A life course approach to reducing the NCD burden in low- and middle-income countries

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Foreword

Many members and partners of the UK Working Group on Non-communicable Diseases (UKWG) promote the implementation of NCD prevention and management interventions that take a life course approach through advocacy, research, and direct service delivery. Work from, or funded by, several UKWG members is featured in this report (The George Institute for Global Health, NCD Child, the Global Alliance for Chronic Diseases (GACD), and Worldwide Hospice Palliative Care Alliance). New evidence-based approaches for implementing health interventions that take a life course approach in LMICs will also be generated through the GACD's 2021 funding call focused on NCD prevention.

Introduction

Non-communicable diseases (NCDs) – which include cardiovascular diseases, respiratory diseases, cancer, diabetes and mental health conditions – kill 41 million people each year, and 77% of these deaths occur in low- and middle-income countries (LMICs) (1). Tobacco use, physical inactivity, and the harmful use of alcohol, mental stress and trauma, and unhealthy diets all increase the risk of NCD onset and contribute to the progression of existing disease.

The World Health Organization advocates that policies and programmes take a **life course approach** to addressing the rising global burden of NCDs (2). Despite the ubiquity of this term in public health literature, the WHO and others do not provide a consistent definition. In January 2022, the UKWG conducted a survey of representatives from organisations addressing NCDs in LMICs through direct service delivery, research, and/or advocacy initiatives. Of the 16 respondents, we found that only 25% indicated that they were 'very confident' that they understood the definition.

Part of the uncertainty about its definition lies in a debate around whether the term 'life course approach' can only be ascribed to interventions that target periods in early life, or if this term might also appropriately be used to describe interventions that target other life stages. Indeed, early life represents a critical period for reducing harmful and promoting healthful physical, environmental, and psychosocial exposures. Response to changes in such exposures is more robust and more durable in early life, with evidence that interventions during this period can help shape future health even decades later (3). However, the WHO and others (2, 4) are increasingly using the term life course approach in a way that better aligns with the themes of universal health coverage, in the sense that proponents of both call for health interventions across the entire lifespan.

In response to the lack of clarity around the term, the UKWG has developed a description of life course approach as it relates to preventing and managing NCDs:

> A life course approach to NCDs involves maximising people's health and/or wellbeing throughout their lifespan, using holistic measures that aim to improve these factors. Such measures typically target a combination of social, environmental, economic, and lifestyle determinants of health.

A life course approach involves adapting health and/or wellbeing-promoting interventions to facilitate their effectiveness and acceptability within certain life stages (*e.g.,* adolescence, older age), or during key transitions within or between life stages (*e.g.,* high school graduation, retirement). The targeted life stage(s) or transition(s) are key periods when health-impacting behaviours are established, and/or when environmental exposures are more likely to affect health. The targeted life stage(s) are thus inflection points for future health and/or wellbeing across the rest of the individual's life, with potential intergenerational effects.

In this report, seven examples are presented, demonstrating real-world application of a life course approach at distinct life stages with the aim of reducing the burden of NCDs in LMICs. We hope that the clarification of life course approach terminology and examples of its application will drive the adoption of this approach among policymakers, researchers, and implementers, thereby strengthening policy and programmes that target NCDs and improve global health equity.

Key findings

Through the compilation of these case studies, the following themes emerged:

1. Adapting an intervention to a particular life stage may create opportunities for influencing health at other life stages, even if the intervention is not delivered directly to individuals in these other life stages. For example, behavioural interventions that target children and young people may also influence behaviour in those close to them, such as older siblings, parents, and grandparents. As another example, interventions targeting mothers during pregnancy can also impact the baby's lifelong health. *(Case studies 1, 2, and 4)*

2. Life stage is not the only important factor in tailoring an intervention to a specific population; consideration of gender, sexual orientation, and other protected characteristics is often necessary to deliver effective interventions. (*Case studies 1, 3)*

3. NCDs do not exclusively appear in middle-aged and older adults. This means that treatment options, including affordable and accessible medications and behavioural change interventions, also must be tailored to children and young people. *(Case studies 2–4)*

4. Interventions to prevent NCDs should be delivered throughout the life course, including in older adults with existing NCDs. (*Case studies 1–7)*

5. Due to the longitudinal outlook associated with the term 'life course approach,' it is debatable about whether this term can apply to end-of-life care. We argue that it can be; even if the timeline between advanced disease and death is short, end of life nevertheless marks a key transitionary period in the life course. *(Case study 7)*

Pregnancy and the first 1000 days

A mother's experience in pregnancy can predict her future NCD risk. In some women, physiological changes that occur during pregnancy trigger the onset of NCDs such as gestational diabetes, hypertensive disorders, and mental health conditions. While these conditions might resolve shortly after giving birth, they also signal increased future risk for chronic non-communicable diseases (5). Women with gestational diabetes, for instance, have seven times higher risk of developing type II diabetes compared with women without gestational diabetes. Hypertensive disorders in pregnancy, such as preeclampsia, can double or triple the risk of future chronic hypertension. Moreover, the increased risk for hypertension and diabetes becomes evident just 5 to 10 years after giving birth. Many women also suffer postpartum depression, which can lead to recurring episodes of depression throughout her life.

The babies of these mothers are also impacted. Babies with mothers who have gestational diabetes and/or hypertension have lower average birth weight and higher incidence of prematurity, whereas babies with mothers with postpartum depression demonstrate lower mood and poorer mother-infant attachment (6). Maternal NCDs during and just after pregnancy thus impact the baby's health during the critical period of its first 1000 days (from conception to age two years), and even affects the baby's lifelong NCD risk.

There is a limited but growing evidence base describing how to target NCDs during pregnancy in LMICs and other under-resourced contexts (7–9). Pregnancy offers an optimal moment for intervention, as the infrastructure for delivering antenatal checks is well-established in most LMICs (10). This enables the embedding of NCD care into existing maternal and infant health programmes, offering an opportunity to reduce lifelong NCD risk for both mother and baby (7).

Case study 1: SMARThealth Pregnancy in India

Pregnant women in rural India frequently struggle to access health care necessary to control risk factors that can impact pregnancy outcomes as well as future NCD risk. The SMART*health* Pregnancy programme, led by Prof Jane Hirst (University of Oxford) and Dr D Praveen (the George Institute for Global Health, India) aims to address this challenge by improving the detection, referral, and management for the three most common high-risk pregnancy conditions in rural India: gestational diabetes, hypertension, and anaemia.

Community health workers known as ASHAs (Accredited Social Health Activists) deliver much of the outreach services in rural India. The intervention includes an education programme for ASHAs, as well as a low-cost tablet App to support their clinical decision making and electronic referral to the primary care centre. ASHAs screen women at several designated timepoints during their pregnancy and provide assessments after birth that coincide with routine infant immunisations. Through their participation in the study, primary care doctors receive a complimentary tablet App to support evidence-based prescribing and management for patients whom the ASHAs refer.

In 2020, the results of a pilot study involving 200 women demonstrated the feasibility and acceptability of the intervention. In 2021, the research team commenced an ongoing larger trial in the states of Telangana and Haryana, which aims to recruit 3400 pregnant women and randomise them to either the SMART*health* Pregnancy intervention or treatment as usual. Project participants will be followed until the babies' first birthday to evaluate if SMART*health* Pregnancy successfully reduces anaemia after birth and improves postpartum detection and management of identified cases of diabetes and/or hypertension. In addition to monitoring health outcomes, the team is evaluating the economic and implementation aspects of the programme, and concurrently developing a new module of the App to support women's mental health.

More information about SMARThealth Pregnancy is accessible on the University of Oxford and The George Institute for Global Health webpages. Support for this project is provided by UK Research and Innovation. Please contact Prof Jane Hirst (jane.hirst@wrh.ox.ac.uk) or Dr D Praveen (dpraveen@georgeinstitute.org.in) with any questions about the intervention.

Childhood

In childhood, behaviours are established that are critical for healthy development, and accessibility to healthy foods, safe places to exercise and play, and clean air are imperative (2). As most children attend school, there are opportunities to offer interventions with wide-scale reach that improve accessibility to needed resources, reduce socioeconomic disparities, and instil healthy behaviours at a young age, facilitating a healthy transition from childhood to adolescence and beyond. In addition, children typically live with older caretakers including parents and grandparents, and thus interventions aimed at children can also offer an opportunity to influence health at other key life stages. Given the growing burden of children living with NCDs, interventions that are tailored to children and their families should include a mix of both preventative measures aimed at those without existing disease, as well as screening and treatment options that can delay or stop disease progression and reduce the risk of poor future health outcomes (11).

Case study 2: School-EduSalt in China

High salt intake is a major risk factor for heart disease and stroke and even a modest reduction in salt intake can lower blood pressure and the risk of cardiovascular disease. In China, salt intake is high in both adults and children, and unlike in developed countries, the major source of salt in the Chinese diet is salt added during food preparation at home. Behavioural change around salt intake is thus critical but difficult to achieve; to date, no countries have introduced a successful programme to reduce salt intake through education. The School-EduSalt (School-based Education Programme to Reduce Salt) study tested a novel approach in China to lowering salt intake in children, and by extension, in their family members. In China, children have considerable influence in their families, and the study's approach was to educate children at school about the harmful impacts of excess salt intake and to encourage students to take these lessons home to their families.

From 2012–15, a team of researchers from the UK and China conducted the study in 28 primary schools in northern China. Teachers were first trained to deliver the intervention; lessons were then delivered to students over one semester (approximately 3.5 months). The trial found that educating primary school children was successful in reducing salt intake by around 25% in both children and adults, accompanied by a significant decrease in the adults' blood pressure.

In 2017, the team established an NIHR Global Health Research Unit called 'Action on Salt China' (ASC). Building on the findings of School-EduSalt, one strand of the ASC was to investigate whether a smartphone application-based education programme (AppSalt) could lower salt intake in schoolchildren and their families. The programme was delivered through primary school settings. Children's homework was to get the whole family involved in the salt reduction activities following the guide in the app which was installed on parents' smartphones. The study involving 54 primary schools in northern, central, and southern China, and demonstrates that this App-based education programme is feasible and effective in lowering the families' salt intake over one year.

The research team is now working alongside policymakers and educators to scale the education model using the 'child-to-parent' approach in three cities in China (Zhenjiang, Ganzhou, and Qinhuangdao), with the intention of reaching students in 300 schools (EduSaltS). The salt reduction courses are delivered through a smartphone App. More than 54,000 students from 208 primary schools and their families have participated in the scale-up phase thus far, with the number expected to grow. Preliminary results demonstrate widespread acceptability and uptake of the programme.

School-EduSalt is also informing efforts to reduce salt intake elsewhere. Modelled on the School-EduSalt trial, a research team carried out a salt reduction study in Malawi, the 'NoToNa' study (2018–21), funded by the UK MRC.

You can read the full description of the intervention and the results of School-EduSalt study in the British Medical Journal (2015) 350: h770 https://doi.org/10.1136/bmj.h770 and the AppSalt study in the *British Medical Journal (2022) 376: e066982 https://doi.org/10.1136/bmj-2021-066982. The School-EduSalt study is supported by the UK Medical Research Council (MRC), funded under the Global Alliance for Chronic Diseases Hypertension call; the ongoing EduSaltS study is jointly funded by UK MRC and NIHR under the Global Alliance for Chronic Diseases Scale-up call, and the AppSalt study was funded by NIHR (16/136/77) using UK aid from the UK government to support global health research. You can contact the project co-Principal Investigators, Professor Feng He, Queen Mary University of London, at f.he@qmul.ac.uk or Professor Puhong Zhang, George Institute China, at zpuhong@georgeinstitute.org.cn for additional information.*

Adolescents and young adults

The WHO defines young people as those between the ages of 10 and 24 years, which is comprised of the overlapping groups of adolescence (ages 10–19) and youth (15–24) (12). Seventy percent of preventable deaths from NCDs in adults have been linked to risks encountered, and behaviours that started, during adolescence (13). With a population of approximately 1.8 billion, young people comprise a quarter of the world's population, and almost 90% live in LMICs (14). This life stage thus marks a period of emerging independence and an important time for laying the foundations of good health (15).

While NCD prevalence increases with advanced age, there are also millions of young people globally living with existing NCDs. Young people in LMICs with NCDs often die prematurely because of lack of access to such interventions, or suffer from long-term disabilities from chronic conditions that are not adequately managed, especially mental health conditions. Thus, just as in children, tailored approaches to managing NCDs, including behavioural and pharmaceutical interventions, are also required during this life stage (16, 17).

Case study 3. Providing mental health support and sanctuary to vulnerable young people in Ethiopia

Adolescence typically accompanies recognition of one's sexual orientation, and non-straight youth often face social discrimination, leading to mental health conditions and increased drinking, smoking, and other coping behaviours linked to increased risk of NCDs (18, 19). In Ethiopia, there are consistent reports of societal discrimination against non-straight people, and same-sex relations are illegal and punishable with imprisonment (20). This has forced this community to remain hidden, as its members feel unsafe to reveal their identities.

In 2021, the Women and Children Welfare and Development Organisation responded to the mental health burden in this community by initiating a novel mental health care and psychosocial support (MHPSS) programme for youth in Addis Ababa, Ethiopia, in partnership with the Human Rights and General Well Being Support and Development Organisation and with funding from Our Right Action International. As part of the programme, MHPSS experts trained peer volunteers with direct or indirect experience of mental illness to identify, enrol, and provide support to young members of the community. The peer volunteers interacted with the enrolled participants weekly and responded quickly when participants missed or terminated their participation to ensure minimal loss to follow-up. Programme activities included weekly focus group discussions, recreation activities, and emotional support at a friendly safe space at the youth centre.

The programme carefully monitored qualitative and quantitative indicators, and found that it successfully improved the lives of young people. The programme was well-received, with over 270 participants, and evaluations showed that the programme successfully improved participants' self-esteem and autonomy,

created a sense of community and belonging, and identified and referred cases of mental illness to specialists. Perhaps most importantly, the programme provided a safe space for the 50 young participants who had been victims of physical and emotional violence from friends, family, intimate partners, and other community members. This programme thus provided sanctuary and responded to the health needs for one of the most marginalised populations in Ethiopia, but it has not been able to continue due to funding cuts. In addition to responding to immediate health and wellbeing needs, this programme demonstrated a life course approach to NCD care because it provided psychosocial skills and a strong community for young people, empowering them to make healthy choices that protect against future NCDs, including recurrent mental illnesses and physical conditions linked to poor mental health.

To find out more about the Women and Children Welfare and Development Organisation, please contact Dr Abel at lgbtq@wacwado.org or visit https://wacwado.org/.

Case study 4. School nutrition programmes improve the health of entire families in Eswatini

Action Against NCDs is a volunteer-driven, grassroots organisation that was created when Lindokuhle Sibiya, its co-founder, noticed that adolescents with diabetes were dropping out of school in Eswatini. This organisation proactively prevents NCDs within communities as well as helps people living with NCDs develop healthier habits that delay or halt the progression of their disease. In partnership with multiple government and NGO partners, Action Against NCDs develops educational programmes and plants school vegetable gardens with the aim of teaching students ages 14 through young adulthood how to grow, select, and cook healthy foods. In addition to working with schools, Action Against NCDs reaches teenagers and people into their 30s who have dropped out or graduated from school by working with neighbourhood community centres to deliver health education courses. To incentivise the most vulnerable young people to join these courses, Action Against NCDs partners with local businesses that offer food donations to those who are struggling with poverty and are at the greatest risk of poor health.

Action Against NCDs decided to target its programme to young people as they are most likely to be responsible for cooking for their families, and they are also more likely than other age groups to be social media savvy and to share what they learn virtually. Thus, by educating a young person about healthy eating and cooking habits, a young person will provide healthy meals to their entire families, benefitting both older and younger generations. While girls tend to be more active participants in the cooking portion of the intervention due to gender norms around domestic work, boys and men are also able to experience nutritional benefits for this same reason.

Action Against NCDs' programme exemplifies a life course approach because it targets a health intervention to a specific life stage – in this case, adolescents and youth – with the objective of instilling healthy behaviours that can protect lifelong health. Action Against NCDs' programme demonstrates that a focus on a specific life stage and a gender-sensitive approach can provide an entry point to sharing public health messaging with the larger community, leading to multi-generational impact and widespread reduction in NCD risk.

To find out more about Action Against NCDs, please contact Lindokuhle Sibiya at lindokuhlelindokuhlesibiya@gmail.com.

Middle adulthood

Middle adulthood is a period of elevated risk for NCD onset, requiring, in addition to prevention interventions, more robust screening and concentrated effort to interrupt the progression of any detected diseases, both through behaviour change and medications (1). In middle adulthood, behaviours may become more entrenched and resistant to change compared to earlier in life. Individuals focused on career, raising children, and caring for older family members may have limited time or resources to focus on their own health (21). These factors, on average, reduce interactions with the health system in middle adulthood and thus opportunities for intervention, and also provide a barrier to adherence to prescribed interventions. Working hand-in-hand with adults to identify which health problems to prioritise and co-

designing solutions that accommodate busy routines is thus critical for instilling healthful change, reducing physical and mental decline, and establishing a positive pathway towards healthy ageing.

Case study 5. A partnership approach to offering community-driven, affordable NCD care in Indonesia

Since 2002 in West Java, Indonesia, the Faculty of Nursing at the Universitas Padjadjaran has provided training to student nurses while also helping to address complex and expensive community health challenges using the cost-effective 'Nursing Centre Model.' The defining feature of this model are partnerships between student nurses and faculty nurse-academics with local communities and health authority through integration of nursing education, research, and community engagement. In this model, the nursing school students and faculty provide a framework for facilitating community-driven agenda-setting and securing local government buy-in for the proposed plan. In addition, the nursing students learn technical skills through the delivery of the agreed-upon intervention, with oversight from senior faculty. This model of care has recently been used to target the growing burden of NCDs in West Java, using an approach that tailors interventions to the needs of adults at different life stages, including middle adulthood.

Community members shape all aspects of interventions offered through the 'Nursing Centre model.' Nursing students regularly conduct community surveys, going door-to-door to understand concerns and the prevalence of certain diseases and risk factors. Nursing students then work with community leadership, such as respected religious leaders, to convene a town hall. Community members interpret the survey results based upon their lived experience, drive discussions about which of the identified health problems should be prioritised, and work together with health authorities and nursing students to co-design solutions.

In a number of recent meetings, community members highlighted non-communicable diseases as a major threat to the wellbeing of middle aged and older adults, and pointed to high levels of smoking, physical inactivity, and poor nutrition captured in household survey results as reasons for the elevated risk of chronic diseases. Community members decided that they would like to address this threat through health promotional activities.

In response, the Faculty of Nursing co-designed a multipronged approach to reducing NCD risk factors and helping patients with existing chronic disease manage their illness. Community members are able to access student nurses who can help monitor their blood pressure and blood sugar levels at regular community events, the frequency and location of which are selected to encourage uptake among busy adults. Exercise courses of various levels of intensity are offered to accommodate different age groups, and the timing of the classes are strategically selected to ensure that they will be accessible to most working adults.

Community members define meaningful evaluation indicators and outcomes, which may vary depending on the individual's life stage. Senior researchers from the Universitas Padjadjaran monitor these, and conduct randomised trials as necessary, to ensure the rigour and effectiveness of all programmes. Based on the results of multiple published studies, the Universitas Padjadjaran 'Nursing Care Model' offers a highly effective approach to reducing the NCD burden across the life course, including in middle adulthood, while simultaneously training the next generation of health personnel in delivering care, all at a lower cost than typical delivery models that do not use student practitioners.

The Continuity of Care Research Center, Faculty of Nursing, Universitas Padjadjaran, Indonesia lead this initiative. You can contact Dr Neti Juniarti at neti.juniarti@unpad.ac.id to learn more.

Older adulthood

The chances of developing and needing to manage chronic conditions increases with advanced age. Although many older adults have existing NCDs, there is clear evidence of the importance of continuing to modify risk factors for NCDs throughout older adulthood to avoid additional morbidity and adverse events, especially through interventions that promote healthy sleep patterns, hypertension control, physical activity, and good nutrition (22–4). Older adults also face heightened threats to mental health, including bereavement, financial stress, and social isolation. Instilling healthy behaviours in older adults, while also addressing wider social determinants of health, is therefore critical to maximising overall health and combating frailty and mental deterioration, which are directly linked with the older person's ability to maintain control over their daily activities. Loss of this independence can be catastrophic for an older person's wellbeing, and can have serious financial and wellbeing consequences on their (usually female) family members who often step in to provide care (25). Taking a life course approach to care for older adults, thus, often means taking a multipronged approach that is adapted to the needs not just of the older adult, but to the younger generation of carers.

Case study 6. Strengthening Thailand's long-term care capacity for older adults

A research team from Juntendo University in Japan, led by Professor Myo Nyein Aung is supporting Thailand in improving its health system and policies for the continuous care of older people, especially those suffering from and at the risk of NCDs. In 2016, 16% of the Thai population was 60 years and older, and this percentage is estimated to increase to 33% by 2040, making Thailand the third most rapidly ageing country in the world. While Thailand has a strong health care system and near-universal health coverage, its long-term care and insurance programmes are poorly developed. Similar to other Southeast Asian countries, care for older adults in Thailand is still primarily dependent on the family, and the burden on individual family members, especially on daughters, is growing as family sizes shrink. The long-term care burden in families can lead to caregiver job loss, abuse of older persons, and caregiver burnout. Moreover, family caregivers often do not know how to adequately manage the complex needs of older adults requiring long-term care, which can lead to worsening health and frailty, and health inequities between older adults whose families have the resources to hire trained health professionals and those that do not.

The goal of the research team is to identify a care model that will maximise the autonomy and mental and physical health of older adults for as long as possible while also reducing the burden of care responsibilities on their families. To this end, Professor Aung's team conducted a cluster-randomised control trial (the gold standard in clinical research) to understand whether a novel intervention called the 'community-integrated intermediary care model' (CIIC) could enhance and support traditional family-based caregiving.

The CIIC model is a complex programme that, consistent with a life course approach to prevention, includes interventions directed at both the older adult and their family caregivers. First, the CIIC model supports caregivers in identifying symptoms of physical or mental health decline (including the presence of NCDs) and in accessing resources available through Thailand's national insurance programmes and primary care system that can help prevent further loss of function and the need for more intensive long-term care. Some of the materials that are available through government programmes include home safety devices (e.g. rails for the bathtub) and equipment to support mobility (e.g. canes, walkers, wheelchairs). Second, the CIIC model also includes functional training for older adults, encouraging healthy ageing through an exercise programme that incorporates light cardio and resistance training.

In addition to programmes targeting older adults directly, the CIIC model directly supports family caregivers. It includes a screening initiative that continuously monitors family caregiver burden, and provides family caregivers with short-term stay facilities for older adults to complement their usual care when these responsibilities become overwhelming for the caretaker. Family caretakers are also given training courses, with the aim of improving their ability to support the long-term needs of their older adult family members, and thereby improving equitable outcomes among older adults.

Despite disruptions caused by the COVID-19 pandemic, Professor Aung's team found evidence of reduced caregiver burden at six months follow-up in the group that received the CIIC model compared to the control group. The older adults that received the intervention also experienced less functional decline and were less likely to experience depression. Professor Aung's model thus was able to amplify the existing benefits of Thailand's health care and insurance programmes and provide a previously-unmet strategy for long-term care – a model with global implications in the effort to move away from just treatment-focused approaches to medicine in older adults, and towards prevention activities that extend and promote autonomy and wellbeing, both for the older adult and their family caregivers.

To learn more about this study, please email Professor Myo Nyein Aung, Associate Professor, Juntendo University, Tokyo, Japan at myo@juntendo.ac.jp. Citations for the papers whose results are described in this summary are available in the 'Works cited' section of this report (26–8).

End of life

A good death is as important as a good life, and palliative care can help maximise mental wellbeing for patients in chronic pain, especially (though not exclusively) at the end of the life course (25). Nearly 80% of adult palliative care need is in LMICs, and approximately 70% of patients needing care suffer from NCDs (29).

The tenets of universal health coverage dictate that no one with a life-limiting condition spend their final months and days in unnecessary pain and distress, but currently only 12% of the global palliative care need is being met (29). Barriers include lack of specialised health training and lack of political will. In addition, there are legal restrictions and other access problems to pain-relieving medications in 83% of countries globally.

Case study 7. Panama's inclusion of palliative care into the public care system

Panama has emerged among LMICs as a noteworthy exemplar of addressing and overcoming some of the barriers to implementing palliative care services. In 1989, Panama embedded its National Palliative Care Programme within its existing primary health care system, a model that continues to present day. Palliative care is offered free of charge in keeping with the tenets of universal health coverage, and is available to those who are suffering at the end of their lives as well as to those with non-terminal disease. The programme was developed with the support of the Ministry of Health, and a new position was created within the Ministry to oversee the programme, demonstrating clear and continuous government will and support for the programme.

Some of the specific policy achievements that enabled the creation of this robust national model were amendments to the Controlled Substance Act to include essential palliative care medications, accreditation and approval of a specialisation programme in palliative medicine, and implementation of an annual evaluation process to oversee continued programmatic improvement.

The success and sustainability of the Panamanian model is attributed to the highly collaborative nature of the endeavour, which brings together passionate civil society advocates, health professionals, national and international non-governmental organisations with government. Government support has allowed this model to be embedded within existing health infrastructure, providing integration between treatment-based and pain-relief based models of care, and improving the overall experience for patients and their families.

More information about this project can be found on the Worldwide Hospice Palliative Care Alliance (30).

Conclusion

At particular life stages or transitions, individuals have, on average, similar behavioural patterns (e.g. attending school versus going to work; frequency of engagement with social media and technology); levels of engagement with health services; and exposure to NCD risk (e.g. partying with alcohol in adolescents, isolation in older adulthood). Recognising the distinguishing characteristics of each life stage, and tailoring NCD interventions accordingly, can help improve an intervention's feasibility and acceptability, and thus the likelihood that it will be sustained over the long term. Taking a life course approach thus offers an opportunity to ensure that effective interventions are available for, and delivered at, each life stage, reducing the global NCD burden, and advancing the goal of universal health coverage to make high quality care available throughout life.

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