.g., biostatistics, informatics, computer-based programming, artificial intelligence, and software, as appropriate - Tableau, python, MS-SQL, R).</li> </ul>
B.3	<ul> <li>Identify needs, challenges, principles, and key details for data sharing, challenges of large-scale data management.</li> </ul>	<ul> <li>Identify and understand data sharing needs and principles and address challenges to large-scale data use in public health systems.</li> </ul>	<ul> <li>Understands data sharing needs and principles and coordinates transdisciplinary teams to address challenges to large- scale data sharing and use in public health systems.</li> </ul>	<ul> <li>Understands data sharing needs, principles and limitations in public health systems.</li> </ul>
B.4	<ul> <li>Know and understand methodological and statistical problems inherent in the analysis of secondary and big data.</li> </ul>	<ul> <li>Understand and address methodological and statistical problems inherent in the analysis of secondary and big data.</li> </ul>	<ul> <li>Understand methodological and statistical problems inherent in the analysis of secondary and big data.</li> </ul>	<ul> <li>Is aware of methodological and statistical problems inherent in the analysis of secondary and big data.</li> </ul>
B.5	<ul> <li>Use and interpret findings from data</li> </ul>	<ul> <li>Generate and interpret findings from data</li> </ul>	<ul> <li>Interpret findings from data exploration tools and other analytics.</li> </ul>	<ul> <li>Interpret findings from data exploration</li> </ul>

		exploration tools and other analytics.	exploration tools and other analytics.		tools and other analytics.
	В.6	• Use information technologies and communication tools necessary to support epidemiologic investigations and surveillance - e.g., smartphone survey, GPS tracking.	• Use information technologies and communication tools necessary to support epidemiologic investigations and surveillance - e.g., smartphone survey, GPS tracking.	• Understand the use of information technologies and communication tools necessary to support epidemiologic investigations and surveillance - e.g., smartphone survey, GPS tracking.	<ul> <li>Recognizes         <ul> <li>opportunities to use             information             technologies and             communication tools             necessary to support             epidemiologic             investigations and             surveillance - e.g.,             smartphone survey,             GPS tracking.</li> </ul> </li> </ul>
	B.7	<ul> <li>Understand how "omic" tools can be integrated into an ecological model of health including social and environmental determinants.</li> </ul>	<ul> <li>Understands and integrates "omic" tools into an ecological model of health including social and environmental determinants.</li> </ul>	• Understands how "omic" tools can be integrated into an ecological model of health including social and environmental determinants.	<ul> <li>Is aware about the use of "omic" tools and their integration into an ecological model of health.</li> </ul>
	B.8	<ul> <li>Identify the role of emerging "omics" technologies applicable to epidemiologic research and incorporate them into epidemiologic research.</li> </ul>	<ul> <li>Identifies the role of emerging "omics" technologies applicable to epidemiologic research and incorporates them into epidemiologic research.</li> </ul>	<ul> <li>Understands the role of emerging "omics" technologies applicable to epidemiologic research.</li> </ul>	<ul> <li>Is aware about the role of emerging "omics" technologies applicable to epidemiologic research.</li> </ul>
	B.9	<ul> <li>Understand general methods for linking data resources for creating information.</li> </ul>	<ul> <li>Understands general methods for linking data resources for creating information.</li> </ul>	<ul> <li>Understands general methods for linking data resources for creating information.</li> </ul>	<ul> <li>Is aware about general methods for linking data resources for creating information.</li> </ul>

	B.10	• Design, implement and evaluate population-based projects, programs or interventions that use social media as a communication platform and a tool for public health education and promotion.	• Design, implement and evaluate population-based projects, programs or interventions that use social media as a communication platform and a tool for public health education and promotion.	• Understands processes necessary for the design, implementation and evaluation population-based projects, programs or interventions that use social media as a communication platform and a tool for public health education and promotion.	<ul> <li>Design, implement and evaluate population- based projects, programs or interventions that use social media as a communication platform and a tool for public health education and promotion.</li> </ul>
	C.1	• Develop tools that protect the privacy of individuals and communities involved in health programs, policies, and research.	• Develop and apply tools that protect the privacy of individuals and communities involved in health programs, policies, and research.	• Leads interdisciplinary teams to develop tools that protect the privacy of individuals and communities involved in health programs, policies, and research.	• Applies tools that protect the privacy of individuals and communities involved in health programs, policies, and research.
Policy and program planning, implementation, and evaluation	C.2	• Support use of informatics to promote disease prevention at the clinical health, environmental and personal health interface.	• Support use of informatics to promote disease prevention at the clinical health, environmental and personal health interface.	• Support use of informatics to promote disease prevention at the clinical health, environmental and personal health interface.	<ul> <li>Support use of informatics to promote disease prevention at the clinical health, environmental and personal health interface.</li> </ul>
	C.3	• Ensure that knowledge, information, and data needs of project or program users and stakeholders are met.	• Ensure that knowledge, information, and data needs of project or program users and stakeholders are met.	<ul> <li>Leads interdisciplinary teams to ensure that knowledge, information, and data needs of project or</li> </ul>	<ul> <li>Understands and communicates knowledge, information, and data needs of project or</li> </ul>

			program users and stakeholders are met.	program users and stakeholders are met.
C.4	<ul> <li>Design, develop and implement person-centered population health information systems.</li> </ul>	• Design, develop and implement person-centered population health information systems.	• Understands and leads the design, development and implementation of person- centered population health information systems.	• Understands the importance of person- centered population health information systems and is aware of the processes involved in creating these systems.
C.5	• Support information system development, procurement, and implementation that meet public health program needs.	• Leads information system development, procurement, and implementation that meet public health program needs.	<ul> <li>Leads interdisciplinary teams to support information system development, procurement, and implementation that meet public health program needs.</li> </ul>	<ul> <li>Support information system development, procurement, and implementation that meet public health program needs.</li> </ul>
C.6	• Establish frameworks for evaluating the implementation process of information systems and applications and make recommendations to improve user satisfaction and outcomes.	• Creates and applies frameworks for evaluating the implementation process of information systems and applications and make recommendations to improve user satisfaction and outcomes.	• Understands frameworks for evaluating the implementation process of information systems and applications and make recommendations to improve user satisfaction and outcomes.	<ul> <li>Is aware of frameworks for evaluating the implementation process of information systems and applications and make recommendations to improve user satisfaction and outcomes.</li> </ul>

	C.7	• Evaluate communication - Assess reach and dose of communication using tools (e.g., website and social media analytics, data mining software, focus groups, in- depth interviews).	• Evaluate communication - Assess reach and dose of communication using tools (e.g., website and social media analytics, data mining software, focus groups, in- depth interviews).	<ul> <li>Understands methods for evaluating communication - e.g., assessing the reach and dose of communication using tools (e.g., website and social media analytics, data mining software, focus groups, in- depth interviews).</li> </ul>	• Understands methods for evaluating communication - e.g., assessing the reach and dose of communication using tools (e.g., website and social media analytics, data mining software, focus groups, in-depth interviews).
	C.8	<ul> <li>Develop team approaches that bring together diverse disciplines and organizations to develop new and creative ways of designing and implementing studies and addressing public health concerns.</li> </ul>	• Develop team approaches that bring together diverse disciplines and organizations to develop new and creative ways of designing and implementing studies and addressing public health concerns.	<ul> <li>Develop team approaches that bring together diverse disciplines and organizations to develop new and creative ways of designing and implementing studies and addressing public health concerns.</li> </ul>	• Understands team approaches to build diverse teams to design and implement studies and address public health concerns.
Partnerships, collaboration, and advocacy	D.1	<ul> <li>Assess stakeholder data, information, and knowledge needs.</li> </ul>	• Assess stakeholder data, information, and knowledge needs.	<ul> <li>Assess stakeholder data, information, and knowledge needs.</li> </ul>	<ul> <li>Assess stakeholder data, information, and knowledge needs.</li> </ul>
	D.2	<ul> <li>Use new media to conduct advocacy e.g., social media.</li> </ul>	<ul> <li>Use new media to conduct advocacy e.g., social media.</li> </ul>	<ul> <li>Use new media to conduct advocacy e.g., social media.</li> </ul>	• Use new media to conduct advocacy e.g., social media.

	D.3	• Manage IT operations related to project or program and those managed by external organizations.	• Manage IT operations related to project or program and those managed by external organizations.	<ul> <li>Understands IT operations related to project or program and those managed by external organizations.</li> </ul>	• Is aware of IT operations related to project or program and those managed by external organizations.
	D.4	• Develop team approaches that bring together diverse disciplines and organizations to develop new and creative ways of designing and implementing studies and addressing public health concerns.	• Develop team approaches that bring together diverse disciplines and organizations to develop new and creative ways of designing and implementing studies and addressing public health concerns.	• Develop team approaches that bring together diverse disciplines and organizations to develop new and creative ways of designing and implementing studies and addressing public health concerns.	• Develop team approaches that bring together diverse disciplines and organizations to develop new and creative ways of designing and implementing studies and addressing public health concerns.
Diversity and inclusion	E.1	• Effectively communicate with teams through emails, word processing, spreadsheet, and presentation software.	• Effectively communicate with teams through emails, word processing, spreadsheet, and presentation software.	• Effectively communicate with teams through emails, word processing, spreadsheet, and presentation software.	<ul> <li>Effectively communicate with teams through emails, word processing, spreadsheet, and presentation software.</li> </ul>
Communication	F.1	<ul> <li>Use evidence-based communication program models to disseminate research and evaluation outcomes.</li> </ul>	<ul> <li>Use evidence-based communication program models to disseminate research and evaluation outcomes.</li> </ul>	• Understands evidence- based communication program models and leads teams to use these models to disseminate research and evaluation outcomes.	Contributes to the use of evidence-based communication program models to disseminate research and evaluation outcomes.

F.2	<ul> <li>Use mass media, electronic technology, and communication methods (e.g., social media, social) for public health communication, health education and promotion.</li> </ul>	• Use mass media, electronic technology, and communication methods (e.g., social media, social) for public health communication, health education and promotion.	• Use mass media, electronic technology, and communication methods (e.g., social media, social) for public health communication, health education and promotion.	<ul> <li>Use mass media, electronic technology, and communication methods (e.g., social media, social) for public health communication, health education and promotion.</li> </ul>
F.3	<ul> <li>Use information technology to assure openness of public health agency processes and responsiveness to the public.</li> </ul>	<ul> <li>Use information technology to assure openness of public health agency processes and responsiveness to the public.</li> </ul>	• Understand the use of information technology in public communication and lead teams to use technology to assure openness of public health agency processes and responsiveness to the public.	• Understands the use of information technology to assure openness of public health agency processes and responsiveness to the public.
F.4	• Define target audience, develop correct messaging to reach people where they are, considering the people, places, and media they interact with daily and the information sources and formats they trust.	• Define target audience, develop correct messaging to reach people where they are, considering the people, places, and media they interact with daily and the information sources and formats they trust.	• Understand methods for delivering targeted public health messaging to reach people where they are, considering the people, places, and media they interact with daily and the information sources and formats they trust.	<ul> <li>Is aware of methods for delivering targeted public health messaging to reach people where they are, considering the people, places, and media they interact with daily and the information sources and formats they trust.</li> </ul>

F.5	• Tailor surveillance information content and periodicity of dissemination for specific audiences and their uses.	• Tailor surveillance information content and periodicity of dissemination for specific audiences and their uses.	• Understand the use of tailored surveillance information content and periodically disseminated health information for specific audiences.	<ul> <li>Is aware of the use of tailored surveillance information content and periodically disseminated health information for specific audiences.</li> </ul>
F.6	• Evaluate communication - Assess reach and dose of communication using tools (e.g., website and social media analytics, data mining software, focus groups, in- depth interviews).	• Evaluate communication - Assess reach and dose of communication using tools (e.g., website and social media analytics, data mining software, focus groups, in- depth interviews).	<ul> <li>Understands methods for evaluating communication - e.g., assessing the reach and dose of communication using tools (e.g., website and social media analytics, data mining software, focus groups, in- depth interviews).</li> </ul>	<ul> <li>Understands methods for evaluating communication - e.g., assessing the reach and dose of communication using tools (e.g., website and social media analytics, data mining software, focus groups, in-depth interviews).</li> </ul>
F.7	• Support development of strategic direction for public health informatics within the enterprise.	• Support development of strategic direction for public health informatics within the enterprise.	• Lead the development of strategic direction for public health informatics within the enterprise.	• Contribute (where possible) to the development of strategic direction for public health informatics within the enterprise.

Leadership	G.1	• Show entrepreneurial orientation through proactiveness, innovativeness and risk- taking to advance public health, address newly emerging public health issues and better understand risks when aligning community health partners to address health inequities.	• Show entrepreneurial orientation through proactiveness, innovativeness and risk- taking to advance public health, address newly emerging public health issues and better understand risks when aligning community health partners to address health inequities.	• Show entrepreneurial orientation through proactiveness, innovativeness and risk- taking to advance public health, address newly emerging public health issues and better understand risks when aligning community health partners to address health inequities.	• Show entrepreneurial orientation through proactiveness, innovativeness and risk-taking to advance public health, address newly emerging public health issues and better understand risks when aligning community health partners to address health inequities.
	G.2	<ul> <li>Address IT development using principles of systems thinking and engineering.</li> </ul>	<ul> <li>Address IT development using principles of systems thinking and engineering.</li> </ul>	<ul> <li>Understand IT development and lead teams to support the process using principles of systems thinking and engineering.</li> </ul>	<ul> <li>Is aware of IT development using principles of systems thinking.</li> </ul>
	G.3	• Communicate PHI needs and proposed solutions to leaders in public health and elected officials effectively.	• Communicate PHI needs and proposed solutions to leaders in public health and elected officials effectively.	• Communicate PHI needs and proposed solutions to leaders in public health and elected officials effectively.	• Understand PHI needs and proposed solutions.
	G.4	• Contribute to the consideration of the best IT systems to use by the enterprise.	• Contribute to the consideration of the best IT systems to use by the enterprise.	• Contribute to the consideration of the best IT systems to use by the enterprise.	<ul> <li>Contribute to the consideration of the best IT systems to use by the enterprise (where possible).</li> </ul>

	G.5	• Manage and direct health informatics planning for projects related to public health and information technology.	• Manage and direct health informatics planning for projects related to public health and information technology.	• Understand and direct health informatics planning for projects related to public health and information technology.	<ul> <li>Is aware of health informatics planning processes for projects related to public health and information technology.</li> </ul>
	G.6	• Apply procedures (policies) and technical means (security) to ensure integrity and protection of confidential information in electronic files and computer systems while maximizing the benefits to public health.	• Apply procedures (policies) and technical means (security) to ensure integrity and protection of confidential information in electronic files and computer systems while maximizing the benefits to public health.	• Apply procedures (policies) and technical means (security) to ensure integrity and protection of confidential information in electronic files and computer systems while maximizing the benefits to public health.	<ul> <li>Apply procedures (policies) and technical means (security) to ensure integrity and protection of confidential information in electronic files and computer systems while maximizing the benefits to public health.</li> </ul>
Data and data systems management and governance	H.1	<ul> <li>Develop tools that protect the privacy of individuals and communities involved in health programs, policies, and research.</li> </ul>	<ul> <li>Develop and apply tools that protect the privacy of individuals and communities involved in health programs, policies, and research.</li> </ul>	<sup>2</sup> Understand processes for developing and applies tools that protect the privacy of individuals and communities involved in health programs, policies, and research.	<ul> <li>Is aware and applies tools that protect the privacy of individuals and communities involved in health programs, policies, and research.</li> </ul>
	H.2	<ul> <li>Contribute to development of public health information systems that are interoperable with</li> </ul>	• Develop public health information systems that are interoperable with other relevant information systems.	<ul> <li>Understands and leads development of public health information systems that are interoperable with</li> </ul>	• Contribute to development of public health information systems that are interoperable with

		other relevant information systems.		other relevant information systems.	other relevant information systems.
	H.3	• Manage data and information in compliance with policies, protocols, and informatics standards.	<ul> <li>Manage data and information in compliance with policies, protocols, and informatics standards.</li> </ul>	• Understand data and information management policies, protocols, and informatics standards.	• Understand data and information management policies, protocols, and informatics standards.
	H.4	<ul> <li>Aid public health organizations in thinking through and designing testing strategies for new systems.</li> </ul>	<ul> <li>Design, test and implement strategies for new digital information systems.</li> </ul>	<ul> <li>Lead teams to design, test and implement strategies for new digital information systems.</li> </ul>	• Contribute to the design, testing strategies for new systems.
	H.5	• Describe systems analysis methodology, requirements, use cases, data flow diagrams, business process modeling, data modeling, relational data theory, normalization, entity relationship diagrams, SQL, and data warehouses.	• Describe and apply systems analysis methodology, requirements, use cases, data flow diagrams, business process modeling, data modeling, relational data theory, normalization, entity relationship diagrams, SQL, and data warehouses.	• Understand systems analysis methodology, requirements, use cases, data flow diagrams, business process modeling, data modeling, relational data theory, normalization, entity relationship diagrams, SQL, and data warehouses.	<ul> <li>Is aware of systems analysis methodology, requirements, use cases, data flow diagrams, business process modeling, data modeling, relational data theory, normalization, entity relationship diagrams, SQL, and data warehouses.</li> </ul>
	H.6	<ul> <li>Document business rules using algorithms and pseudocode.</li> </ul>	<ul> <li>Document business rules using algorithms and pseudocode.</li> </ul>	<ul> <li>Understands processes for documenting business rules using algorithms and pseudocode.</li> </ul>	<ul> <li>Is aware of business rules regarding data and information systems.</li> </ul>

	Н.7	• Assess and manage risks associated with using and sharing data and information, data security and intellectual property.	• Assess and manage risks associated with using and sharing data and information, data security and intellectual property.	• Assess and manage risks associated with using and sharing data and information, data security and intellectual property.	<ul> <li>Assess and manage risks associated with using and sharing data and information, data security and intellectual property.</li> </ul>
	H.8	• Describe conceptualizations of data, medical vocabulary nomenclature, terminologies, coding and classification, standards ethics, privacy, security, health systems, computer technologies, health information exchange, data quality, and information architectures.	<ul> <li>Apply conceptualizations of data, medical vocabulary nomenclature, terminologies, coding and classification, standards ethics, privacy, security, health systems, computer technologies, health information exchange, data quality, and information architectures.</li> </ul>	<ul> <li>Understands conceptualizations of data, medical vocabulary nomenclature, terminologies, coding and classification, standards ethics, privacy, security, health systems, computer technologies, health information exchange, data quality, and information architectures.</li> </ul>	<ul> <li>Is aware of conceptualizations of data, medical vocabulary nomenclature, terminologies, coding and classification, standards ethics, privacy, security, health systems, computer technologies, health information exchange, data quality, and information architectures.</li> </ul>
	H.9	Construct transactions for health information exchange.	• Construct transactions for health information exchange.	• Understands processes for constructing transactions for health information exchange.	<ul> <li>Is aware of health information exchange systems and protocols.</li> </ul>

<sup>\$</sup>Adaptations to tiered competency statements made based on participants' comments; <sup>\*</sup>Competency statement broken into two simpler statements; IT: Information technology; PHI: Public Health Informatics; SQL: Structured Query Language; MS-SQL: Microsoft Structured Query Language