

# Cancer pain management in Tanzania: using scenarios to explore critical interrelationships and potential interventions

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*Sponsored by:*



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# TABLE OF CONTENTS

<b>LIST OF FIGURES</b> .....	<b>IV</b>
<b>SUMMARY</b> .....	<b>IV</b>
<b>1. INTRODUCTION: WHY PAIN MANAGEMENT? WHY SCENARIOS?</b> .....	<b>1</b>
Pain management in cancer care .....	1
Using scenarios to explore complex interactions.....	2
<b>2. LANDSCAPE ANALYSIS OF CANCER PAIN MANAGEMENT</b> .....	<b>4</b>
Global insights.....	4
Pain management in Tanzania within the Eastern and Southern African context.....	6
Experiences of pain .....	7
Palliative care provision .....	7
Access to pain medication .....	8
Morphine ordering and distribution .....	8
The need/demand gap for morphine in Tanzania.....	11
<b>3. MAPPING CRITICAL SYSTEM INTERRELATIONSHIPS TO HELP TO ADDRESS THE NEED-DEMAND GAP</b> .....	<b>13</b>
Scenarios as an ICCA policy tool.....	13
Understanding the need-demand gap for opioids.....	13
<b>4. DOMAINS OF DISCUSSION FOR A STAKEHOLDER WORKSHOP: CLOSING THE NEED/DEMAND GAP FOR CANCER PAIN MEDICATION</b> .....	<b>18</b>
Workshop questions .....	18
Interacting innovations: what combination of innovations could best address the need/demand gap? .....	19
<b>REFERENCES</b> .....	<b>21</b>

## LIST OF FIGURES

Figure 1: ICCA 3-stage scenario process.....	3
Figure 2: Dimensions of cancer care and pain management development.....	4
Figure 3: Trends in availability of opioid analgesics for medical consumption, by region/subregion 1998–2018: lower availability regions .....	5
Figure 4: Median buyers' prices 2000-2015, morphine sulphate 30mg tablet and morphine sulphate 15mg/ml ampoule (USD) .....	10
Figure 5: Median buyers' prices 2000-2015, pethidine 50mg tablet and 50mg/ml ampoule and tramadol 50mg/ml ampoule (USD) .....	10
Figure 6: Understanding the need-demand gap in morphine for CPM.....	14
Figure 7: Morphine: relationship between procurement and availability levels .....	15
Figure 8: Morphine: relationship between supply and expectation levels.....	16
Figure 9: Morphine: interactions among procurement, expectation and availability.....	16
Figure 10: Critical components of cancer pain management.....	20

# SUMMARY

This working paper provides a work-in-progress overview of research on the application of scenario-building techniques to the problem of the undertreatment of cancer pain in Tanzania. The paper draws on field and documentary research in Tanzania and the UK; on an earlier research dissemination workshop; and on scenarios development exercises within the international *Innovation for Cancer Care in Africa (ICCA)* project. This research is part of the wider ICCA project<sup>1</sup>, that brings together researchers from Tanzania, Kenya, India and the UK to address the opportunities and challenges of linking industry and health systems in order to widen access to cancer care, including innovative use of scenario-building techniques.

Research in 2019 with cancer patients and health professionals, and workshop dissemination of early results to stakeholders in Tanzania, identified undertreatment of pain as a major concern within cancer care. Interviews identified opiate medication as a key resource for treatment of severe pain, and a lack of local production capability for opiate medication leading to a reliance on imports. The research also made visible the complexity of interacting health system and industrial supply factors that contribute to undertreatment of severe pain, including pricing, accessibility challenges, supply chains difficulties, perceptions of opiate medication, and skills and training challenges facing health professionals and policymakers.

In this paper we frame pain management as a policy topic specifically in need of evidence-based contributions that can identify key innovations that can be considered by policy makers and their potential outcome. We show that scenario-building can map critical interactions: both those generating undertreatment and those arising from innovations. The paper also specifically identifies areas where further information is required to complete the scenarios in a form that can be used by policy makers. This project aims to demonstrate the usefulness and accessibility of scenario building techniques for effective policy innovations in complex interlocking industrial and health systems.

Core issues on which we plan to invite and request stakeholders' contribution to this scenario-building exercise include the following:

## 1. Norms, rules and expectations

District, regional and even zonal hospital staff struggle with a lack of consistent access to strong pain management medication and its consequences for patients. Can norms, rules and expectations be changed to widen use within the health system?

## 2. Training

Within Tanzania's palliative care policy, can numbers of staff with relevant training in morphine prescription and use be increased sharply? Have any calculations been made about the likely cost of such extended training?

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<sup>1</sup> The support of the Economic and Social Research Council (ESRC) (UK) is gratefully acknowledged. The content of this working paper is the sole responsibility of the authors and does not necessarily reflect the views of the UK ESRC. Research and Ethical Clearances relevant to the research for this paper were sought and obtained from NIMR, COSTECH, NBS, PORALG, and Regional Offices in Dar Es Salaam, Pwani (Coast) and Tabora, and the Open University, UK.

### **3. Procurement**

Are the figures in this paper (Section 3) on procurement levels in relation to need correct? If not, how should they be corrected, and what is the cost to Tanzania of current procurement? Is there private sector procurement alongside public? Is cost of imports an important constraint on increasing import and use of strong pain medication for cancer patients?

### **4. Distribution and fears of diversion**

To what extent would fear of diversion to illegal use constrain acceptance of wider use of oral morphine in Tanzania? How could wider distribution be organised in the light of security worries, or fears of generating addiction?

### **5. Culture and experience**

A lack of experience in using oral morphine can constrain even trained staff from using it confidently. How can palliative care experts and cancer survivors' organisations support improved pain control?

### **6. Affordability and acceptability for patients**

How can it be ensured that charges for strong pain management do not deter prescription and use?

Could an affordable combination of the following interventions sharply narrow the need/demand gap for strong pain medication for cancer patients?

- Raising the profile or priority of pain management and palliative care, with support from civil society and faith-based groups;
- Increasing training and revising operating procedures to allow and promote prescription and use of oral morphine at lower levels of the health system;
- Ensuring that strong pain medication for severe cancer pain is not unaffordable for patients, through insurance coverage, exemptions, price reductions and/or other initiatives;
- Encouraging hospitals to increase requests for opioid medication, to raise system demand; increasing national procurement in response to rising demand; and widening distribution including appropriate security;
- Improving industrial supply and/or exploring scope for local production of controlled medication within Tanzania.

# 1. Introduction: Why pain management? Why scenarios?

## Pain management in cancer care

Undertreatment of pain is acknowledged as a severe problem in cancer care in Africa, as in many low- and middle-income countries (Knaul et al 2018). In Africa, some estimates suggest that as low as 5% of those in need of cancer pain management have access to treatment (Downing *et al.* 2015). Worldwide cancer pain affects tens of millions of people<sup>2</sup>. While not all cancer patients have pain, estimates are that around half of those who have treatment do. For those patients who experience metastasis<sup>3</sup> and recurrence, this likelihood increases even more; Fallon et al (2018) cite a study showing that more advanced stages of cancer see 70% of patients with pain<sup>4</sup>. Patients' experience of pain reduces well-being, physically and emotionally. The experience of cancer pain can interfere significantly with the quality of life and the ability and capacity to undertake daily tasks, so much so that some sufferers prefer to die instead of continuing with life in ongoing and acute<sup>5</sup> pain (HRW, 2011). This paper explores some of the critical factors that challenge actions to address this undertreatment of cancer pain in the East African context of Tanzania.

While the nature of pain can vary significantly in terms of its cause and nature (i.e. acute, chronic, nerve, bone, etc), cancer pain can almost always be reduced. Treatment of pain will depend on the cause, but can range across palliative surgical, radiotherapy, chemotherapy and drug-delivered and non-drug interventions. Drug-based treatment of pain comprises a considerable component of cancer care pain management. Pain-killing drugs vary in their effectiveness of addressing intensity of pain. Generally, mild to moderate pain is treated by non-opioids such as paracetamol<sup>6</sup>, with stronger pain treatment for moderate to severe pain typically requiring prescription of opioids such as e.g. morphine, tramadol, codeine<sup>7</sup>.

Opioids are regarded as the mainstay of cancer pain treatment. Opioids are classified in their ability to control pain from mild, to moderate to severe intensity. The choice of type of drugs requires a balance between pain relief and side effects, for both opioids and non-opioids (Fallon *et al.* 2018). The opioid of 'first choice' for moderate to severe cancer pain is oral morphine. There is also widespread use of tramadol in palliative care, even though the data on its use are limited and adverse effects can be severe and include dizziness, nausea, vomiting and constipation. There are some who argue that, as evidence for efficacy of weak opioids such as tramadol and codeine is lacking, and/or the time limit is 30-40 days for most patients, we should favour early use of morphine at low doses (see Bandieriet *al.* 2016; Wiffen, Derry and Moore 2017).

<sup>2</sup> This paper minimises comparison across high-income and lower- and middle-income country (LMIC) contexts (see for example, for cancer, de Souza et al 2016). For reference, the European and US figures show lack of adequate treatment in 56%-82.3% of cases (Fallon et al 2018); these authors also cite the Pain Management Index that approx. one in three patients do not receive appropriate pain relief proportionate to pain intensity.

<sup>3</sup> Metastasis may be more accurate than recurrence. In this paper we do not provide a qualification on what this pain means in terms of intensity, experience, quality of life.

<sup>4</sup> Other studies have shown up to 9 out of 10 people with advanced cancer (up to 90%) have pain. (see Cancer Research UK. 2020. *About Cancer Pain*. Available at: <https://www.cancerresearchuk.org/about-cancer/coping/physically/cancer-and-pain-control/about-cancer-pain>.)

<sup>5</sup> The distinction between chronic and acute pain is often unclear with chronic pain becoming acute if the disease is progressive.

<sup>6</sup> It should be noted that some doubt the effectiveness of paracetamol for cancer pain and argue morphine is to be used for mild cancer pain (see the Cochrane systematic review on oral paracetamol by Wiffen et al. 2017).

<sup>7</sup> The WHO propose a '3-step ladder' strategy for cancer pain treatment from non-opioids to weak opioids to strong opioids, according to the pain intensity.

Section 2 of this paper explores some of the factors underlying undertreatment of cancer pain, broadly and in the Tanzanian context. Notably, some of the factors influencing this are found to extend to management of chronic pain more generally. The undertreatment of pain in anti-retroviral therapy has similarly been observed. Logie and Harding (2005) argued earlier for example that “the magnitude of unnecessary suffering in countries like Uganda is so huge that pain relief should be as important a public health priority as anti-retroviral therapy, and the two closely linked” (2005, p.6). The Ugandan pain management experience is considered further below.

## Using scenarios to explore complex interactions

The core perspective underlying the ICCA project is that major social challenges, such as effective cancer care, involve multiple influences and interactions across health systems, society and industrial production and supply. Yet often, professional roles ask us to look from one particular perspective: ‘what are supply chain issues?’ or ‘what pricing of drugs?’ or ‘what policy changes?’ or ‘what training is needed?’. Yet while we try and break up complexity by with contributions experiences of particular sectors, professions or roles, there is much agreement that on the ground, these are interconnected. The experiences of patients, healthcare workers, manufacturers and policy officials are shaped by all of these.

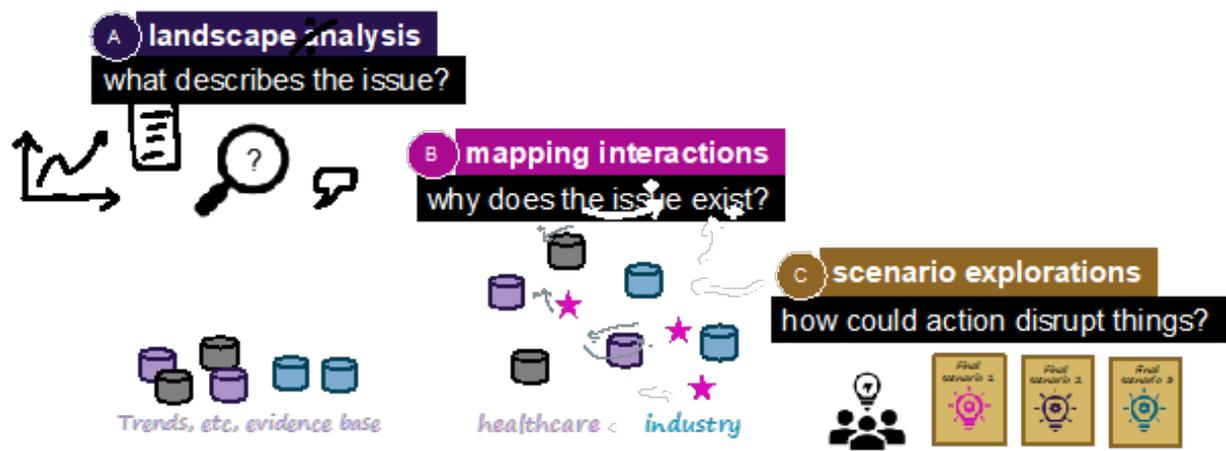
So how exactly can processes of innovation and development, to improve care, come together? And how can we understand the interconnecting pressures they face? It is this puzzle for cancer care innovation that the ICCA project explores<sup>8</sup>. An innovative aspect of the project is the use of scenarios to address these problems of innovation under complexity within health and industrial systems. By ‘systems’ in this case, we mean the diverse set of institutions, actors, values, knowledge and processes that are interconnected and act purposefully. We use a scenario framework in this paper to identify those interrelationships across industrial and health systems that are especially significant for policy makers.

The scenario building process aims to identify the problem of undertreatment of cancer pain – the evidence on its extent and nature – and to classify the causes. The scenario-building traces feedback loops among these causes, and aims to identify the interactions most helpful to focus on. The core question is: if stakeholders, including policymakers, health leaders, innovation practitioners, industry actors, decision makers, civil society actors and academia, want to intervene to address the challenges, what are the critical patterns of system behaviour they must engage with?

The scenario development uses a three-stage process (Figure 1). First, a literature review and landscape analysis identify critical trends and drivers. The next stage is mapping interactions: finding the critical feedback loops. These inform work on third aspect: scenario explorations of the possible impacts of different actions.

<sup>8</sup> Since the 2017 inception of ICCA, COVID has brought global attention to the critical interdependencies of health and industrial supply. <https://www.open.ac.uk/researchprojects/innovation-cancer-care-africa/news/local-manufacturing-health-care-has-be-come-high-politics-during-covid-19-pandemic>

Figure 1: ICCA 3-stage scenario process



Source: Authors

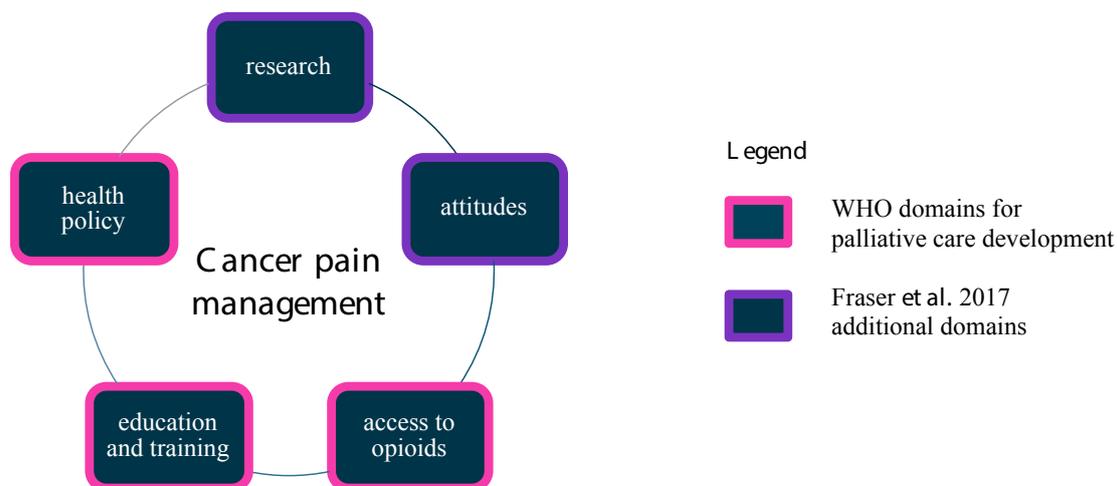
## 2. Landscape analysis of cancer pain management

### Global insights

A literature review deepened understanding of the issues around cancer pain management. A literature search utilised [search] strings such as “cancer pain” and “cancer pain management” in the Web of Science database. The results provided an overview of the issues and perspectives at the global level. Thereafter, the results were refined using “2000-2020” year range, relevance and number of times cited. Furthermore, keywords such as “innovation” and “Africa”, “East Africa”, “Kenya”, “Tanzania”, and “Uganda”, were used to focus results on the innovation theme, the East Africa region and case country, Tanzania.

Pain management is a cross-sectoral, multi-level challenge, cutting across industrial, healthcare, societal and policy systems. The WHO considers palliative care essential to cancer care, and has urged countries to improve the availability of palliative care (HRW, 2011) and include palliative care in all National Cancer Control Plans (NCCPs), key recommendation #5 (WHO, 2020). Even where countries have increased access to palliative care, including creating guidelines and increasing availability of opioids, there is unmet need in pain management and palliative treatments. The WHO identifies three domains – health policy (also described as ‘integration into national health systems’), education and training (of healthcare workers), and drug availability (often described with specific reference to opioids) – as critical to the development of palliative care (HRW, 2011, p.1). Fraser *et al.* 2017 have expanded on these three domains to include cultural aspects (public and professional ‘attitudes’) and knowledge (‘research’). Combined, these domains help to demonstrate that palliative care, like cancer pain management, is multi-dimensional, and requires coordination of actions across policy, industry, community, hospital management and other critical service sectors (Figure 2).

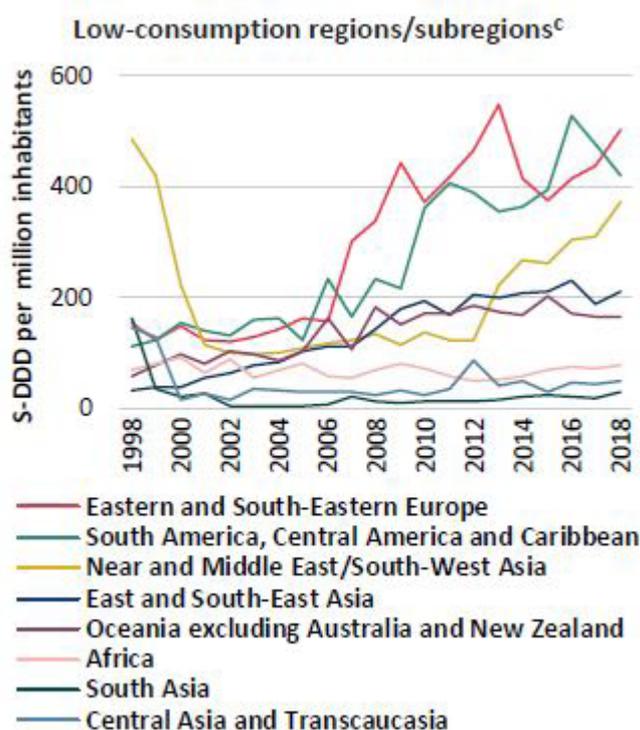
**Figure 2: Dimensions of cancer care and pain management development**



Since opioids are the mainstay for pain management world-wide, the availability of morphine creates a useful lens for exploring relevant data. According to the WHO (HRW, 2011, p.1) there has long been “enormous unmet need” for pain treatment. Fourteen countries [out of 40 countries surveyed] reported no consumption of opioid pain medicines between 2006 and

2008, meaning that there were no such medicines to treat moderate to severe pain available through legitimate medical channels in those countries. In a further eight countries that did not report their consumption of opioids in that period, the situation was probably similar, as governments participating in the international drug control regime for medical opioids will not export those controlled drugs to those that do not. Thirteen other countries did not consume enough opioids to treat even one percent of their terminal cancer and HIV/AIDS patients. These countries were concentrated in Sub-Saharan Africa, but are also found in Asia, the Middle East and North Africa, and Central America” (HRW, 2011, p.2). Figure 2 shows that the situation in Sub-Saharan Africa has not been improving.

**Figure 3: Trends in availability of opioid analgesics for medical consumption, by region/subregion 1998–2018: lower availability regions.**



Source: UN (2020: 14)

A recent *Lancet Commission* report (Knaul et al 2018: 1391) confirmed that pain management, characterised as an “inexpensive, essential, and effective intervention”, continues to be denied to most patients in low-income and middle-income countries. Documenting an “abyss” of unrelieved pain, the report assesses access to morphine for medical need as “close to zero” for much of Africa, while citing Uganda, a country with a programme to address this need, as still having available morphine sufficient for only 11% of palliative care need (Knaul et al 2018: 1425). A study of global impediments to access to medical opioids (Berterame et al 2016) found the main barriers to include lack of training and awareness by health professionals; fear of addiction and of criminal diversion; restricted funding and onerous regulation; international trade controls; and “cultural attitudes” towards pain relief.

International production and trade in narcotic drugs for medical use is controlled and monitored by the International Narcotics Control Board (INCB). If a country which is a signatory of the Single Convention on Narcotic Drugs is importing or exporting controlled drugs for medical use, a competent national authority (regulatory board or Ministry) must register their estimated requirements with the INCB (WHO 2018). If that estimate is below

a country's need, then there will be underuse of narcotic medicines for pain management, since exporters will not supply a country above its confirmed estimates for a given year. Local manufacturers, and quantities produced, must also be registered with the INCB.

A recent technical report (INCB 2019: 21) estimated that in 2018, 79% of the world's population, "mainly people in low- and middle-income countries", consumed only 13% of the morphine used worldwide for relief of pain. Most morphine for medical use is manufactured in high income countries; India is the main global producer of raw opium for licit export, but India is not a large exporter of manufactured medical morphine (INCB 2019).

India also has a large gap between need and use of medication for severe pain: the Lancet Commission (Knaul et al 2018: 1425) estimated that India distributes sufficient morphine-equivalent to meet just 4% of need for pain relief. WHO guidelines emphasise the importance of "balance" between measures to control illicit distribution and use and measures to ensure sufficient licit opioid medication (WHO 2018).

The WHO guidelines (WHO 2018: 33) argue that "Immediate-release oral morphine must be available and accessible to all patients who need it", as treatment for severe pain. However, the INCB and palliative care associations note an increasing shift by manufacturers from morphine production to more profitable and expensive products such as fentanyl-based products (INCB 2019: 48)<sup>9</sup>. Meanwhile the availability, accessibility and affordability of immediate release morphine for pain relief continues to be an international challenge, leaving many to suffer and die in pain.

The Lancet Commission report (Knaul et al 2018) advocates for access to immediate release oral morphine within a framework of palliative care services. Cleary et al. (2013, p. 1) reported that as of 2011, few African countries had palliative care policies and dedicated training. However, the exceptions were in Eastern and Southern Africa: Tanzania, Uganda, Kenya and South Africa had integrated palliative care into health or cancer planning; Rwanda and Swaziland (now eSwatini) had national palliative care plans; and Kenya, Malawi, South Africa and Uganda had recognised palliative care as an examinable subject for health professionals.

## **Pain management in Tanzania within the Eastern and Southern African context**

The ICCA project in Tanzania collected in 2019 detailed accounts of the experiences of 62 cancer patients from first symptoms that turned out to indicate cancer to diagnosis and treatment (Makene et al 2020). A total of 22 health professionals were also interviewed, in three regions including Dar es Salaam, the commercial capital, and a focus group of 7-9 health professionals was also held in the Dar es Salaam specialist cancer hospital, Ocean Road Cancer Institute, and in two regional hospitals (Makene et al forthcoming 2021).

A dissemination event in January 2020 in Dar es Salaam<sup>10</sup> added further stakeholders' perspectives, including views of cancer survivors. This workshop identified pain management as an important challenge for cancer care in Tanzania, and the field data have since been analysed for references to experiences of pain and pain management. Documentary searches have been used to identify literature to contextualise the primary data.

<sup>9</sup> See also [Balanced Opioid Systems Collaborative Paper FINAL \(hospicecare.com\)](https://www.balancedopioid.org/Balanced_Opioid_Systems_Collaborative_Paper_FINAL_(hospicecare.com))

<sup>10</sup> <https://www.open.ac.uk/researchprojects/innovation-cancer-care-africa/news/icca-tanzania-team-holds-workshop-stakeholders-dar-es-salaam>

## Experiences of pain

Among the patients who recounted their experiences, a majority (53 out of 62) described their symptoms as centrally including pain. Respondents frequently described pain as spreading through parts of their body, escalating from just “pain” to “severe” and “unbearable” pain. Back pain was described as spreading to the chest; vaginal pain to the abdomen; pelvic pain spreading through the back and abdomen and becoming “severe”; lower back pain spreading to the stomach and becoming “unstoppable”; stomach pain becoming “extreme” or “very severe” over time, and leg pain “unbearable”. Not only was pain central to most respondents’ experience of cancer, but this experience was further thrown into relief by several who recounted the moment when the pain stopped as the moment they felt better.

The data collected suggests that people struggle with high levels of pain. Many make constant use of over the counter “pain killer” or basic pain medication while seeking care – largely ineffective at easing moderate to severe pain. Patients interviewed report that subsequent actions taken to mitigate rising levels of pain were ineffective; and that rising levels of pain are in general not well managed by hospitals. Subsequently, it appears that patient expectations of pain control are low.

An important relationship of influence was identified between the early response by health care providers to symptoms of pain, and demands for care later in the cancer pathway for patients. In cases where symptoms of pain were not matched early to possible diagnosis of cancer, a patient’s expressed experience of pain during the early stages of cancer did not prevent increased need for palliative pain management during the later stages of cancer.

Given the levels of pain described, it seems likely that pain as a potential symptom of cancer is often not picked up early. In Tanzania, late diagnosis of cancer is widespread (Makene et al 2020) and can limit the possibility of curative interventions, leaving palliative care as the essential remaining approach to manage patients’ illness.

## Palliative care provision

Provision of palliation was identified by Tanzanian research participants working at each of national, regional and district levels as one of their roles in relation to cancer care. Examples of this type of care included pain relief as well as mitigating side-effects of radiotherapy with blood transfusion.

Some research participants explained their holistic approach to palliative care. They outlined cooperation with spiritual leaders; attempts to help patients in financial distress in order to mitigate ‘social pain’; as well as actions to mitigate physical pain (see also Hartwig et al. 2014; Buhl 2018). One other study of palliative care provided to paediatric cancer patients at Bugando Medical Centre, a zonal hospital in Tanzania’s Lake Zone, similarly identified several ‘intangible’ resources drawn on by staff to enhance palliation, including their strong personal faith, which can be a source of comfort for patients and for the healthcare professional working in very difficult conditions (Esmailiet *al.* 2018). In practice, however, health workers’ ability to provide effective palliation to cancer patients, and particularly pain relief, is often limited.

The dedicated palliative care team at the Ocean Road Cancer Institute (ORCI), for example, manage a very high patient load, with a range of impacts on the care provided (Buhl 2018).

Patients at Muhimbili's paediatric oncology ward reported difficulties in accessing pain relief due to staff shortages (Kohi et al. 2019) and the absence of a dedicated palliative care team at Bugando is discussed by Esmaili et al. (2018).

## Access to pain medication

The first line of attempted relief for many patients interviewed was over the counter or dispensary painkillers, often repeatedly. Only two patients specifically mentioned being given morphine (one at KCMC (a zonal Lutheran-supported hospital) and one at ORCI, the national cancer hospital). In terms of the duration of effective pain relief, one mentions that ORCI provided repeated pain relief as needed. Many patients may have been unaware of which pain medication they were provided with.

Most of the "pain killers", presumed to be non-opioids, mentioned in interviews were dispensed by drug shops, pharmacies, dispensaries, health centres and district hospitals. Medicines mentioned by name were paracetamol and diclofenac, including mentions of the use of these for late-stage cancer. Provision of paracetamol for cancer pain was mentioned by several participants at lower tiers of the health system in Tabora Region: these health professionals did not have access to more appropriate pain relief and their patients were located at a great distance from ORCI. Interviews with staff treating paediatric cancer at Bugando Medical Centre similarly indicated challenges in accessing morphine which meant that most staff reported use of paracetamol or diclofenac for pain-relief in terminal patients (Esmaili et al. 2018). At the time this research was carried out, morphine is almost entirely unavailable below zonal hospital level in Tanzania.

At the regional hospitals included in the study, morphine was either not available, or was irregularly available. Hospitals below the zonal were therefore not only unlikely to have opiates, but importantly also unlikely to expect to have them. An important implication is that these hospitals may well not order opioids for future use. The implications for cumulative under-use of strong pain medication are explored in the next section.

## Morphine ordering and distribution

At national and zonal level, the health professional interviewees explained that the public wholesaler, Medical Stores Department (MSD), is the sole institution licensed to import morphine powder and other opiate-based medication for Tanzania<sup>11</sup>. ORCI and the zonal hospitals can order through MSD. Regional hospitals can also acquire opioid medication directly from ORCI, but it appears from the field data that this does not prevent widespread stockouts of morphine at regional level. At a regional hospital, for example, supplies of morphine had run out and, according to focus group discussion, the hospital did not have at present have a permit in place to order more from ORCI.

Cancer patients were sometimes referred back from the regional level to ORCI to access morphine, which they or a relative would need to travel to acquire, or, according to one senior clinician, patients might be treated with tramadol, pethidine or paracetamol. According to Tanzania's palliative care operating procedures patients or their relatives who have come from a long distance can be given morphine and/or other medicine for two

<sup>11</sup> We are unsure whether private sector import is also permitted. A clinician in a major private hospital noted that the hospital sometimes also faced difficulties in ensuring access to morphine. Nor do we know whether faith-based higher levels hospitals can access opioid medication through external donations or support.

weeks to one month, depending on how far they have travelled<sup>12</sup>. Hospitals in Tanzania use pethidine, another controlled medication, for pain control after surgery, and pethidine is much more widely available than morphine in the health system, for surgical use.

A number of sources suggest that the cost of morphine is not the central reason for its prevalent under-use in Tanzania, even given the very sharp financial constraints faced by the Tanzanian health sector. Currently, pain medication seems to represent a very small portion of overall budgets for cancer treatment. An oncologist interviewed stated that the cancer medicines budget for ORCI, of approximately TZS 10 billion (USD 4.4 million) was largely (“95%”) expended on chemotherapy, while pain medication was not currently a large cost. A regional hospital focus group reported that morphine costs were not a significant barrier to access: the problem was one of availability.

There are however contradictory accounts from the patients’ and health professionals’ perspectives. Esmaili et al. (2018) do identify the cost of morphine, alongside other medicine and costs associated with hospitalisation, as a major impediment to paediatric cancer patients at Bugando Medical Centre continuing to receive palliative treatment at the end of life. They found that post-mortem fees that would be incurred should a patient die while in hospital were another significant reason why terminal patients were withdrawn from care including pain management. In 2018, one Tanzanian palliative care specialist argued that the omission of palliation from public and private insurance packages meant many patients could not afford morphine and were thus suffering severe pain (Qorro 2018). In 2019, ORCI had reportedly been selling morphine for 6,000 TZS per litre since 2017, which represented an increase in price from TZS 5,000 per five litres prior to this, leading to government plans to subsidise the price (Magubira 2019).

Up to date trade prices for morphine powder – the form in which morphine is imported – are not easy to obtain. The Lancet Palliative Care Commission (Knaul et al 2018) used a figure of USD 0.01849 per milligram for sustained release morphine tablets or capsules, the import price cited by Rwanda for 2014<sup>13</sup>. The lowest international price found would have reduced that in 2014 by 60%. No price was given for wholesale morphine powder import. The Lancet Commission costed the morphine in their essential package for palliative care at USD 20 per *patient* at Rwandan prices for 2014, and USD 8 per patient at the lowest international prices then available.

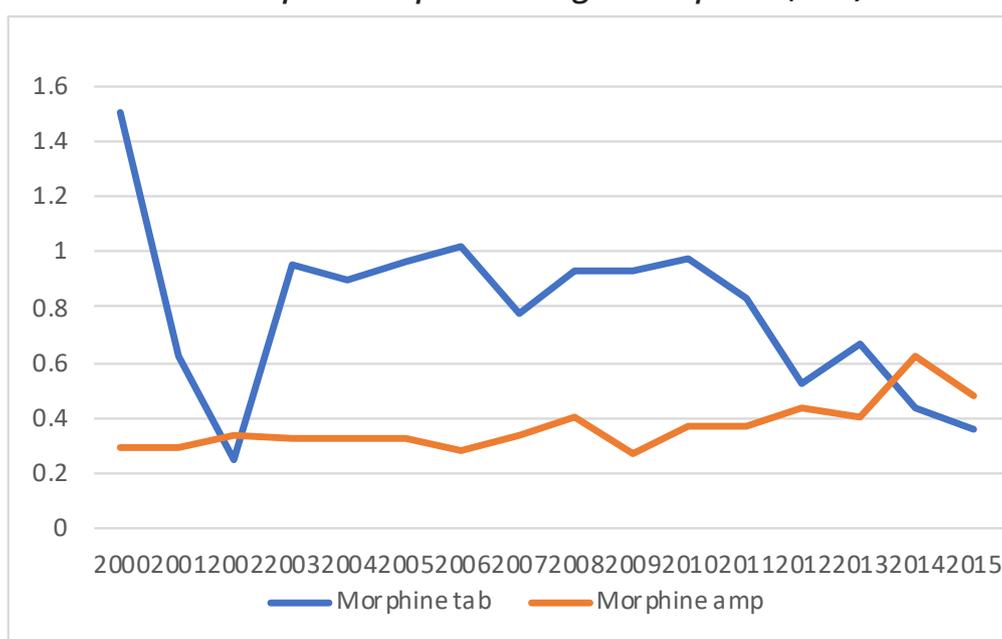
Trends in prices for medical opioids are not easy to track after 2015 when the *International Medical Products Price Guide* ceased annual publication. Before that date, the *Guide* (MSH 2015 and previous years) registered prices for morphine in tablet form and other medical opioids including pethidine and tramadol. Figure 3 shows that median registered buyer prices in low- and middle-income countries for morphine sulphate tablets varied but on an apparently falling trend, while median prices for morphine sulphate injectable ampoules were rising. Median buyer prices for pethidine tablets had been rising, while prices for pethidine and tramadol injectables were recorded as quite stable over the same period (Figure 4).

There was considerable variation around these median prices, with a number of low- and middle-income countries paying substantially more than the lowest international prices registered in the *Guide*. We have not found data for buyer or seller prices for bulk morphine powder.

<sup>12</sup> <https://www.orci.or.tz/wp-content/uploads/2020/04/zz.pdf>

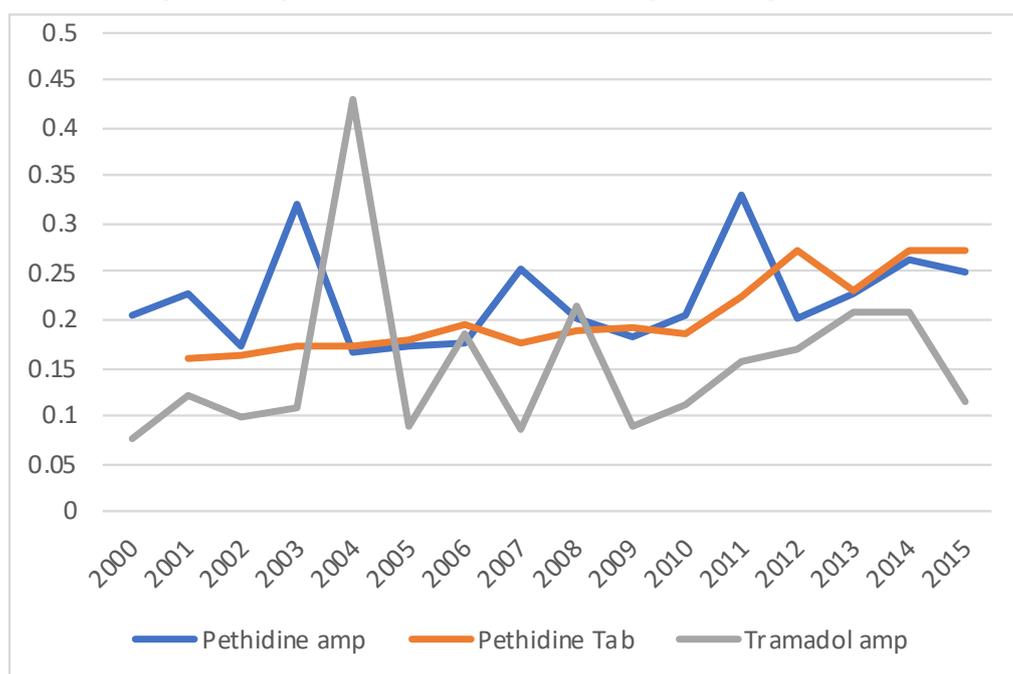
<sup>13</sup> Source: online data appendix, Lancet Palliative Care Commission report [https://www.mia.as.miami.edu/assets/pdf/data-appendix-lcgapcpc-oct122017\\_xk-4-22-201.pdf](https://www.mia.as.miami.edu/assets/pdf/data-appendix-lcgapcpc-oct122017_xk-4-22-201.pdf)

**Figure 4: Median buyers' prices 2000-2015, morphine sulphate 30mg tablet and morphine sulphate 15mg/ml ampoule (USD)**



Source: drawn by authors from MSH (2015) and previous years (online)

**Figure 5: Median buyers' prices 2000-2015, pethidine 50mg tablet and 50mg/ml ampoule and tramadol 50mg/ml ampoule (USD)**



Source: drawn by authors from MSH (2015) and previous years (online)

Relevant prices include wholesale import prices, and also prices for local distribution. The current MSD catalogue (MSD 2020) gives TZS 12,300.00 for 10 ampoules of 10mg/ml morphine injectable, the only morphine listed (USD 0.53 per ampoule). Pethidine 50mg/ml injectable is priced at TZS 9,100.00 for 10 ampoules (USD 0.4 per ampoule). By contrast, Hill et al (2016) give Indian retail prices (from the Indian maximum permitted price list for controlled prices) for a 30mg morphine tablet as USD 0.08, very considerably lower than the international prices in Figure 3.

## The need/demand gap for morphine in Tanzania

INCB (2019) argues that many low and middle income countries consistently request an annual licence for morphine imports that is substantially lower than need. To what extent is this the case in Tanzania? How big is the gap? In the absence of comprehensive prevalence and associated required pain management data, it is hard to estimate need.

One way to create an estimate, set out here for discussion, is to compare usage of pain medication in Tanzania with use in a country facing comparable challenges, but with a history of seeking to develop low-cost access to morphine: Uganda (Fraser et al 2017, Amandua et al 2019, Kamonyo 2018). Uganda is the highest ranked African country among low income countries in the 2015 Quality of Death index, and the second highest ranked in the group of African and Middle Eastern Countries.

Nevertheless, coverage of need is still patchy in Uganda. A recent campaigning report<sup>14</sup> noted that the government's Health Sector Development Plan 2015/16 - 2019/20 (MoH 2015) showed that palliative care services were being offered in only 4.8% of the public hospitals in the country. Since then the coverage seems to have expanded: Kamonyo (2018) states that there are inpatient and home care programs in 90 of 112 health districts with at least one accredited health facility. Coverage of palliative care depends heavily on non-governmental organisations providing hospice and outreach care at community level.

Morphine for palliative pain control is provided to patients free of charge in Uganda, and included, as in Tanzania, in the national essential medicines list. Procurement of morphine powder and its constitution into liquid morphine is centralised in a collaboration between the Ministry of Health and the NGO Hospice Africa Uganda (Fraser et al 2017).

Amandua et al (2019) showed that the "standalone" (NGO) providers of palliative care in Uganda were supported by two sources: 93% of financial running costs had come from donations over five recent years, while the government was providing in kind support in the form of the form of medicines, training and payment (presumably waiver) of taxes. In recent years there has been no budget line for palliative care in the government health budget<sup>15</sup>; the most recent year for which this budget line was given was 2016/17, at Ugandan shillings 155 million (approximately USD 46,000). It is not clear what this included.

In general, the Ugandan health budget is heavily donor-dependent, and also relies heavily on charging; only around 13% of the total budget is government-funded and the absolute total is falling.

Given this effort, how does import of morphine differ between Tanzania and Uganda? Table 1 shows the different levels of imports between the two countries and estimates what would be involved in bringing Tanzanian imports up to Ugandan levels, given the different populations and estimated cancer incidences.

<sup>14</sup> Statement by Civil Society Organizations in Uganda on Budget Allocation for Palliative Care Services for the Financial Year 2019/2020 submitted to The Deputy Speaker of Parliament / The Chairperson Committee on Health, written by Organisations working on Palliative Care, Human Rights and Budget Advocacy, Kampala December 2020 <https://pcauganda.org/wp-content/uploads/2020/12/Civil-Society-Statment-on-National-Budget-Allocation-of-Palliative-Care-April-2019-1.pdf> consulted 4/2/21

<sup>15</sup> According to the Civil Societies' Organisations' statement, see note 14.

**Table 1: morphine ordering “gap” between Tanzania and Uganda: estimates**

1.	Estimated cancer prevalence <b>Tanzania</b> (cases)	73,303
2.	<b>Tanzania</b> population	59,734,213
3.	Prevalent case estimate/population <b>Tanzania</b> (1/2)	0.00123
4.	Morphine requirements to purchase 2020 <b>Tanzania</b> (grams)	10,020
5.	Morphine used/prevalent case estimate <b>Tanzania</b> (grams) (4/1)	0.14
6.	Estimated cancer prevalence <b>Uganda</b> (cases)	62,548
7.	<b>Uganda</b> population	45,741,000
8.	Prevalent cases to population <b>Uganda</b> (6/7)	0.00137
9.	Morphine requirements to purchase 2020 <b>Uganda</b>	50,000
10.	Morphine used/prevalent case estimate <b>Uganda</b> (9/6)	0.80
12.	Morphine required in Tanzania using Tanzania prevalence and Uganda use/prevalent case ratio (grams) (1*10)	58,597
<b>13.</b>	<b>Tanzania ordering gap 2020 (grams) (12-4)</b>	<b>48,577</b>

Sources:

Lines 1,2,3: WHO/Globocan <https://gco.iarc.fr/today/data/factsheets/populations/834-tanzania-united-republic-of-fact-sheets.pdf>

Lines 6,7 8: WHO/Globocan <https://gco.iarc.fr/today/data/factsheets/populations/800-uganda-fact-sheets.pdf>

Lines 4, 9: INCB (2020) [https://www.incb.org/documents/Narcotic-Drugs/Technical-Publications/2019/Narcotic\\_Drugs\\_Technical\\_Publication\\_2019\\_web.pdf](https://www.incb.org/documents/Narcotic-Drugs/Technical-Publications/2019/Narcotic_Drugs_Technical_Publication_2019_web.pdf)

Table 1 data on morphine imports license requests for Uganda and Tanzania is taken from INCB (2020). The prevalence and population data are the most up to date from the WHO’s Globocan global registry of cancer data. Table 1 shows that the morphine request for Tanzania per estimated cancer case is much lower (at 0.14 grams) than it is for Uganda (0.8 grams)<sup>16</sup>. To request morphine imports equivalent in terms of use/case to the Ugandan use would require Tanzania to order nearly 6 times its current order according to INCB published data. Current Tanzanian import prices for wholesale morphine powder would allow us to calculate the cost of these additional imports for Tanzania. As noted above, however, the Lancet palliative care commission (Knaul et al 2018) calculated that Uganda was itself far from achieving use adequate for need.

In addition, there is a large training cost associated with widening access to morphine. In 2004 Uganda legalised prescribing of oral morphine by clinical officers and nurses who had undertaken nine months palliative care training. This was a key step in widening access, allowing home and local use for palliative care. That training programme is based at Makerere University and run jointly with Hospice Africa Uganda. Uganda has undertaken quite widespread integration of palliative care into medical and nursing curricula, including a national palliative care training manual recently developed by the Ugandan Ministry of Health for health care providers at all levels of service delivery (Fraser et al 2017). No costing of this training programme appears to be publicly available.

<sup>16</sup> Tanzania also requested 30 kilos of codeine and 77 kilos of pethidine; these were also substantially lower than Uganda’s request for 100 and 150 kilos respectively, despite a lower population. (INCB 2020)

### 3. Mapping critical system interrelationships to help to address the need-demand gap

#### Scenarios as an ICCA policy tool

Scenario building is one way to look for patterns in behaviour within health and industrial systems. Better understanding of those patterns, and how they arise, improve our chances of addressing their underlying causes. The aim is to identify some of the fundamental structures that generate behaviours that have become problematic for desired policy outcomes, so that we can identify ways of systemically addressing them, rather than troubleshooting symptoms.

One way that analysts spot such persistent behavioural patterns is by scanning for common (recurrent) stories, also described as archetypal patterns, and then exploring the systemic structures that are responsible for such generic patterns of behaviour over time. The use of a system archetype is an important approach and device to encourage and communicate systemic thinking. These archetypes articulate causal hypotheses for the seemingly counterintuitive behaviour of systems. They are modelled in scenario building as closed systems in an attempt to capture the system variables as endogenous, that is, to understand how the system produces its own behaviour.

The usefulness and validity of archetypal behavioural patterns therefore rests in their application as models that help the understanding of fundamental dynamics within a system. According to Senge, Ross, Kleiner, Roberts, and Smith (1994), archetypes had their origins in the mid-1980s when a group of systems thinkers developed a set of eight archetypes to provide managers with easier access to the world of mathematically based computer modelling that characterizes system dynamics. An early application of the archetypes was seen in *Beyond the Limits* (Meadows, Meadows, & Randers, 1992) that demonstrated the limits to worldwide economic and population growth." Hirsch and Immediato (1999) applied systems archetypes to the health care industry in the United States to illuminate strategic choices made by health care professionals. The burgeoning learning organisations approaches to health system change within low and middle income countries draws on this type of thinking (see for example Naimoli and Saxena 2018).

In this paper, we start to build scenarios to describe and explain how the demand for opioids is shaped by multiple dynamics within and around the health system, and to focus attention onto a few critical interactions between industrial and health sector behaviours that are relevant to policy.

#### Understanding the need-demand gap for opioids

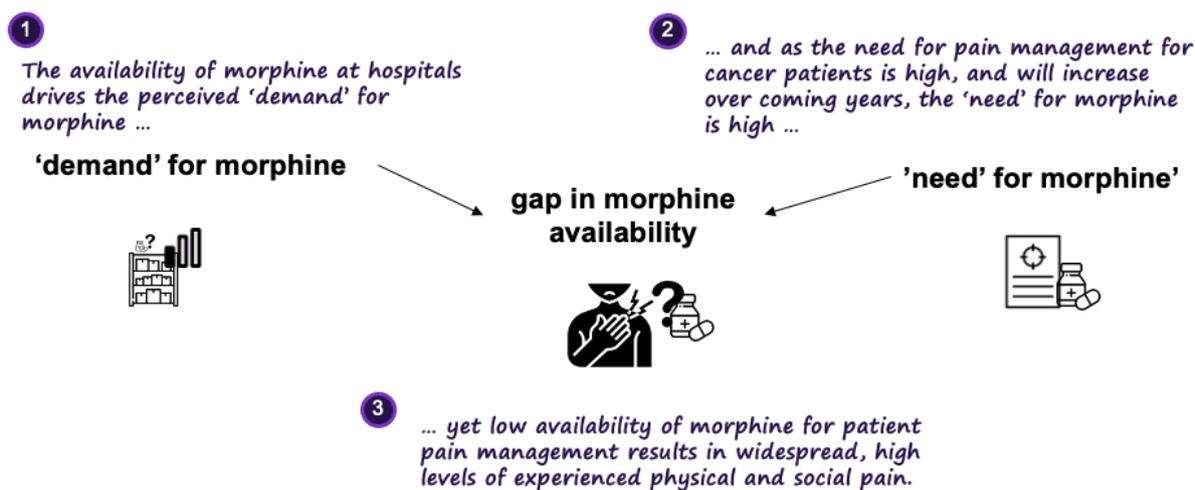
Demand for opioids for medication for severe pain is generated "from below" within the health system. By "demand" we mean the amount of opioid medication procured internationally each year, since Tanzania does not currently have a local manufacturer. That is procurement of opioid medication responds to expressed requirements for those facilities that use the medication, in the same way as procurement for other medication is generated within the health system (Mackintosh et al 2018 describes medication procurement processes within Tanzania).

The gap between need and demand, documented above for Tanzania, is therefore rooted in decisions within the health system. In the public systems, the volume demands by medicine are aggregated up from requests from facility staff including, at hospital level, pharmacists. Those aggregated requirements form the basis for procurement requests to the public wholesaler (MSD). The requests from each facility must fall within the facility's overall budget held at MSD.

Facilities may also be able to fill gaps by purchase from approved private wholesalers. However, in the case of controlled medications such as opioids, all public sector purchase requests primarily go through MSD. We are not clear whether reputable private pharmacies can also handle opioid medication and if so, which? Nor whether international faith-based organisations can supply such medication to hospitals they support.

A gap between need and demand for morphine for pain management becomes apparent as low levels of aggregated requests for pain medication fail to generate the level of morphine availability needed to address all of cancer patients' pain. What are the main factors that cause this gap? Do they feed back to reinforce each other, and if so how? Figure 5 presents the shape of the problem.

**Figure 6: Understanding the need-demand gap in morphine for CPM**

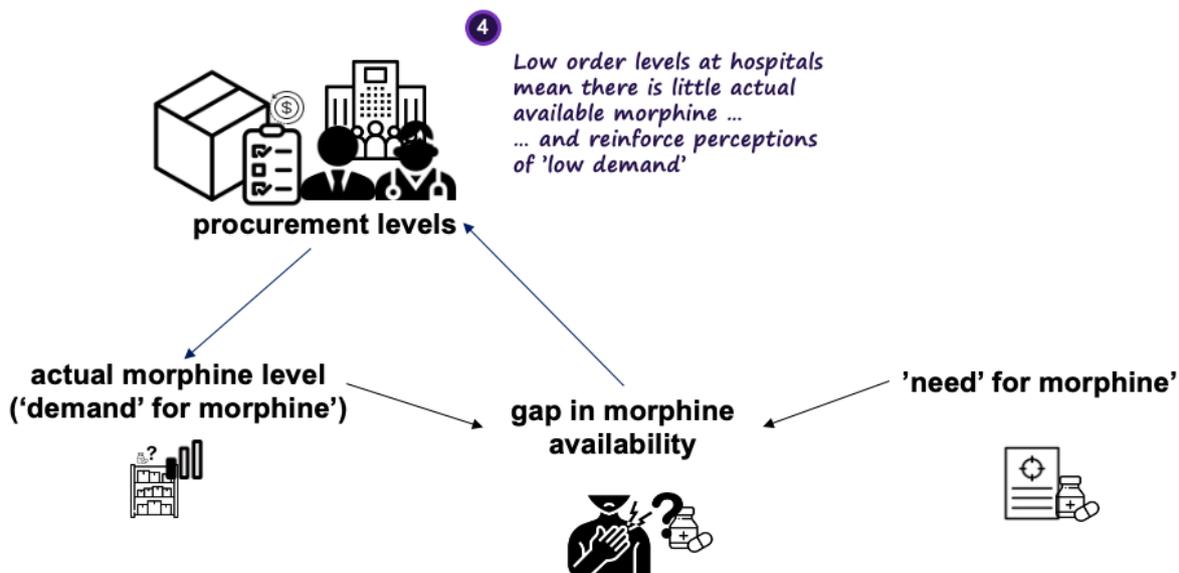


Source: authors

Health facilities' ordering of morphine is shaped by both the ordering systems, as well as expectations of what can be ordered. One immediate implication is that demand in practice is driven by ***past usage***. In general, when medication stocks get low on the shelves they will be re-ordered, or staff know roughly what they typically use for, say, six months and order ahead.

A negative feed-back loop then occurs between the perceived demand and need: facility staff and shop staff use what they have, adapting practice to the possibilities and to patients' financial standing. So what is ordered tends to *stick* at what was ordered before; there's a fair bit of "stickiness" or inertia in the procurement system, including ordering of opioids. Figure 6 illustrates these links.

**Figure 7: Morphine: relationship between procurement and availability levels**



Source: authors

This pattern could be understood in terms of the 'drifting goals' archetype of complex system behaviour where there is a mismatch between a goal (explicit or implicit) and current state of affairs (Senge 1990; Sterman 2000; Wolstenholme 2003). Here the (implicit) goal is sufficient strong pain medication to meet need.

The current state of affairs is under-ordering and incomplete access to strong pain relief for cancer-related pain.<sup>17</sup> In a balanced system, if such a gap between goal and current state persists, then action should be taken to bring performance up to standard. It is not uncommon to have a time delay though between that action and decrease in performance gap.

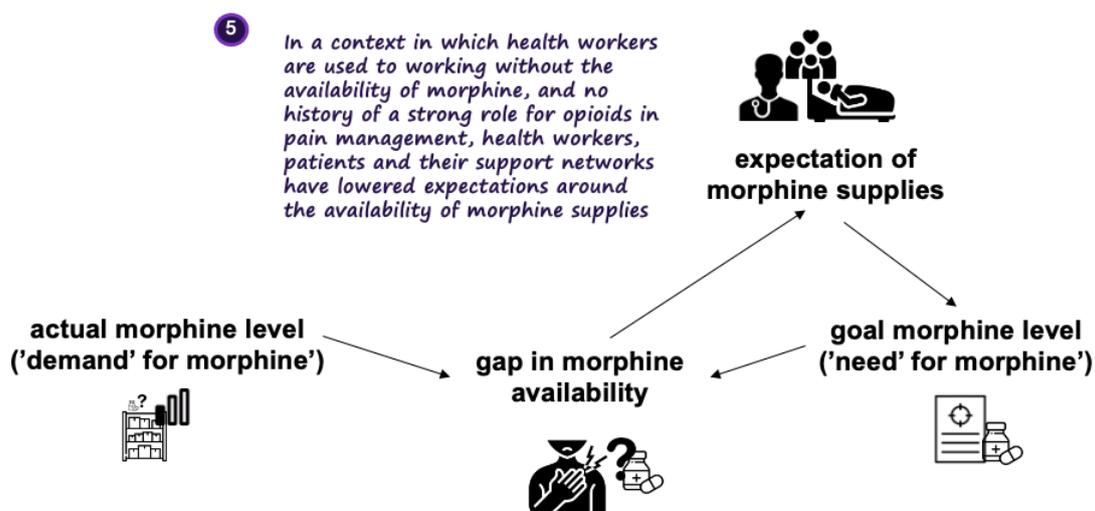
In the case of the gap studied here in availability of morphine, a direct response to the need/demand gap would imply 'over-ordering' above the demands generated by the system. But that in itself would not address the reasons for underordering and underuse, without other interventions.

The model implies that, in fact, there is another way that the gap between goal and actual state is adjusted in systems facing such a gap. And that is, by lowering the goal, by reducing expectations that needs can or should be met. This reduces the gap and is a more immediate response, embedding a pattern where low expectation drives low performance.

This interplay between lowering relative expectation and decreased performance is seen in other systems. In business, it is the invisible interaction that sees delivery delays become the accepted level of service and end up lowering product standards as the focus becomes on decreasing delays by getting products out the door. Figure 7 illustrates this role of expectations.

<sup>17</sup> There are of course other sources of need for strong pain relief, including HIV-related illness, as Knaul et al (2018) emphasise. The focus here on cancer-related pain does not imply a lack of concern for other sources of need.

**Figure 8: Morphine: relationship between supply and expectation levels**

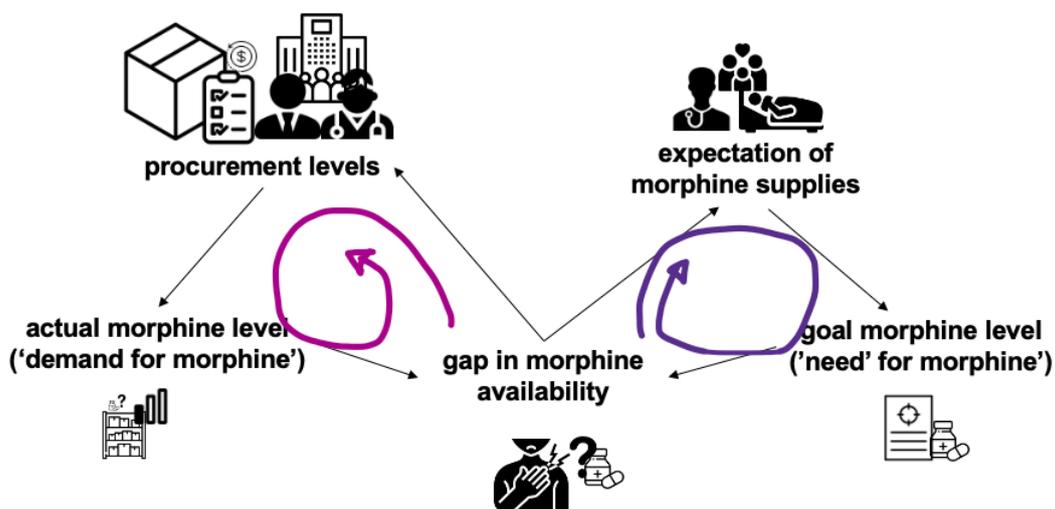


Source: authors

The gap between need and demand is strongly structured by institutional processes. What can we learn from scenarios, drawing on others' experience, about how to change this persistent pattern? The critical thing is to ask what drives the setting of the goal(s) for meetings needs? Often current demand levels are set by past levels rather than by desired standards. Or they may be set by something external to the system. In the latter case, an external intervention by government would set a larger target demand level and seek to generate more demand from within the system at ordering and wholesale level. Goals located outside of system, are typically less susceptible to drifting goal pressures. The role of government is often to intervene to set targets that have long time horizons to achieve that balance.

In this case, this means to take a fresh look at demand and the factors that drive its growth. If there is potential for growth, how can the system build capacity to generate future demand and use the products effectively? What combination of "shoves" could make a step change to how demand is generated within the health system? Figure 8 illustrates some of the feedback loops that need to be reversed.

**Figure 9: Morphine: interactions among procurement, expectation and availability**



Source: authors

On the left hand side, the current procurement “stickiness” is generating a low level of demand and a need/demand gap, in a vicious circle sustaining low and even decreasing levels of demand. On the right hand side, it is possible for rising expectations of supplies – associated with a capability of using them effectively – to generate a virtuous circle where increased perceptions of needs raise demand and expectations in the future. This could lead to increased use, counteracting and balancing the needs/demand gap, leading to increased use.

What are the key interacting interventions that can generate such a virtuous circle in the Tanzanian context? That question and some implied sub-questions require stakeholder advice and involvement. Questions for a discussion with stakeholders are set out in Section 4.

## 4. Domains of discussion for a stakeholder workshop: closing the need/demand gap for cancer pain medication

### Workshop questions

What are the sources of the “stickiness” that keeps ordering of opioid medication and its subsequent use so far below need in Tanzania? Some of the key factors, and implied interventions, from the Tanzanian research to date are the following.

#### 1. *Norms, rules and expectations*

District, regional and even zonal hospital staff are used to working without consistent access to strong pain management medication, as Hartwig et al (2014) noted. Experimentation with the use of tramadol, a weaker opioid, where morphine was unavailable (Hartwig et al 2014) demonstrated both its usefulness and its limitations, and also documented the negative impact on health care staff unable to assist cancer patients in severe pain.

At present, the norms and rules for morphine ordering and use restrict it to zonal and, sporadically, regional hospitals, with evidence of stock outs. Ordering will not increase until those rules and expectations change. Is this correct, and if so, what will it take to change them?

#### 2. *Training*

Tanzania has a palliative care policy, and some trained staff. According to the palliative care unit Standard Operating Procedures for ORCI, the national cancer hospital<sup>18</sup>, a doctor, or a nurse who has relevant diploma level training or above, can prescribe morphine. Patients or their relatives who have come from a long way away can be given morphine and/or other medicine for two weeks to one month, depending on how far they have travelled.

What are the standard procedures for lower level (zonal and regional) and for private hospitals? How many staff have had relevant training in morphine prescription and use? Is there any plan to extend this training to the district level? Have any calculations been made about the likely cost of such extended training?

#### 3. *Procurement*

Are the figures in Section 3 correct for current procurement levels? If not, what are the correct figures? And how much does the current level of procurement cost Tanzania? What are the key constraints on the level of national procurement of morphine powder? Is public finance a major constraint? Is there private sector and faith-based overseas procurement alongside public procurement of opioids for medical use? Which and how much? It has been suggested, above, that the main constraint on higher levels of procurement is not financial. Is that thought to be correct? Is there a problem of supply chains and sources e.g. difficulty in finding reliable suppliers at low cost?

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<sup>18</sup> <https://www.orci.or.tz/wp-content/uploads/2020/04/zz.pdf> date April 2020

#### **4. *Distribution and fears of diversion***

To what extent would fear of diversion to illegal use constrain acceptance of wider use of oral morphine in Tanzania? How is current distribution organised: that is, where is the morphine powder made up for oral use, and how is it distributed? (Do zonal hospitals, for example, collect from ORCI and in what form?) How could or would wider distribution be organised? We have found so far little evidence of what has been called ‘opiophobia’, through fear of generating addiction in patients. Is this thought to be a major constraint on use and demand?

#### **5. *Culture and experience***

A lack of experience in using oral morphine can constrain even trained staff from using it confidently. A culture of acceptance of a substantial level of unmanaged pain -generated by long experience of coping with the consequences of unavailable medication - can also constrain use and therefore demand. To what extent have palliative care experts and cancer survivors’ organisations played a role in pressing for better pain control? To what extent do experiences of staff struggling to support patients in pain feed effectively into national palliative care planning and medication demand?

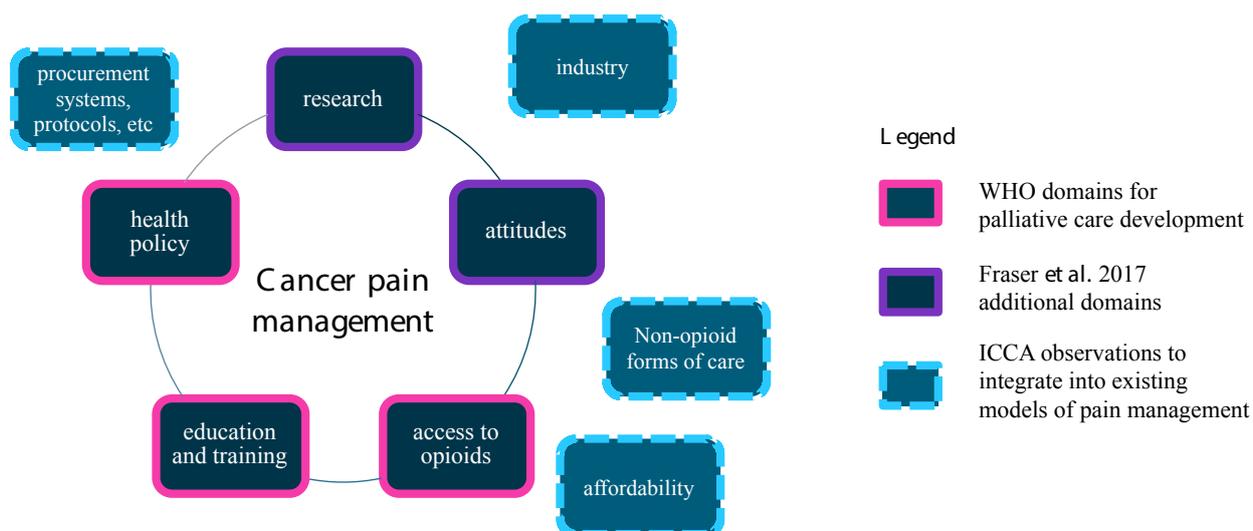
#### **6. *Affordability and acceptability for patients***

We have little evidence from ICCA research on the cost of strong pain management for patients, given the low level of use of use of opioid medication found. Are patients charged for pain medication at ORCI? Are cancer patients charged at zonal or regional level? What would be the typical charge for a cancer patient requiring oral morphine, and has this been found to be a deterrent to prescription and use?

### **Interacting innovations: what combination of innovations could best address the need/demand gap?**

Figure 1 identified domains of cancer pain management from WHO documents and other literature. Figure 9 adds additional items from Section 3, including procurement systems, industrial supply sources, capabilities and norms in non-opioid and non-morphine forms of care, and issues around affordability (including affordability of broader palliative and end of life care and insurance costs and coverage).

**Figure 10: Critical components of cancer pain management**



Source: authors

Given this set of components, what are the interacting initiatives that could generate pathways to closing the need/demand gap? What are the potentially accessible combinations of the following?

- Raising the profile or priority of pain management and palliative care, including strengthening the priority and focus on pain management within the health system, with support from civil society and faith-based groups;
- Increasing training and revising operating procedures to allow and promote prescription and use of oral morphine at lower levels of the health system; addressing fears around diversion and addiction;
- Ensuring that strong pain medication for severe cancer pain is not unaffordable for patients, through insurance coverage, exemptions, price reductions and/or other initiatives;
- Encouraging hospitals to increase requests for opioid medication, to raise system demand; increasing national procurement in response to rising demand; and widening distribution including appropriate security;
- Improving industrial supply and/or exploring scope for local production of controlled medication within Tanzania.

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