Chapter 16

Translating Evidence to Policy

The Challenge for DOHaD Advocacy

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16.1 Introduction: DOHaD over Two Decades

Maternal, newborn, child, and adolescent health (MNCAH) is clearly established to be a driver of health across the lifecourse and generations [1]. It is now 20 years since the founding of the International DOHaD Society, based on the research themes of the Fetal Origins of Adult Disease (FOAD) established by David Barker and others at the end of the last century. From its inception, Developmental Origins of Health and Disease (DOHaD) research largely focused initially on metabolic control and the major organ systems, such as cardiovascular, lung, and kidney; it also focused on pathophysiology rather than on normal development. It took some time for the incorporation of phenotypic variation in normal development to be recognised as part of the continuum of adaptive and maladaptive developmental plasticity [2, 3]. Similarly, the field has been slow to recognise that the same conceptual paradigm applied to the effects of developmental processes on brain development and socio-emotional health – with effects in the short term on infant and early childhood neurocognitive, emotional, and behavioural development – and then on school readiness, educational attainment, employment prospects, and wider contributions or costs to society [4, 5]. [See also Cohen in this volume.]

Research in DOHaD accords with other agendas that have developed in parallel over the last two decades, such as The First 1000 days and Best Start to Life [6, 7]. It is referred to in the 2011 UN Political Declaration on the Prevention and Control of NCDs [8], the 2015 Global Strategy for Women's, Children's and Adolescents' Health [9], and the 2016 report of the WHO Commission on Ending Childhood Obesity [10]. From this point of view, it could be argued that DOHaD has already been translated to inform policymaking at an international level. However, it has only been referred to in very general terms rather than indicating or identifying specific interventions, and so it has not influenced policymaking significantly. Even the lifecourse concept that underlies DOHaD has not been widely adopted within health policies, for example in Europe where a specific review was commissioned [11].

Although the epidemiological observations of Barker and other researchers in FOAD and DOHaD initially focused on high-income countries (HICs), it was clear from the outset that the insights into the impact of early development on later health and disease would be even greater in low-middle-income countries, especially as their societies passed through nutritional and economic transitions towards aspects of HIC lifestyles [12]. From this standpoint, much of DOHaD thinking was reflected in the Sustainable Development Goals (SDGs; e.g. Target 3.4 that aims to reduce by one-third premature mortality from NCDs by 2030). Again this was largely aspirational and not linked to specific actions. Since 2015, many additional challenges to health have arisen globally, in

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particular those stemming from the COVID-19 pandemic, continuing food insecurity, the accelerating impact of climate change and environmental degradation, and conflict and economic factors leading to large-scale migrations. The midterm evaluation of progress towards attaining the SDGs shows that insufficient progress has been made [5] and most areas of MNCAH have even deteriorated [13].

An aspect that is only now receiving significant attention concerns the ethical, moral, and social justice arguments for advocating greater policy focus on the application of DOHaD science. (See Chiapperino et al. and Kenney and Müller in this volume.) Many forms of disadvantage are passed across generations in multiple ways, and this raises questions about individual and societal responsibilities to protect the environment and the health prospects of future generations. DOHaD research has extended our understanding of intergenerational disadvantage, including the biological mechanisms by which environmental influences can project across generations to have significant implications for their future well-being. Examples of these mechanisms include having a shared nutritional environment [14], microbiota transfer [15], and the influences of maternal mental state on offspring brain development [16]. Epigenetic processes may play a role in embedding these intergenerational embodiments of disadvantage [17].

Maternal, newborn, child, and adolescent health is particularly vulnerable to the detrimental effects of challenges faced by societies, as is clear from the effects of COVID-19, climate change, and conflict, all of which are known to exacerbate pre-existing inequalities in MNCAH. Examples from COVID-19 include unplanned pregnancies resulting from lack of access to contraception, missed child vaccinations, teenage girls dropping out of school, and domestic violence [18]. DOHaD insights therefore provide an understanding of how the bedrock of social and economic resilience of societies to such challenges, now and in the future, can be undermined, and make a powerful argument for greater investment in MNCAH during socio-economic shocks [19].

The UN Global Strategy for Women's, Children's and Adolescents' Health (2016–2030) states that economic investment in this area will yield a tenfold return [9] (but see the chapter by Cohen in this volume). This argument is based on the long-standing work of the Nobel Laureate in Economics Professor James Heckman and his team; even so there are compelling reasons to think this may be an underestimate [20, 21].

For these reasons, DOHaD researchers need to equip themselves to argue that their research and concepts should inform health and wider policymaking. To a great extent, this has not happened. Here we discuss why.

16.2 Understanding the Role of Scientists in Policymaking

Translating scientific knowledge and evidence into policy is far from straightforward. Science alone rarely makes policy; there are always considerations that extend well beyond the ambit of science and that mostly lie with policymakers and society [22, 23]. While science itself is not value-free, many other value-based considerations influence decision-making. All policymaking involves making a choice (including whether to act or not), and in making such choices, decision-makers must assess which stakeholders benefit from a decision, and which do not. This is core to the political dimension of policymaking [24].

Science has its own distinct cultures, methods, and epistemologies and is not simply a matter of assimilating 'facts' universally agreed by researchers [25]. Even though it may

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be badged as objective, in reality science too involves value judgements, for example over what questions to investigate and how to do so, and especially over the sufficiency and quality of evidence from which to draw conclusions [26]. Such values – which may vary between disciplines, research teams, or institutions – shape the knowledge about which there is consensus. Policymakers also have their own cultures and values, which are likely to accord more closely with wider social values than with those of scientific researchers. Faced with this potential gap, there is increasing recognition of the need for boundary structures and processes to broker the interchange between science and policy [23].

Scientific data, however robust, do not equal information, or the knowledge and evidence that policymakers will accept as sufficiently important or compelling to necessitate a potential policy initiative. Moreover, policymakers have many sources of information in addition to that from scientists – tradition and beliefs, local knowledge, anecdotes, and the personal representations made to them all the time by a range of stakeholders or 'experts'. Science is but one source of such information, and when it is constantly contested, by scientists themselves as well as other constituencies and wider dissemination of misinformation, its impact is diminished. Scientists should not put the policymaker in the position of being a scientific referee as this will lead to uncertainty and inaction [23].

It is therefore more important than ever for scientists to understand how policymaking works, recognising that it is not a linear process and does not necessarily have clear or straightforward objectives. It is usually shaped by acute external factors, as well as by political and societal values. In addition, politicians increasingly must make decisions on a very short timescale, perhaps even a few days for major issues, with suboptimal information and little opportunity to consult experts. They are unlikely to be trained in scientific methodology. They will have to depend on input from civil servants, who may have considerable experience but who may also bring their own agendas and reflect departmental priorities.

Policymaking is thus essentially about making choices between different options that affect different stakeholders in different ways, and with different consequences, many of which are not certain. Virtually all policymaking involves complexity, uncertainty, and a degree of risk. But perceptions of complexity and risk vary, not only between scientists and policymakers but also between government departments too: a policy that seems to carry a low risk for the treasury may have an unacceptably high risk for a defence department.

The so-called 'policy cycle' almost never operates as is sometimes suggested in textbooks, and perhaps it never did except in the minds of theorists [22]. The cycle (awareness raising > problem definition > identification of options > policy selection > implementation > evaluation) is manifestly cumbersome and time-consuming and requires consensus and concerted action across government departments. Getting beyond the mindset of the policy cycle first requires recognition of the complex nature of policymaking and ensuring that awareness-raising by scientists addresses what policymakers need.

There are two distinct components to translating evidence to policymaking: evidence synthesis and evidence brokerage. Evidence synthesis must be much more than a narrow summary from a single field of science. It must be pluralistic and consider all the domains that might impact on achieving a policy goal and the questions that will matter to a policymaker (e.g. direct and indirect impact, effect size, and so forth). Evidence

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brokerage requires individuals who are skilled in the language and needs of both the policy and scientific communities and are able to translate between them. This requires what has often been called honest brokerage [27]. The basis of effective brokerage is being clear about what the science shows, what questions it does not answer, and what options emerge from it [23].

Problem definition by scientists does not help the policymaker. They expect the science community to present solutions they can enact. So when problems are presented they must be accompanied by solutions that are scalable, impactful, and supportable both ideologically and by a broad range of stakeholders [22]. In general, this favours attention to problems that have an identifiable single solution rather than a complex and complicated set of potential solutions. Yet, DOHaD science is unlikely to deliver simple single interventions with significant impact; rather it indicates the need for a broad shift in attitude and priorities within the policy and political community. A further complexity is that while interventions must be early in the lifecourse, the economic return accumulates over many subsequent decades [20, 28, 29]. Indeed, as has been suggested in areas such as climate change, issues where the return is in the distant future are unlikely to secure urgent political attention [30]. This is not helped by the use of discounting in economic forecasting [31], which argues against the deployment of funds to address long-term objectives, especially those affecting the beginning of life.

16.3 Translating DOHaD: What Do Policymakers Need from Scientists?

Any solution to a problem presented to policymakers must be based on a high degree of scientific consensus. This is seldom the case; scientific research by its nature competes for funding and recognition. Thus policymakers will be justifiably suspicious if the suggested solution is simply a disguised request for more funds for an area of research.

Even where there is consensus within the scientific community, it must still be presented to policymakers without hubris, condescension, or alarmist speculation. Wherever possible, economic and societal-value considerations of the proposed solutions need to be included, but again these should not stray beyond evidence. The gathering of such evidence may require participatory research, for example with a population or patient group, but this is time-consuming and raises its own methodological problems, especially where children and adolescents are concerned. (See Tu'akoi et al. in this volume.)

DOHaD science in many ways has not matured to the point where this participation has been achieved. Nor has the scale of the solution to the problem it encompasses been adequately defined. For example, while it is widely accepted that the risk of later NCDs has in part its origin in early life, and while there is no dispute that over 70 per cent of deaths globally every year result from NCDs [32], the contribution of DOHaD processes to the risk, *vis a vis* unhealthy lifestyles in adulthood and genetic variation, is not really known. This needs to be addressed if future advocacy is to be effective. At present, the strongest advocacy for DOHaD involves the counterfactual, based on untestable assumptions; that is the health and financial cost of inaction rather than the benefits of action.

DOHaD is a multidimensional issue, so interventions to address it will be complex. However, there is a lack of compelling research showing the benefit of such interventions. Rather, based on the evidence to date, a likely programme of intervention would involve a diffuse set of recommendations for preconception health for both parents,

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pregnancy management, nutrition, and nurturing care for the early years. Recommendations involve in part changing individual behaviour and in part structural issues concerning inequality and intergenerational disadvantage; these are holistic issues that challenge all governments and societies. There are no good precedents on which advocacy can be based.

DOHaD science will inevitably suffer from the fact that it advocates for preventive measures to address future burdens of ill health. Policymakers are not likely to act on prevention measures other than vaguely agreeing that 'prevention is better than cure' [33]. Because the benefits of an intervention based on DOHaD science will accrue at some point in the future well beyond the duration of an electoral cycle or two, it is unlikely to convey any sense of urgency. For this reason, DOHaD advocacy needs to encompass the short- (e.g. pregnancy outcomes and socio-emotional health in the pre-school years), medium- (educational attainment, adolescent health, and well-being), and longer-term (NCDs) implications of its evidence.

A first question policymakers will inevitably ask when presented with the evidence for a solution will be the following: given all the competing demands on resources and the interests of a range of stakeholders, do they need to do anything about it and, if so, when? As in other areas of advocacy for a cause, the evidence behind the message is only one aspect of the process; at least as important can be who is conveying the message and how it is framed. Clearly DOHaD needs to employ its most influential spokespersons, but it also needs to couch its messages in terms of other policy issues that are relevant, such as climate change, the impact of pandemics such as COVID-19, economic development, and ongoing conflicts and migration. Each of these has detrimental effects on population health and economic consequences, and each raises questions of equity and social justice [34–36]. There is a strong argument that each of these challenges has the most pronounced short- and longer-term effects on MNCAH, and therefore insights from DOHaD research could be highly relevant to mitigating such effects.

It has to be recognised that most advocacy-based approaches to policymakers fail. Persistence and reshaping the brief with relevant influential stakeholders therefore need to be the key aspects of the process, built in from the start. It can be helpful to ensure that a multiple streams theory approach is adopted, by which the domains or streams of problem, policy, and political components are included [37]. It may then be necessary to wait for a window of opportunity to open, for example as a result of external events, which makes a change in policy desirable, necessary, or appropriate, so making reception of an advocacy approach more likely to be positive. Successful approaches usually involve a collaboration between and consensus among a range of groups. Therefore, DOHaD advocates need to work with allies and form allegiances in ways that have not been undertaken to date. Even more important is to work towards providing advocacy for 'the right intervention at the right time'. In practice, this means considering how a particular policy initiative might align with other ongoing initiatives. Spillover benefits may be critical, for example plans to address childhood obesity may have benefits for educational attainment.

While DOHaD has a broad agenda and relevance globally, nonetheless from a practical point of view any advocacy initiatives must be relevant and deliverable at a local level. This may involve comparisons between populations or regions and perhaps include accountability for previous commitments. DOHaD advocacy needs to link to ongoing initiatives and be locally adaptable as well as globally relevant.

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16.4 An Alternate and Complementary Approach: Devolved Solutions

DOHaD science effectively argues for a greater focus on the state of the parents before conception and on the support of the parent and infant in multiple ways through and after pregnancy, in the expectation that the offspring's potential through life will be protected or enhanced. Indeed, many of the later costs to that individual and to society are predictable from the age of about three [5, 38]. But the interventions needed are complex and context dependent. What might be appropriate in terms of nutritional advice for a family in a high-income country is not the same as that needed in a country where food insecurity is endemic. And even within a high-income country, there will be large foci of nutritional deficiencies within some components of the community. Further the very nature of the DOHaD challenge requires a multilateral approach that is both universal and targeted. For example, to focus on nutrition and not to consider emotional stress would be unlikely to improve outcomes significantly. That said, the DOHaD agenda aligns with wider issues of great concern, such as environmental despoliation and climate change, the impact of climate change, COVID-19, and the current cost of living crisis [39].

It is difficult in the current state of DOHaD knowledge to get beyond the conclusion that most progress will be made through local action. Certainly, this needs government support, but communities are in the position in many places to identify needs and to take action. However, this requires a new form of partnership with the science community, one that is meaningful and involves, codesign, respect for lay input, and a long-term commitment. This type of action-focused transdisciplinary research is neither easy to do nor easy to fund. It requires researchers to get out of their comfort zones, and it requires a commitment to long-term engagement, which in turn does not fit well with traditional academic incentives. Building trust with a community, adjusting scientific ideas to local knowledge and expertise, and through a local cultural lens can require sustained commitment before anything concrete can be planned. Many issues here outside the scope of this review are discussed in this handbook and elsewhere [40]. Yet if the DOHaD community is to see its knowledge turned into action, local engagement offers a productive and rewarding pathway. In turn, with a local focus, a broader form of advocacy for wider action is created.

16.5 Final Comments

Since the field first emerged, most DOHaD research has been premised and designed on the assumption that a singular developmental trigger would change biology with specific latter outcomes that manifest under particular conditions [41]. That model assumed that devising a singular intervention might be possible. But, 35 years on, it is clear that subsumed within the DOHaD 'space' are multiple and overlapping ways in which the developmental trajectory can be affected that in turn can have variable impacts later depending on genetic influences and later environmental exposures. With this understanding comes the need to think differently about how DOHaD knowledge enters the public domain. This requires partnership with others committed to the MNCAH field and translation of DOHaD knowledge and advocacy into a greater awareness of the importance of intergenerational health and circumstance. The solutions needed do not

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involve singular interventions and will require a reorientation of society and community values. An approach in part focused on the community, in part on the policymaker, is required. The DOHaD research community itself must now also evolve to meet these obligations.

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