Preface

Maternal and Child Health, Life Course Health Development, and the Life Course Research Network

Prior to 1900, the health of mothers and children was considered a domestic concern. Childbirth was often supervised by untrained birth attendants such as family members; basic care of sick children was rudimentary and undeveloped, with the unfortunate but all-too-real expectation that some children would not survive into adulthood (Rosenfeld and Min 2009). With the advent of scientific medicine in the nineteenth century, discoveries in bacteriology, and other sanitary reforms, childbirth came under greater medical scrutiny, and pediatric hospitals were established to care for ailing children. A greater focus on maternal nutrition, the spread of scientifically supported birthing practices, and other newly minted public health practices – along with improved social and living conditions – led to dramatic decreases in infant mortality rates and to improved child survival. In 1912, the Children's Bureau was established in the United States as a federal agency with responsibility for assuring the health of mothers and children. In 1935, Title V of the Social Security Act established the Maternal and Child Health Bureau (MCHB), which today administers a broad range of programs to address the health needs of the nation's maternal and child health (MCH) population.

For most of the twentieth century, MCH programs and policies continued to focus on two basic areas: (1) promoting healthy births by preventing maternal and infant mortality and, more recently, (2) preventing premature births and providing medical care for children with long-term medical and developmental disorders. Success was marked by decreasing rates of maternal and infant mortality but was challenged by persistent disparities in outcomes, especially differences in infant mortality between White and African-American children. Similarly, while great strides were made in reducing child deaths due to infectious disease and improving the effectiveness, availability, and quality of medical interventions for a range of childhood conditions from hemophilia to complex congenital heart diseases, the number of children reported as being disabled due to a chronic health problem rose dramatically from 2% in 1960 to over 8% in 2011 (Halfon et al. 2012).

In the late 1980s, a new and rapidly converging set of research findings from the life course health sciences began to recast the importance of early life on

lifelong health (Ben-Shlomo and Kuh 2002; Halfon and Hochstein 2002). Research that was particularly relevant to the MCH field revealed how:

- Preconception health and perinatal risk can impact birth outcomes and have a sustained and long-term impact on child and adult health several decades later.
- Susceptibility and sensitivity of the developing brain to adversity, as well as to supportive and caring relationships, can be measured not only in brain morphology but also using functional measures of cognitive and emotional performance, including school readiness, academic performance, and long-term mental health.
- Risky and chaotic family environments, and toxic and unpredictable social environments, are transduced into a child's biology, manifesting as disease and causing changes in immune, inflammatory, and metabolic function that can be linked with childhood health conditions like obesity and ADHD and adult conditions like diabetes, hypertension, and heart disease, to name a few.

These and other research findings also suggested new explanatory mechanisms for seemingly intractable problems such as the persistent racial and ethnic gaps in infant mortality. The dominant biomedical approach to treating infant mortality focused on prenatal care and the prevention of pathological signs and symptoms (e.g., eclampsia), but what the findings from the life course health sciences began to suggest is that women's preconception reproductive capacity – including neuroendocrine response patterns, vascular health, and stress reactivity – could condition their response to pregnancy, the timing of parturition, and the likelihood of prematurity (Lu and Halfon 2003). This work suggested that in addition to improving technical interventions to pathophysiological responses that emerge during pregnancy by providing access to high-quality prenatal care, more attention should be focused on improving (if not optimizing) health during the preconception and interconception periods. This idea led to a set of new initiatives focused on girls' and women's reproductive health trajectories, including public health strategies to improve preconception health and research strategies to better understand how adversity impacts reproductive health across the life course.

For the past two decades, there has been a growing recognition across the MCH community that life course health science is building an important evidence base about the central and vital role of health during the prenatal period and the early years on subsequent lifelong health (Halfon and Hochstein 2002; Galobardes et al. 2004 and 2008; Power and Kuh 2013). Research on the changing epidemiology of childhood chronic illness and the growing number of longitudinal studies documenting the legacy of chronic illness in childhood on patterns of adult health, morbidity, and mortality are also connecting the dots between child health and the potential for healthy aging (Halfon 2012; Wise 2004; Wise 2016). As the United States experiences rapidly rising healthcare costs due to rapidly increasing rates of chronic disease and multi-morbidity, life course health science is shining a light on the early part of the life-span when preventable risks are setting in motion the inflammatory, neuroendocrine,

and metabolic processes that predispose an individual to degenerative chronic disorders manifested decades later. The recent IOM report *Shorter Lives, Poorer Health* that explores why the United States is the sickest of rich nations also highlights that the health of children in the United States falls far behind the health of children in other nations and that these life course determinants cannot be ignored (Woolf and Aron 2013).

Perhaps the most salient and obvious reason for MCH to adopt a life course perspective has come from the epidemic of childhood obesity, which has demonstrated how childhood growth can influence rates of the most common and costly adult health conditions, including diabetes and cardiovascular disease (Gillman 2004). It has also shown how a mother's prenatal health, along with her preconception weight, influences pregnancy outcomes, the likelihood that an infant will be obese, and the potential for lifelong obesity and resultant comorbidities (Oken and Gillman 2003; Gillman et al. 2008).

For at least the past two decades, life course health science research has been reframing our approach to many persistent health and health-care issues, from infant mortality to obesity, and from school readiness to lifelong cognitive potential and reserves. This research has influenced thought leaders, researchers, policymakers, and service providers to consider the importance and essential role of MCH as a vehicle for improving health outcomes for mothers and children and, ultimately, for the population as a whole. In 2010, as MCHB celebrated its 75th birthday, Peter Van Dyck, the Associate Administrator of the Health Resources and Services Administration and Director of MCHB, announced that the Bureau intended to launch a national dialogue about the importance of life course health science in reaching MCH goals. He also highlighted how MCH could use this science to help research, programs, policies, and partnerships coalesce around moving life course theory into life course practice. The transformation would be accomplished by an integrative approach to understanding how health and disease develop. However, although this transformation is aimed at creating a rigorous approach to the study of the development of heath across the life-span, there is no doubt that there are still many outstanding questions about the relationship between early experiences and lifelong health and well-being, and about how existing and emerging knowledge can be applied to the development of evidence-based practice and policy.

Unfortunately, the lack of a strong research and data infrastructure, coupled with limits on funding currently available in the United States to support the development of new methodologies and collaborative approaches, has hampered the production of the transformative, transdisciplinary, and translational research that is needed to advance the emerging field we have termed "life course health development" (LCHD). Moreover, the fact that researchers who are interested and engaged in LCHD research continue to work in discipline-specific silos has been a significant impediment to rapid progress. In recognition of and response to these challenges, in 2010, MCHB issued a Request for Proposals to develop a Maternal and Child Health Life Course Research Network (LCRN) that would be charged with providing a virtual platform and undertaking a set of activities that would together serve as a new infrastructure for catalyzing progress and enhancing funding to support basic,

theoretical, and applied and translational LCHD research of relevance to MCH practice and policy.

The UCLA Center for Healthier Children, Families, and Communities – with the support and participation of a diverse array of colleagues from around the United States – submitted a successful application to establish an LCRN with the following goals:

1. Engage a diverse, active, and sustainable community of LCHD stakeholders.
2. Increase capacity for, engagement in, and production of LCHD research.
3. Catalyze the translation and application of LCHD research to practice and policy.

To launch the LCRN, the UCLA team initiated a strategic network design process that engaged individuals with substantial expertise in health development, as well as those with deep knowledge of the science of network development and facilitation. This strategic design process included a series of interviews with key informants (see http://www.lcrn.net/tag/expert-interviews), as well as an in-person meeting of the network's 30-member design team that resulted in the approval of the LCRN charter (see http://www.lcrn.net/wp-content/uploads/2012/07/LCRN-charter-2.pdf), the development of a scope of work comprised of specific activities intended to achieve the network's aims, a concept for the network's online presence including a website and social networking platform, and the constitution of an advisory committee that would provide UCLA project staff with guidance for the duration of the project (see http://www.lcrn.net/about).

Following the design meeting, project staff undertook a process to develop a series of background papers that would serve as the basis for the MCH Life Course Research Agenda-Setting Meeting that took place in February of 2013 in order to achieve the following aims:

1. Catalyze a paradigm shift in how researchers, practitioners, and policymakers think about, understand, and promote LCHD.
2. Evaluate, refine, and determine the utility of the seven proposed principles of LCHD.
3. Identify the ways in which the topics discussed at the meeting are converging and/or diverging across disciplines.
4. Identify knowledge that is ready for application in order to assist MCH and other practitioners in taking advantage of what we know now and speeding the progression from research to translation.
5. Provide recommendations that will enable the LCRN to develop an MCH Life Course Research Agenda (LCRA) that includes priorities in the areas of basic research, translational research, and methods and data development.
6. Provide background paper authors with input that will advance their papers toward completion and publication.
7. Identify next steps for both the LCRN and the LCHD field as a whole.

Background paper topics were selected by project staff with the input of the LCRN advisory committee and MCHB staff, and included topics that were selected strategically due to their potential to enhance our understanding of health development and advance the LCHD field, as well as topics that were selected more opportunistically when researchers learned of the project and wanted to ensure that the issues of importance to them had a chance of making it into the preliminary version of the LCRA, version 1.0 (see concluding chapter of this volume).

The 2013 agenda-setting meeting brought together 90+ invited stakeholders including researchers, practitioners, policymakers, funders, and other thought leaders from the United States, Canada, and the United Kingdom. Over the 2-day meeting, participants engaged in a highly facilitated process of reviewing the evidence base and providing the background paper authors with the feedback they would need to complete their research and develop a set of recommended research priorities. A highlight of the meeting was to critically examine the seven proposed principles of LCHD (see Halfon and Forrest in this volume) that were intended to provide a more unified theoretical foundation and a more consistent set of terminology for this emerging field.

Following the agenda-setting meeting and in response to the enormous amount of momentum and enthusiasm generated among the participants, UCLA staff, again with the guidance of the LCRN advisory committee and representatives from MCHB, began to pursue development and publication of a volume that would contain revised versions of the background papers, as well as several chapters to be commissioned based on gaps identified at the agenda-setting meeting, plus a preliminary version of the LCRA. To this end, a four-member LCRN editorial team was constituted and charged with working closely with the background paper authors to ready their drafts – with a particular focus on trying to align the chapters with regard to the terminology and, more importantly, the conceptual frameworks underlying the writings – for inclusion in the Handbook of Life Course Health Development, and develop additional chapters and material as needed.

Concurrent with the preparation of this volume, the LCRN has produced three unique webinar series, organized research nodes focused on particular topic areas, developed strategic partnerships aimed at enabling the translation of LCHD research to practice and policy, and produced several peer-reviewed publications, among other activities. We invite readers to learn more about the LCRN – including how to join – at lcrn.net.

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