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BRIEF REPORTS

Building a Foundation for Family Health Measurement in National Surveys: A Modified Delphi Expert Process

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Abstract

Introduction Families are the most proximal and powerful context for the development, promotion, and disruption of health of individuals across the life course. Despite families' critical role in health, U.S. nationally representative health surveys lack comprehensive and standardized assessments of family health and functioning.

Methods To foster research on family health in population surveys, we developed a conceptualization of family health using a modified Delphi process with family health experts. Experts responded online to produce consensus definitions of 'family' and 'family health.' Guided by these definitions, they responded to a survey to create a list of concepts for measurement of family health and ranked the importance and measurability of those concepts.

Results We achieved consensus among 15 family health experts on definitions of 'family' and 'family health.' Thirty-one family health concepts were organized into six domains, then ranked by relevance and importance as follows: (1) "Family relationships" and "family social context" tied for first priority, (2) "family member health, (3) "family health-related practices," (4) "family health resources," and (5) "management of time and activities."

Discussion Social relationships and social environment were prioritized as more essential than other aspects of family environments typically assessed in population surveys, such as health practices and family members' illness and disease. This study develops the scientific groundwork needed to advance routine monitoring of family health in national health surveys and in child/family performance measures.

Keywords Family health · Measurement · National health surveys · Delphi expert process

Significance

What is already known on this subject? Despite strong scientific evidence that families powerfully influence members' health, routine population health surveys characterize health of individuals with little attention to family health. An established concensus of family health and its ranked components is needed to support development of a core set of survey items to assess health of families to use in setting national health goals and monitoring their progress across time. *What this study adds?* This study provides a definition and concenptualization to advance routine monitoring of family health in national health surveys. The study also prioritizes core concepts for measurement and outlines essential next steps of research in this area.

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Introduction

Families and Health

Families are the most proximal context for the promotion of health and development of individuals across the life course and over generations (Bronfenbrenner and Morris 2006; Haskins et al. 2014), thus acting as a constant social determinant of health. From the healthcare perspective, the economic value of the care that families provide to chronically ill, disabled, and frail family members is two to six times greater than that contributed by the medical care system (Arno et al. 1999; Leiter et al. 2004). Not only do families create home environments and provide access to resources that affect the health of individual family members, the collective health of the family unit is a potent predictor of the health of individuals, either as a promoter or disruptor of health and development (Schor et al. 1987). Evidence suggests that children raised in families that provide nurturing and care, a stable environment, and protection from external threats, promote effective development of key regions of children's brains and adaptations essential to child health, development, and quality of life (Cabrera et al. 2012; Shonkoff 2012; Sroufe et al. 2010). In addition, children in home environments with healthy family functioning and authoritative parenting styles (i.e., responsive care and limit setting) have healthier weight control behaviors (Berge et al. 2013, 2010). Conversely, neglectful parenting, disruption of the family system, and family stress are associated with poorer child health outcomes including preterm birth, reduced cognitive development, and increased child morbidity (Britto et al. 2017; Repetti et al. 2002).

Despite recognition that the family has an overarching role in individual wellbeing, and the strength of communities and society (Novilla et al. 2006), no consensus exists within public health or across disciplines on the definition and key components of family health that can be used at a population level. Multiple, inconsistent definitions of 'family' exist (Bogenschneider 2014), but there have been almost no efforts to develop a consensus definition of family for use at the population level, nor has a population-based definition of 'family health' has been developed. Both are needed for public health surveillance, research and intervention.

The work of Sharon Denham (2003) comes closest to providing a definition of family health that goes beyond the health of individual family members. Denham did extensive work interviewing families in Appalachia to determine the key aspects of family health. From this, she developed a Family Health Framework for use in the nursing discipline that categorizes family health into three dimensions: functional aspects (e.g., relationships and interactions), contextual aspects (including both internal and external contexts such as family socioeconomic status), and structural aspects (e.g., family routines) (Denham 2003). Her work led her to define family health as the "interactions and processes of individuals who identify as family and dwell together in a household niche that is dynamically impacted by complex contextual systems with potentials to affect health" (Denham 2003, p. 3). One limitation of Denham's model is that her definition and framework are oriented to families living within the same household, thereby excluding extended and in some cases even immediate family members not residing in the same household but who may still have an important effect on the collective family unit. Despite the importance of Denham's work, the Family Health Framework was not published in a scientific journal, limiting the uptake within nursing and across other disciplines.

Since U.S. population health surveys do not assess family health and functioning using an accepted definition and consistent set of measures, development of knowledge regarding the powerful role of families in health has been limited. Being able to measure family health in a comprehensive and consistent manner will allow us to study and impact connections among individual, family, and community health and examine trends over time.

Current Assessment of Family Health in Routinely Administered National Health Surveys

In a previous phase of this work, we reviewed the content of six routinely administered national health surveys examining inclusion of content in any area of family health (see Online Appendix 1). We found a near exclusive focus on the health of individual children and adults, with few formal measures of family health. The majority of items in these surveys focus on individual health status, behaviors, and medical care utilization. For example, the National Health and Nutrition Examination Survey (NHANES) offers an opportunity to better address the nation's health by improving data on family functioning. Despite solid evidence on the relationship of family and household practices to childhood obesity (Berge et al. 2015), the survey contains few questions about family practices related to eating habits or routines such as who buys the groceries and who usually cooks (CDC.Gov, NHANES). It does ask about shared meals, which relates to both food quality and family relationships (Berge et al. 2015).

To the extent that U.S. families are assessed, the data collected in these national health surveys almost exclusively relate to family structure, household composition, income, race, participation in means-tested programs, and, health status of individual family members.

A welcome exception is the National Survey of Children's Health (NSCH) which does examine some family routines and activities, family resilience, family-centered care and other family health related topics. However, this focus is not based on a defined model or definition of family health. The conclusion of our review was that existing U.S. surveys do not use a comprehensive approach to assess family relationships or sense of belonging, family-level health behaviors, decision-making, routine practices or resource allocation. This critical gap in these influential health surveys powerfully limits our ability to develop public health programs, policies, and goals designed to promote the well-being of American families, to evaluate these interventions, or to understand trajectories of family health over time.

In recent years, frameworks for improving measurement of the health and well-being of the nation have acknowledged the need for family health measurement (CDC.gov). For example, the *Culture of Health* model acknowledges that "health is greatly influenced by complex factors such as where we live, and the strength of our families and communities," but does not state how the strength of families should be assessed (rwjf.org). The "Community and Environment" determinant of health within the United Health Foundation's *America's Health Rankings* seeks to assess family and social relationships particularly for women and children, however is only able to include data on protective family routines and habits based on NSCH items (https://www.americashealthrankings.org).

A basic barrier to obtaining national data on family-level health and functioning is the lack of an agreed-upon definition of family health and primary concepts of family health. Availability of these definitions can guide selection and development of measures of family health. The predominant federal definition of family, used by the Census Bureau, is structural, based on legal relationships and household composition. That is not adequate for the purposes of understanding all family influences on members' health as such definitions fail to account for family-level functions, behaviors, and relationships.

Study Aims

Recognizing the need for more comprehensive and actionable measurement of families in routine surveys and the performance measures mandated for federally funded child-serving programs, a family health focus was developed within the Maternal and Child Health Measurement Resource Network (MCH-MRN). The MCH-MRN is supported by the Maternal and Child Health Bureau of the U.S. Health and Human Services Administration (HRSA) to promote interdisciplinary and collaborative efforts to measure health across MCH populations across the lifecourse. The strategic plan of the MCH-MRN (2016–2019) identified family health measurement as a gap area and convened a Family Health Technical Working Group (FH-TWG) to address two goals: (1) provide a workable definition of 'family' and 'family health' and (2) to recommend domains of family health of highest priority for incorporation into routine health surveys and child/family program performance measures (Bethell et al. 2018). This paper briefly summarizes the initial work and the products of the FH-TWG.

Methods

The goal of this study was to lay the groundwork for family health measurement in national surveys and child/family performance measures by creating definitions of 'family' and 'family health" and identifying and prioritizing the family health concepts and domains, based on the consensus of family health experts. Given that aim, we utilized a Delphi process—a methodology that establishes reliable group consensus of new concepts via an iterative ranking process using quantitative or qualitative methods (Boberg and Monis-Khoo 1992; Diamond et al. 2014). Experts are consulted two or more times and are typically enabled to review the responses of other participants and reevaluate their own responses (Landeta 2006). This study was deemed excempt from IRB oversight as participants were providing expert opinions, not personal information. Prior to engaging experts in the Delphi process, a team of researchers at the Johns Hopkins Bloomberg School of Public Health developed preliminary definitions of 'family' and 'family health,' drawing from their collective expertise and Denham's prior work (2003).

Selection of Participants in the Delphi Process

The MRN work was carried out with a national group of family health experts, identified by searching the literature and talking with family health leaders, scientists and advocates (see Fig. 1). The participation of 13 experts was solicited via email and phone call. The experts represented a range of family and public health academic institutions, child and family 'think tanks,' federal child-serving agencies, prominent national health foundations, and family advocacy organizations (See Online Appendix 2 for a complete list of experts). Of those invited, two declined, resulting in a final sample of 15 participants total, including a leadership team of 4 (the authors of this paper). All of those who agreed to participate attended a group conference call about the goals of the project and the need for a conceptual structure to guide assessment of family health and functioning in health surveys and practice settings. Below we outline the three pretermined rounds of the Delphi process (see also Fig. 1 for a summary of each round and participant flow).

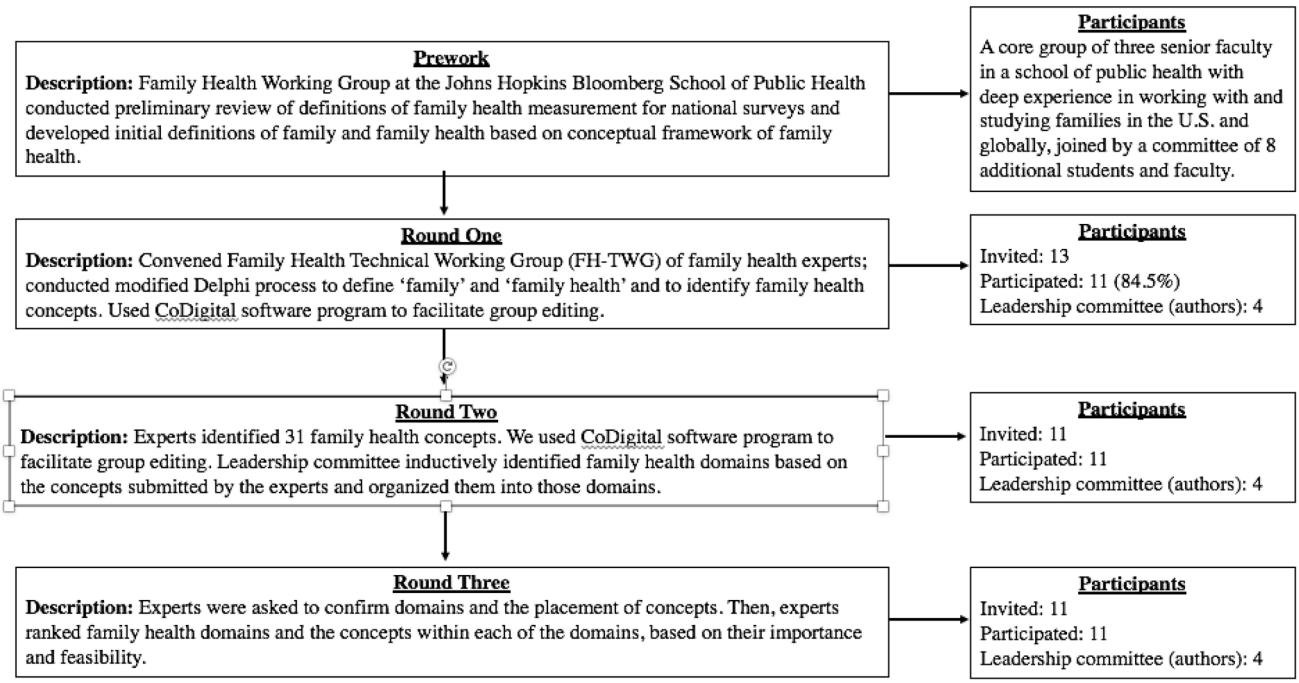

Fig. 1 Description of Delphi rounds and participant flow

Delphi Round One

To solicit expert responses in round one, we used *CoDigital* (https://www.codigital.com/), an online crowd sourcing tool that allows respondents to view and update each other's written contributions in order to collaboratively reach consensus on a final product. Participants made iterative edits and comments regarding proposed definitions of 'family' and 'family health'. Consensus was achieved when the committee leading this effort determined that we were not receiving new information (i.e., saturation) or additions to the definitions.

Delphi Round Two

In this round, experts were invited to review and edit a list of 16 family health concepts and to suggest additional ones of importance. Participants were allowed to add or drop items. None were deleted and 15 concepts were added, expanding the total to 31. The leadership committee then inductively identified the family health domains represented by the 31 concepts and assigned the concepts to the domains.

In *Delphi round three*, experts received a Microsoft word survey with a list of six domains, and 31 related family health concepts. For each concept, we provided a working definition of the concept along with two potential survey items identified by the leadership committee. These items were for illustration purposes only. Experts were first asked to confirm domains and the placement of concepts and then to rank the family health domains in order of importance for population measurement (range 1–6). Then, within each domain, experts ranked concepts in that domain, considering both their importance and feasibility for assessment in routine health surveys and child/family program performance measurement. Rankings were tallied and averaged using Microsoft Excel. We calculated means, standard deviations and medians of rankings for each domain and for concepts within each domain separately (see Tables 1 and 2, respectively). 'Concept mean' refers to the average (of the 15 experts' scores) assigned to that concept within a given domain. For example, the domain of "Family relationships, interactions and beliefs" has 10 concepts, therefore

Table 1 Ranking of family health domains

Rank	Domain (range 1–6)	Mean (sd)**	Median
1	Family relationships, interactions, and beliefs	2.33 (1.54)	2
2	Family social context	2.33 (1.54)	2
3	Family member health	3.33 (1.54)	4
4	Family health-related practices	3.67 (1.68)	4
5	Family health resources	4.33 (1.05)	4
6	Management of time and activities	5.00 (1.25)	5

**Lowest final score (sum/N) = highest priority for incorporation into routine health surveys and child/family program performance measures

Table 2 Ranking of family health concepts, by domain

Rank within domain	Concept	Mean (sd)**	Median
Family relationships, interactions and beliefs concepts (range 1–10)			
1	Cohesion, love, and supportiveness for one another	2.47 (2.03)	2
2	Family relationship quality	2.53 (1.36)	2
3	Sense of family belonging	4.13 (3.18)	3
4	Communication	5.40 (1.68)	5
5	Family problem solving	5.20 (2.43)	5
6	Quality of co-parenting relationship	5.73 (2.66)	4
7	Father involvement	5.87 (2.45)	6
8	Beliefs and values regarding caregiving	6.93 (1.45)	7
9	Beliefs about family responsibilities	7.73 (1.71)	8
10	Connection with extended family, non-custodial parents (social support)	9.00 (1.13)	9
Family social context concepts (range 1–3)			
1	Safety in the family	1.67 (0.72)	2
2	Satisfaction with family life	2.13 (0.92)	2
3	Quality of the home environment	2.20 (0.77)	2
Family member health concepts (range 1–8)			
1	Overall (physical/mental) health status of family members	1.73 (1.62)	1
2	Mother mental health	2.33 (1.11)	2
3	Father (other parent) mental health	3.80 (1.08)	4
4	Child health	4.93 (1.71)	5
5	Respondent/maternal limitations of activity	4.47 (2.07)	4
6	Other parent health	5.27 (1.83)	5
7	Child health (additional)	5.93 (1.62)	6
8	Other adult in home health	7.27 (0.96)	8
Family health-related practices concepts (range 1–7)			
1	Shared family meals	2.33 (1.95)	1
2	Parent support for and modeling of physical activity	3.53 (1.81)	3
3	Parent modeling and support of healthy eating	3.47 (2.00)	3
4	Caring for the sick	3.40 (2.23)	2
5	Food availability and preparation	4.13 (0.83)	4
6	Parents encourage healthful foods	4.73 (1.39)	5
7	Monitoring of food intake by children and other family members	6.40 (0.83)	7
Family health resources concepts (range 1–3)			
1	Parents' capacities for caregiving (parenting)	1.73 (0.80)	2
2	Adequacy of economic resources	2.07 (0.80)	2
3	Family/family member resilience (internal resources)	2.20 (0.86)	2
Management of time and activities concepts (range 1–3)			
1	Family routines	1.33 (0.72)	1
2	Work/family schedule and spillover (time): work interferes with family activities	2.20 (0.68)	2
3	Work/family schedule and spillover (time): family activities interfere with work obligations	2.47 (0.64)	3

**Lowest final score (sum/N) = highest priority for incorporation into routine health surveys and child/family program performance measures

this domain has a range of 1–10, with the mean and median within that range. Some domains have only three concepts, thus a range of 1–3.

We also note that TWG members received a near-final draft of this manuscript for their review and comments. Several raised important questions that we addressed and all of them approved the submission of this manuscript with their names in the final published version (Online Appendix 2).

Results

Definitions of 'Family' and 'Family Health'

In *round one,* expert consensus was achieved on definitions of 'family' and 'family health.' Experts were allowed to edit, add to and delete portions of the definitions using the software *Codigital*. Minimal changes were made to our originally proposed definitions. The definitions are purposefully broad to allow their application to a range of health services, goals, program performance monitoring, and policy development. We acknowledge that for some specific applications, more precise or delimited definitions may be needed.

Family was defined as: "Two or more persons related by blood, adoption, marriage, or choice and whose relationship is characterized by at least one of the following: (1) social and/or legal rights and obligations, (2) affective and emotional ties, and (3) endurance or intended endurance of the relationships. Relations by choice are characterized by an emotional connection strong enough to be perceived by individuals as a kinship tie."

Family health was defined as: "A *resource at the level of the family unit* that develops from the intersection of the health of each family member, their interactions and capacities, as well as the family's physical, social, emotional, economic, and medical resources. Family health is greater than the sum of its parts. Positive family health promotes family members' sense of belonging and capacity to develop and adapt, to care for one another, and to meet responsibilities."

Domains and Concepts of Family Health

Round two yielded 31 family health concepts that were then organized by the leadership committee into six domains. In *round three* these concepts and domains were then ranked by the experts and averaged across experts. Table 1 presents the domains in the experts' rank order of importance for measuring family health (1 = most important). Greatest importance was ascribed to "Family relationships" and "family social context" (both with mean ratings of 2.33). Ratings for the other domains were: "family member health" (mean = 3.33); "family health-related practices" (mean = 3.67); "family health resources" (mean = 4.33); and "management of time and activities" (mean = 5.00). We note that within this limited range (1–6) the average medians show substantial overlap (e.g., family member health, health practices, and health resources all have a median of 4). Results for concept rankings are presented in Table 2.

Discussion

Research and Practice Implications

This brief report summarizes initial efforts toward building a scientific foundation for the measurement of family health for the purposes of public health goal-setting and monitoring, and for program performance measurement and improvement. We present operational definitions of both 'family' and 'family health,' and identify the prioritized domains and concepts related to family health based on a modified Delphi expert process. Notably, the domains of family relationships and family social context (both with medians of 2) were prioritized over the types of factors typically asked on national health surveys such as family member health, health practices, and health resources (all with median scores of 4). Among domains with a larger number of concepts (e.g., family relationships), the same median score for several concepts highlight the need to determine whether or not concepts are distinct for measurement purposes (e.g., cohesion and family relationship quality may not need to be assessed with different items; whereas family communication and family problem solving do require distinct sets of items for assessment). In domains with a limited number of concepts such as social context, the truncated range makes the medians less informative.

Our definition of family health and its components complement the structural, functional and contextual aspects of family established from Denham's community-based work (2003). Our work furthers Denham's by expanding family health beyond the confines of a household for population health measurement of family health. Thus, this definition and model of family health is supported by both expert opinion and community member validation.

This study helps advance the scientific basis for family health measurement. The definition and domains of measurement contribute to public health and family science by identifying priority areas for measurement development in routine health surveys and program performance measures. Future work should identify questionnaire items that assess the prioritized concepts in each domain that have sufficient item-level reliability to support use in future surveys and program performance measures.

Some concepts may require novel item development. Once these concepts have been operationalized with reliable survey items, the questionnaires can be used across practice settings (e.g., healthcare, home visitation programs, Head Start, Center for Medicare and Medicaid's Integrated Care for Kids) and in population surveys to examine family health in general and the unique role of family social context, relationships and health practices to child and adult health.

Strengths and Limitations

A limitation of this work is that recruitment of experts was purposive and may not represent all expert opinions. Furthermore, the definitions should be examined across various socio-cultural groups and family types. Nonetheless, the sample included nationally-recognized experts and family advocates who work across disciplines and geographic regions within the U.S. (including rural and urban areas) and who have a strong scientific and theoretical background in families and health. A larger sample of experts and family advocates and leaders may be useful to confirm and extend these findings.

Despite these limitations, this study addresses a critical need for understanding and assessing family health, utilizing a Delphi process to facilitate multiple rounds of editing/revision to achieve consensus among experts. The results of this study provide a foundation from which to encourage development of family-level health measures. The National Advisory Council on Minority Health and Health Disparities (NIMHD) recently identified the importance of such measurement in their recommendation to promote the concept of "family health, family well-being, and family resilience" to the "funding opportunity development" stage (NIMHD). This recommendation acknowledged that the scientific community's limited ability to address health disparities has been contributed to by the paucity of NIH-funded research that adequately characterizes family-level exposures and processes.

Conclusion

Defining family health and its key domains and concepts is an essential first step for developing the standard assessments needed to understand the health, functioning, and well-being of populations of families with more precision than current descriptors of economic status, disease, race and geographic location allows. We posit that these domains and concepts apply to all family types, although future empirical testing may demonstrate that some concepts apply better to some family types than to others. Operationalizing each concept will necessarily involve testing a range of items to ensure full coverage of each concept and relevance to all types of families. A parallel goal is to refine a population-based family health conceptual framework to further ensure the comprehensiveness of the core set of survey items needed to characterize family health in state and national surveys and in program performance monitoring by public agencies and service providers. The availability of a consistent set of family descriptors in representative surveys will enable monitoring of family health and better understanding of how aspects of family health affect the family unit and individual family members. Standardization will enable comparisons across populations and programs, and will also allow the U.S. to establish national *Healthy People* goals for aspects of family health and to monitor progress toward these goals over time and across families in different economic, cultural, and social contexts. Given the central role and influence of families on the health of virtually all people in the U.S. it is imperative to move this assessment effort forward.

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Compliance with Ethical Standards

Conflicts of interest The authors declare they have no conflict of interest.

Ethical Approval This study was not considered human subjects research and did not require approval from an ethics committee.

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