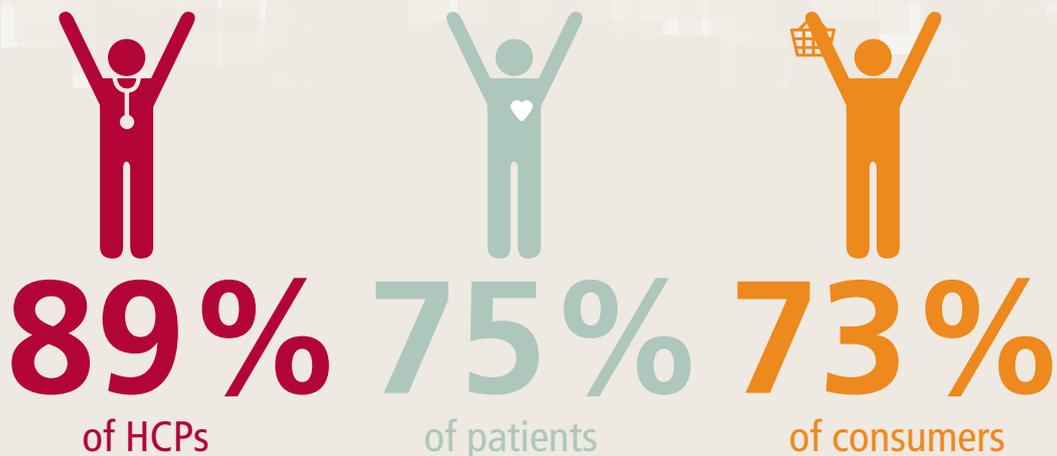




mHealth

# Global views on potential of mobile health solutions to address chronic disease challenges

A white paper for regulatory bodies



believe that mHealth solutions can convey  
*significant health benefits*

# Executive summary

The United Nations (UN) and the World Health Organization (WHO) are driving the prevention and control of chronic disease - this is now a top global priority. As a regulator, how are you addressing this healthcare challenge?

For regulators, this is undoubtedly a challenging time in healthcare. How can increasingly ageing or under-served populations be cared for with fewer resources? How can over-stretched systems cope with ever-increasing demands?

Mobile health (mHealth) solutions can help to address all of these challenges. Broadly defined, mHealth refers to the use of mobile communication and devices for providing healthcare services for patients, healthcare professionals and carers.

As demonstrated in this global end-user research funded by the GSMA and conducted among 2,000 healthcare practitioners (HCPs), patients and consumers, mHealth solutions can help to address many challenges resulting from chronic disease: high healthcare costs, high medicine wastage, inequality of care, and low quality care. Specifically, this research revealed these top five findings:

- 1. mHealth solutions offer value (cost efficiency with improved quality of care) to all healthcare stakeholders**
- 2. mHealth solutions must be affordable**
- 3. mHealth solutions drive behavioural change to reduce medicine waste**
- 4. Prevention of chronic disease is a key focus for all governments – mHealth solutions support disease prevention**
- 5. mHealth solutions require a collaborative, step-wise approach**

This research clearly shows that mHealth solutions offer a win:win opportunity for regulators to dramatically address today's global healthcare challenges with chronic disease. These findings should encourage regulators to embrace existing and emerging technologies and use them to their advantage.

# Introduction

*“The global burden and threat of non-communicable diseases constitutes one of the major challenges for development in the twenty-first century, which undermines social and economic development throughout the world, and threatens the achievement of internationally agreed development goals.”<sup>1</sup>*

Delivering affordable healthcare is one of the biggest challenges faced by any government.

Worldwide, total healthcare spending exceeds US \$4.2 trillion, consuming an average of 10% of GDP in OECD countries and increasing at an average of 5% every year. However, this spend is highly skewed. The top 20 healthcare consuming countries contain 16% of the world’s population, yet spend nearly 90% of every one of those US \$4.2 trillion. The US alone, with 5% of the population, spends over 45%. The remaining 84% of the world’s population share 11% of health spending, but account for nearly 95% of the diseases while devoting around 5% of GDP to health. This broad disparity in spend means that challenges faced by health systems are different in the developing and developed world, but are real everywhere.<sup>2</sup>

In countries with well-established health systems, the overwhelming challenge is to meet the rising expectations of citizens while controlling costs to a manageable level. There are also still huge issues of inequality of access to healthcare. Outside of more established healthcare systems, circumstances vary widely. However, a common theme is the enormous disparity of health provision and escalating costs.<sup>2</sup>

Many of the challenges can be addressed by moving the current model of care from direct healthcare practitioner (HCP)-patient / consumer contact to healthcare delivered by non-physical interaction between HCP and patient / consumer. This is particularly needed in chronic disease where interaction with several HCPs is required at regular intervals to ensure constant monitoring and appropriate care. For this reason, mobile health (mHealth) technology is ideally placed to address the pressing challenges; to make healthcare more accessible, more cost-effective, more equitable and higher quality, and to assist in disease prevention strategies. Across the public and private sector in all countries, mHealth solutions can offer enormous benefits to all stakeholders.

With HCPs comparatively slow to adopt changes and new technologies, in recent years, healthcare payers (planners, insurers) have become one of the dominant players in mHealth. Recent research confirms that they have embraced the value of online and mobile applications for co-ordinating care for patients with chronic disease, such as diabetes, exchanging information with patients and providing personal health records (PHRs).<sup>3</sup> Other recent mHealth research confirms that payers have grasped the benefits of mHealth solutions in terms of aiding compliance. For example, in China, 97% of payers plan to reimburse this in the next three years; in India, 83%; in Brazil, 80%; and in the US, 69%, illustrating the emphasis that is being placed on this arena.<sup>4</sup>

*Dr Stuart Bootle, UK, says, “As a person living with Type 1 diabetes, I need to use technology on a day-to-day basis to help me take control of my condition and reduce the risk of future complications. Working as a doctor, I have limited ‘face-to-face’ time with patients. There is a real need for mHealth solutions to help healthcare professionals connect with their patients outside of the traditional consultation - to support sustained change in lifestyle behaviours, better decision-making and optimal use of appropriate therapeutic interventions. By enabling healthcare professionals and patients to work together in this way, mHealth has the potential to enable improvement in health outcomes without increasing the use of limited healthcare professional resources.”*

*Jonathan Anscombe, Partner, Health Practice, A.T. Kearney Limited, London, comments, “Regulators are still some way away from coming to terms with how best to evaluate and regulate mobile health solutions. While issues such as information governance and technical integration standards are developing fast, approaches to assessing cost effectiveness and clinical impact are still not well understood.”*

For regulators, there are undoubtedly many challenges to the increased adoption of mHealth solutions. For example, how can affordability of care be addressed to the satisfaction of all end users? How can already stretched resources be better utilised? How can different models of payment for mHealth solutions fit with different models of healthcare provision? And, most importantly, who pays for mHealth?

In this white paper, we discuss some of the results from a large multi-country end-user survey of HCPs, patients with chronic disease (diabetes and cardiovascular disease) and general wellness consumers (adults with a high level of interest in health and wellness who do not suffer from a chronic health issue). This research was commissioned by the GSMA, a global organisation that represents the interests of mobile operators worldwide (see back page). The research findings make interesting reading for regulators around the world trying to make sensible, cost-effective and equitable decisions on healthcare. Furthermore, this research, together with other recent research into mHealth solutions,<sup>4,8</sup> emphasises the opportunities that mHealth can offer regulators to address many of today's health challenges. It outlines some of the barriers and suggests how they can be addressed. It also shares some learnings from major stakeholders in mHealth solutions and chronic disease around the world.

All stakeholders involved in healthcare have different interests and priorities for mHealth solutions. By working together, all interested parties can see mHealth for what it is – an opportunity to dramatically improve healthcare cost-effectively – wherever we are, whatever our role, whatever our current healthcare system. As you read it, this white paper is designed to prompt you to ask the following questions - how can mHealth solutions benefit your country, your population and your healthcare economy, and what actions do you need to take?



### Recommended reading: IDF Europe Policy Puzzle

In the 3rd Edition of the IDF Europe Policy Puzzle, FEND and IDF Europe have joined forces with EURADIA and PCDE in recognising the burden of diabetes in the whole of Europe. These organisations share a conviction that providing sustained and comparative documentary evidence on the epidemic levels and disparity of diabetes care across the European region will persuade governments and health providers that action to deal with this condition is urgent. They have published this latest audit at a time when, despite considerable political awareness of the health risks of diabetes and the knowledge that the disease is largely preventable, Europe is faced with epidemic growth of the disease. This comprehensive audit of diabetes policies across the European region serves as an update to the previous editions and introduces new countries from outside the EU.

*"This is definitely what we all want to see - helping patients improve their quality of life and their overall health."*

Research Respondent, Diabetes Specialist

### World Diabetes Day

Welcoming the fact that the International Diabetes Federation has been observing 14 November as World Diabetes Day at a global level since 1991, with co-sponsorship of the World Health Organization, and recognising the urgent need to pursue multilateral efforts to promote and improve human health, and provide access to treatment and health-care education, the United Nations decided to designate 14 November, the current World Diabetes Day, as a United Nations Day, to be observed every year beginning in 2007. World Diabetes Day aims to raise public awareness of diabetes and related complications, as well as its prevention and care, including through education and the mass media.<sup>15</sup>

### Spotlight on chronic disease, particularly diabetes

The focus of the GSMA end-user research was on chronic disease, with diabetes used as an example throughout this white paper.

Chronic disease, such as diabetes, is currently the leading cause of mortality in the world and accounts for 63% of all deaths worldwide.<sup>7</sup> The prevention and management of chronic disease is a global health priority as highlighted by the World Health Organization's (WHO's) "Action Plan on Prevention and Control of Non-Communicable Diseases 2008-2013".<sup>8</sup>

*Sophie Peresson, Regional Director, IDF Europe, notes, "Over the past decade, we have seen a significant rise in the prevalence and incidence of diabetes and pre-diabetes. In every country, we have seen demands for healthcare practitioners' time soar in line with the increased diagnoses, increased need for out-patient appointments, and increased hospitalisations from complications. This is placing enormous pressures on already over-burdened healthcare systems globally. We need urgent action on prevention and access to high quality care, but we know that the actions will not reverse the situation - they will at best control the progression and hopefully minimise the burden of chronic disease in Europe."*

Currently 366 million people (8.3% of adults) worldwide have diabetes<sup>6</sup> and, if current trends continue, by 2030 around one in ten adults will have diabetes.<sup>6</sup> The WHO predicts that diabetes will become the seventh leading cause of death.<sup>9</sup> Currently, the Middle East and North Africa, China and India have the highest prevalence of diabetes, followed by the US, Indonesia, Brazil and Russia.<sup>10</sup> Six out of the world's top ten countries for highest prevalence (%) of diabetes are in the Middle East and North Africa region – Kuwait, Lebanon, Qatar, Saudi Arabia, Bahrain and the United Arab Emirates.<sup>11</sup> Rapid economic development coupled with ageing populations have resulted in a dramatic increase in the prevalence of diabetes.<sup>11</sup>

Unless addressed, the mortality and disease burden from chronic disease will continue to increase. WHO projects that, globally, deaths from chronic disease will increase by 17% over the next ten years. The greatest increase will be seen in the African region (27%) and the Eastern Mediterranean region (25%). The highest absolute number of deaths will occur in the Western Pacific and South-East Asia regions.<sup>8</sup>

Diabetes poses a considerable economic burden on healthcare systems worldwide, with 11% of the global healthcare expenditure spent on the disease.<sup>12</sup> Most countries (80%) spend between 5-18% of their national health expenditures on treatment and management of the condition.<sup>12,13</sup> Higher income countries spend more on diabetes, and these account for 90% of the global expenditure, with the US spending more than half of the total. Low- and middle-income countries spend less than 10% of the global expenditure. India - which accounts for one of the highest prevalence rates - spends less than 1% of the total global expenditure on the disease. In the UK, the cost of diabetes to the NHS is over £1.5m an hour or 10% of the NHS budget for England and Wales. This equates to over £25,000 being spent on diabetes every minute. In total, an estimated £14 billion is spent each year on treating diabetes and its complications, with the cost of treating complications representing the much higher cost.<sup>14</sup> Overall, the global expenditure on diabetes is predicted to rise by up to 34%, reaching a total of around US \$595 billion by 2030.<sup>12,13</sup>

### Regional overview of diabetes:<sup>13</sup>

- **Africa: 78% of people with diabetes are undiagnosed**
- **Europe: the highest prevalence of type 1 diabetes in children**
- **Middle East and North Africa: 6 of the top 10 countries by diabetes prevalence**
- **North America and Caribbean: 1 adult in 10 has diabetes**
- **South and Central America: 12.3% of all deaths were due to diabetes**
- **South-East Asia: almost one-fifth of the world's people with diabetes live in just seven countries**
- **Western Pacific: 132 million adults have diabetes, the largest number of any region**

**"Diabetes is undoubtedly one of the most challenging health problems in the 21st century."<sup>6</sup>**

## About the research

This end-user research - commissioned by the GSMA and undertaken by Ipsos MORI between March-June 2012 - was performed to understand how mHealth solutions are perceived by HCPs, patients with chronic disease and general wellness consumers. These end user groups included a broad range of ages and social levels (patients/consumers) and professional experience (HCPs) primarily from urban locations. Participants were provided with a definition of mHealth and shown examples of potential solutions. The research was conducted in two phases in one 'developed' country (the US) and three 'emerging' countries (Brazil, China and India).

The participants interviewed in both phases were drawn from market research access panels (respondents who have opted in to undertake research). For Phase I, Ipsos MORI used its own panels in Brazil, China and India, and a third party panel in the US. For Phase II, it used third party online panels across all four countries. Respondents were sent a link to the screener and study.

In terms of entry criteria, respondents were excluded from Phase I if they stated they had no awareness of mHealth and were not confident discussing it. These exclusion criteria did not apply to Phase II, although Ipsos MORI limited those respondents not aware of/not confident in discussing mHealth to <15% of the total sample in any one market. Respondents were excluded if they had taken part in any mHealth market research in the previous three months (both phases). As well as ensuring a mix of ages for the patients/consumers, Ipsos MORI also ensured a good balance of males/females.

The first research phase was an in-depth qualitative phase to explore the perception and usage of mHealth, in which one to two focus groups with a broad mix of participants (three to six in each) were held in each of the four countries. Some of the quotes received are shown in this white paper. The second research phase was a quantitative phase in which online surveys provided validation of themes uncovered during the first phase for the four countries as a whole, and for each country individually to look for inter-country differences. The survey included 2,000 respondents in total, with 50 end users from each HCP group (cardiologists, diabetes specialists, primary care practitioners and community health workers or nurses) and 100 from each patient/consumer group (chronic patients with cardiovascular conditions, chronic patients with diabetes, and general wellness consumers) in each country.

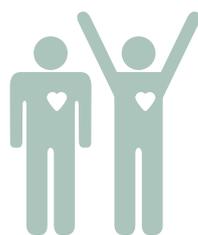
### Key to icons used throughout this white paper



HCP



Diabetes HCP



Patient



Diabetes patient

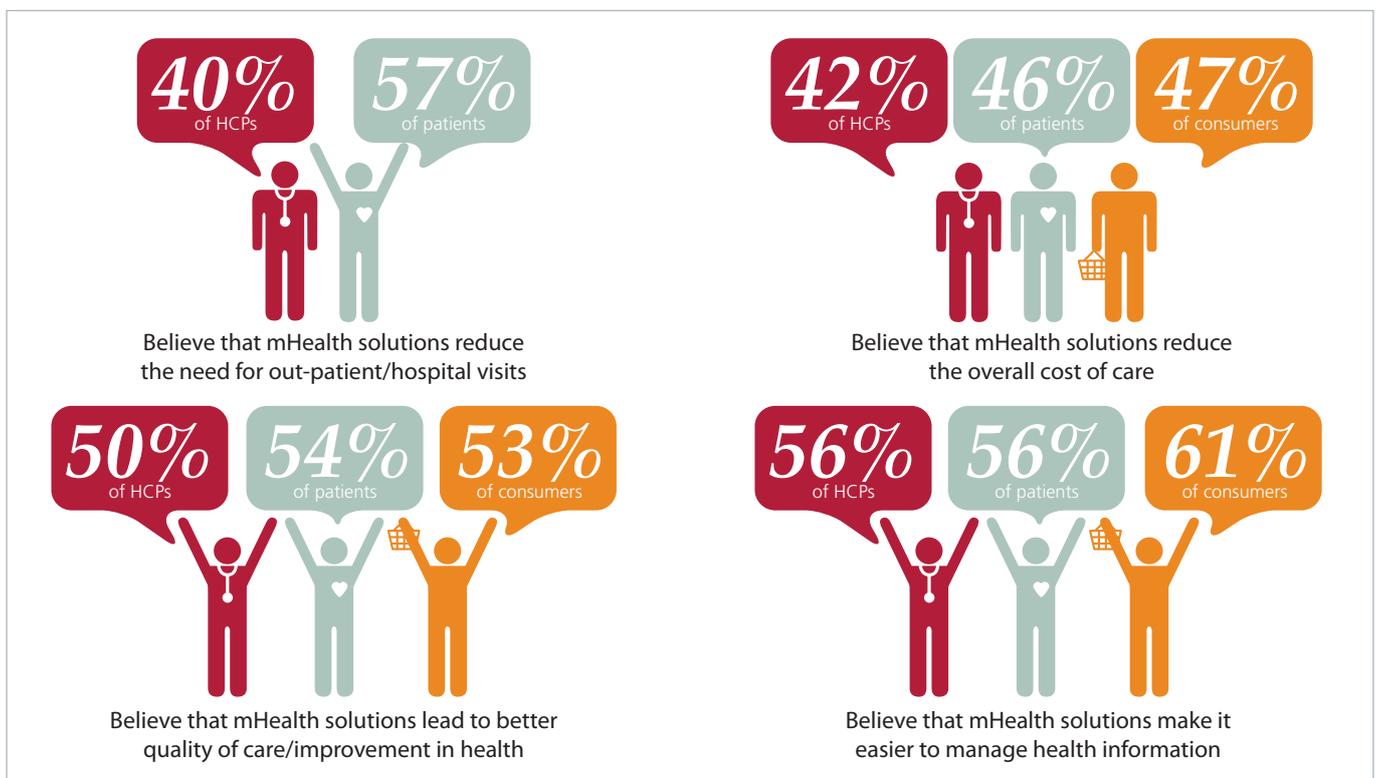


General wellness consumer

# Key message 1. mHealth solutions offer value (cost efficiency with improved quality of care) to all healthcare stakeholders

## mHealth solutions offer a win:win opportunity for regulators by resulting in cost efficiencies

mHealth solutions improve both the efficiency and cost efficiency of care, and the new GSMA research confirms that HCPs, patients and consumers believe that mHealth can achieve this in many different ways. For example, this research showed that among all types of respondents, those surveyed believed that mHealth solutions can result in all of the following:



Results from a recent Vodafone mHealth report support these findings, showing that HCPs believe in the numerous benefits of mHealth solutions to improve quality of care. They also showed additional quality benefits for patients, such as allowing them to monitor their condition outside of the hospital environment, live a less disrupted life and respond rapidly to changing healthcare needs.<sup>5</sup>

Such an improvement in quality of care is much needed. In an attempt to improve care globally, the WHO has a highly active diabetes programme.<sup>16</sup> With over 80% of people with diabetes living in low- and middle-income countries, the WHO is striving to improve access to such aspects of care as HbA1c testing for low- and middle income countries.

*Jonathan Anscombe, A.T. Kearney, notes, "Mobile technologies can dramatically reduce the cost of healthcare by making HCP/patient interactions more effective, by improving the ability to spot problems before they occur, and by enabling patients to take a greater role in their own care. But these technologies will only be adopted if they save the system money. Indeed, it is the fact that mobile technologies can be deployed at low cost that makes them so attractive."*

*In short, mHealth solutions can drive cost efficiency of care in many different ways. For this reason, regulators should urgently explore the increased use of mHealth solutions.*

### Essential reading

- IDF Task Force on Sustainable Diabetes and Noncommunicable Disease Policy and Prevention, at: <http://www.idf.org/sustainable-diabetes-and-ncd-policy-and-prevention>. Accessed October 2012.
- NCD Alliance, at: <http://ncdalliance.org/>. Accessed October 2012.

Almost half of HCPs would use mHealth solutions if they were shown to reduce the time required to manage a patient's condition.

### **mHealth solutions improve cost efficiency by reducing workload, resource and time pressures for HCPs**

Time and resource pressures are currently considerable in healthcare systems, as illustrated in this research. Forty percent of HCPs surveyed stated that they are currently overworked and lack time needed to effectively care for patients, and almost half of HCPs would use mHealth solutions if they were shown to reduce the time required to manage a patient's condition.

Previous research shows that mHealth solutions enable HCPs to diagnose, treat and monitor more patients than traditional face-to-face routes, thereby freeing up time and resources to treat more patients and allowing more of a focus on complex cases.<sup>17</sup> Furthermore, according to a recent PricewaterhouseCoopers LLC (PwC) mHealth survey,<sup>4</sup> mHealth could enable a move from doctor-directed care towards a more personalised, patient-oriented model. Indeed, patients believe that mHealth offers them convenient access to providers and, in some countries such as India, mHealth is often the only access to healthcare.<sup>4</sup>

*Mohammad Chowdhury, Pricewaterhouse Coopers LLC, notes, "Our survey found that payers are more willing to pay for mHealth solutions than HCPs are to recommend them. This was a surprise, but illustrates the perceived value of this intervention in addressing healthcare challenges. If HCPs embrace this opportunity by accepting payers' money to implement widespread but customised use of mHealth solutions, then everyone will benefit."*

However, to be useful, HCPs need mHealth solutions that integrate seamlessly and simply into current practice. In our survey, over half of HCPs would use mHealth solutions if they could be integrated into current systems.

*With spiralling healthcare costs worldwide, limited resources and overstretched healthcare services, a change in the current system is needed. mHealth will simplify and streamline current practice, and so ultimately improve the value and quality of care.*

"Another thing is the doctor's time... We see a patient every minute so time is of importance..."

Research Respondent, HCP, India

## Key message 2. mHealth solutions must be affordable

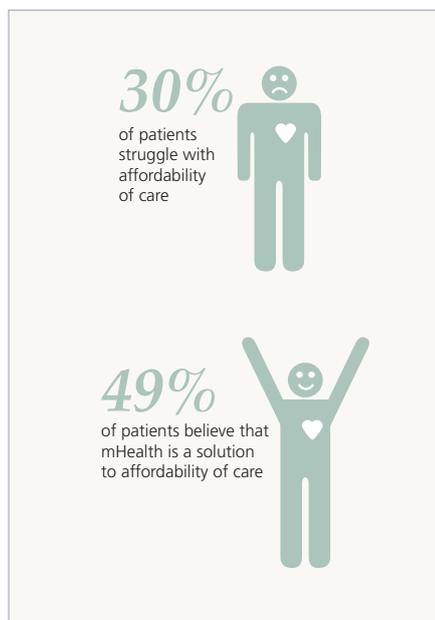
### The affordability of mHealth solutions are a concern to all end users

Using diabetes as an example of current healthcare costs, diabetes poses a considerable economic burden on healthcare systems worldwide, with 11% of the global healthcare expenditure spent on the disease.<sup>18</sup> Most countries (80%) spend between 5-18% of their national health expenditures on treatment and management of the condition.<sup>18,19</sup>

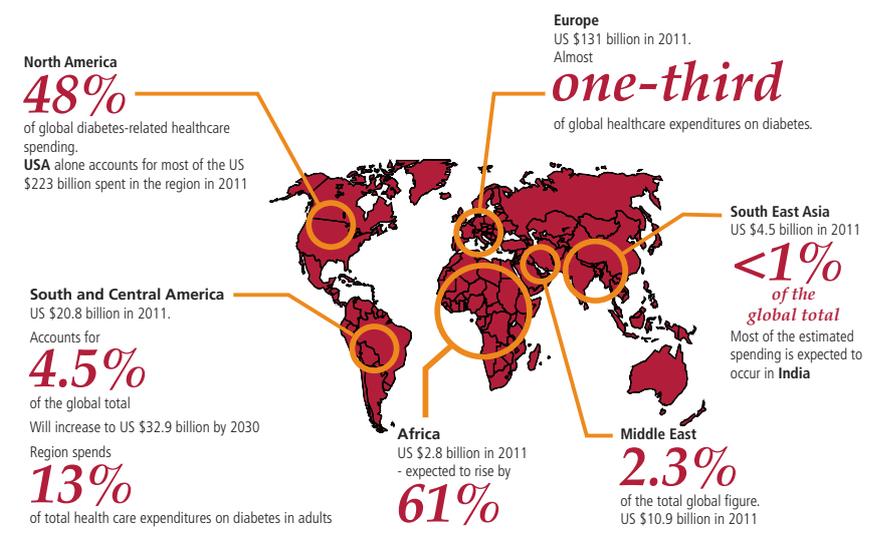
Higher income countries spend more on diabetes, and these account for 90% of the global expenditure, with the US spending more than half of the total. Low- and middle-income countries spend less than 10% of the global expenditure. India - which accounts for one of the highest prevalence rates - spends less than 1% of the total global expenditure on the disease. In the UK, the cost of diabetes to the NHS is over £1.5m an hour or 10% of the NHS budget for England and Wales. This equates to over £25,000 being spent on diabetes every minute. In total, an estimated £14 billion pounds is spent a year on treating diabetes and its complications, with the cost of treating complications representing the much higher cost.<sup>20</sup> Overall, the global expenditure on diabetes is predicted to rise by up to 34%, reaching a total of around US \$595 billion by 2030.<sup>18,19</sup>

*Horst Merkle, Director Information Management Systems, Diabetes Care, Roche Diagnostics Corp., comments, "Roche has more than 35 years experience in leading the way towards optimal diabetes management. Its brand Accu-Chek is the committed expert which enables and empowers success in diabetes with impactful solutions - leading to an improved medical outcome. Late complications in diabetes drive cost. The utilization of effective diabetes management solutions helps to lower both mortality and morbidity in people with type 2 diabetes. A recent Roche study with insulin-using diabetics showed improved metabolic control (lower HbA1c), enhanced treatment satisfaction and less hypoglycemia by using an advanced diabetes management system. mHealth opens opportunities to innovate standards of care resulting in overall cost savings in the healthcare system. We continue to work hard on new structured and integrated concepts that allow effective and efficient therapy management and mHealth is an integral part of this strategy. I personally believe that mHealth technologies have the potential to deliver the aforementioned outcomes faster and more cost effectively than traditional proprietary devices."*

At a time of such current financial concerns and constraints, mHealth solutions will not be accepted if they add to the current costs of healthcare. It is true that there are invariably costs associated with mHealth solutions and an interesting question is who pays for these (see page 10). Indeed, many HCPs, patients and consumers surveyed by GSMA were concerned about the inaccessibility of mHealth solutions due to costs; 36% of patients believe that mHealth will be expensive, with Brazil and China driving this perception (45% and 41% respectively). Furthermore, almost three quarters of patients and consumers surveyed were concerned that mHealth solutions would not be covered by their insurance company. This is a particular concern in the US, where almost half of HCPs believe they will not be remunerated for mHealth. However, conversely, affordability of mHealth solutions was the most cited factor that would lead to increased usage for most end users in all countries surveyed. **Of crucial value to regulators is the finding in this research that one third of patients surveyed struggle with affordability of care and half of them believe that mHealth is a solution to this.**



## Diabetes cost burden around the globe<sup>21-26</sup>



## Who pays for mHealth?

*“Ultimately, if mobile health is to realise its full potential, it will need to be accepted by reimbursed health systems as a mainstream technology.”<sup>2</sup>*

Of course, an important aspect in affordability is who pays for what? Who should and will fund mHealth solutions if they are to be introduced on a widespread scale?

Whilst healthcare systems are all different, there are several broad categories of funding characterised by the way funds are distributed by health payers in wealthier countries, and their relationship to healthcare providers:<sup>2</sup>

- **Free market:** All healthcare is delivered by private health insurance companies contracting with private or not-for-profit health providers for delivery of services
- **National insurance:** Multiple, highly regulated insurers compete with each other to provide standardised coverage, adjusted so that risk is equalised across the population
- **National health systems:** A single health payer system that provides healthcare to all its citizens, funded through either general taxation or a nominal “national insurance” payment, with the government effectively acting as a monopoly insurer

Within the poorest countries, healthcare funding comes from individuals, the state and non-governmental organisations (NGOs), and focuses on the provision of basic healthcare.<sup>2</sup>

To achieve widespread uptake within a reimbursed system, an mHealth solution must deliver healthcare more cost effectively than existing solutions. A number of factors play into the decision as to whether a particular technology will be funded by payers, e.g., willingness to pay, budget constraints, pathway considerations, innovation value, tangible value creation and funding flows and reimbursement model.<sup>2</sup>

*Jonathan Anscombe says, “As illustrated in the A.T. Kearney report for the GSMA entitled ‘Mobile health; who pays’, this is an incredibly complex area, depending on the structure of local healthcare systems, what the value system offers and local systems for reimbursement. Mobile health has enormous potential to lower the cost of health interactions all along the patient pathway, especially for chronic conditions. Mobile health applications that are able to address conditions such as diabetes, respiratory, and cardiac disease, and the risk factors that cause them, are likely to be most popular. However, it is clear that the large number of pilot projects need to be turned into co-ordinated, cohesive mHealth programmes so that everyone can reap the true benefits of this technology.”*

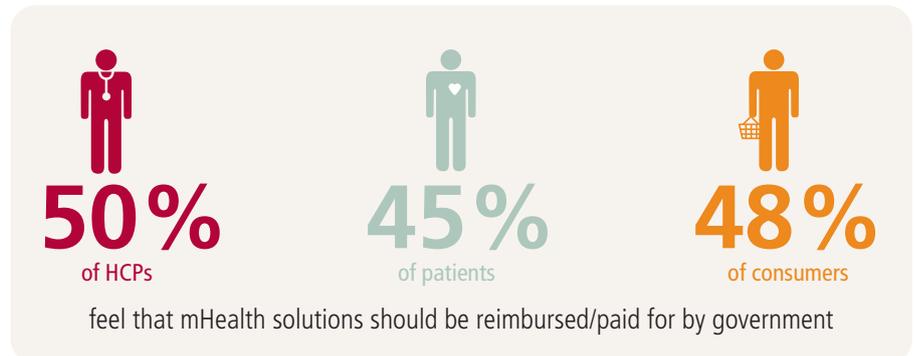
Whatever the system, most important to the success of mHealth will be the way that payments work between the patient/consumer, the health payer and the health provider, and the reimbursement model.

## Regulators need to make mHealth solutions affordable

Around half of HCPs, patients and consumers surveyed in the GSMA research believe that mHealth solutions will reduce the overall cost of care yet improve the quality of care, and we have already reviewed how cost efficiencies can result in numerous ways (see earlier). However, mHealth solutions can only result in such cost efficiency benefits if they are affordable from the outset - to HCPs, patients and consumers. Indeed, affordability was the most cited factor that would lead to increased use of mHealth solutions for HCPs in all countries surveyed except India (which stated interest/request from patients as their number one factor). In relation to this, recent Vodafone research noted that, unless private and public organisations fund the move towards mHealth solutions, barriers to their increased use will remain.<sup>27</sup>

"I probably could not afford the added cost of mobile healthcare on top of regular healthcare."

Research Respondent,  
General Wellness Consumer, US



## Patients and consumers will pay towards high-quality mHealth solutions

However, regulators must not be dissuaded from investing in mHealth solutions by initial upfront costs since, whilst affordability is important, patients and consumers are willing to pay towards them. In this research, 70% of patients and 78% of consumers across all countries surveyed would consider paying towards the cost of an mHealth solution if it were shown to improve the management of their health. This is encouraging for regulators since it confirms the value that is conferred on high quality mHealth solutions in improving health and well-being.

*Regulators must work closely with all stakeholders to increase access to low cost, affordable mHealth solutions.*

"It should be covered by healthcare insurance [...] since the service can be used for prevention..."

Research Respondent,  
General Wellness Consumer, China

**mHealth solutions will drive higher quality care at a lower cost but must be affordable**

## Key message 3. mHealth solutions drive behavioural change to reduce medicine waste

### Behavioural change - the biggest challenge in chronic disease management

Medicine-taking is a complex human behaviour and patients evaluate medicines, and the risks and benefits of medicines, using the resources available to them. Unwanted and unused medicines reflect inadequate communication between professionals and patients - about health problems and how they might be treated, and about patients' ongoing assessment and experience of treatments.<sup>28</sup>

Whilst psychologists have made many attempts to explore what drives behavioural changes in chronic disease and how to influence this, e.g., by changing patients' beliefs and perceptions about their illness and medication,<sup>29-35</sup> drivers differ and the long-term record of changing diet, lifestyle and exercise habits and improving compliance with medication schedules remains poor.<sup>31</sup>

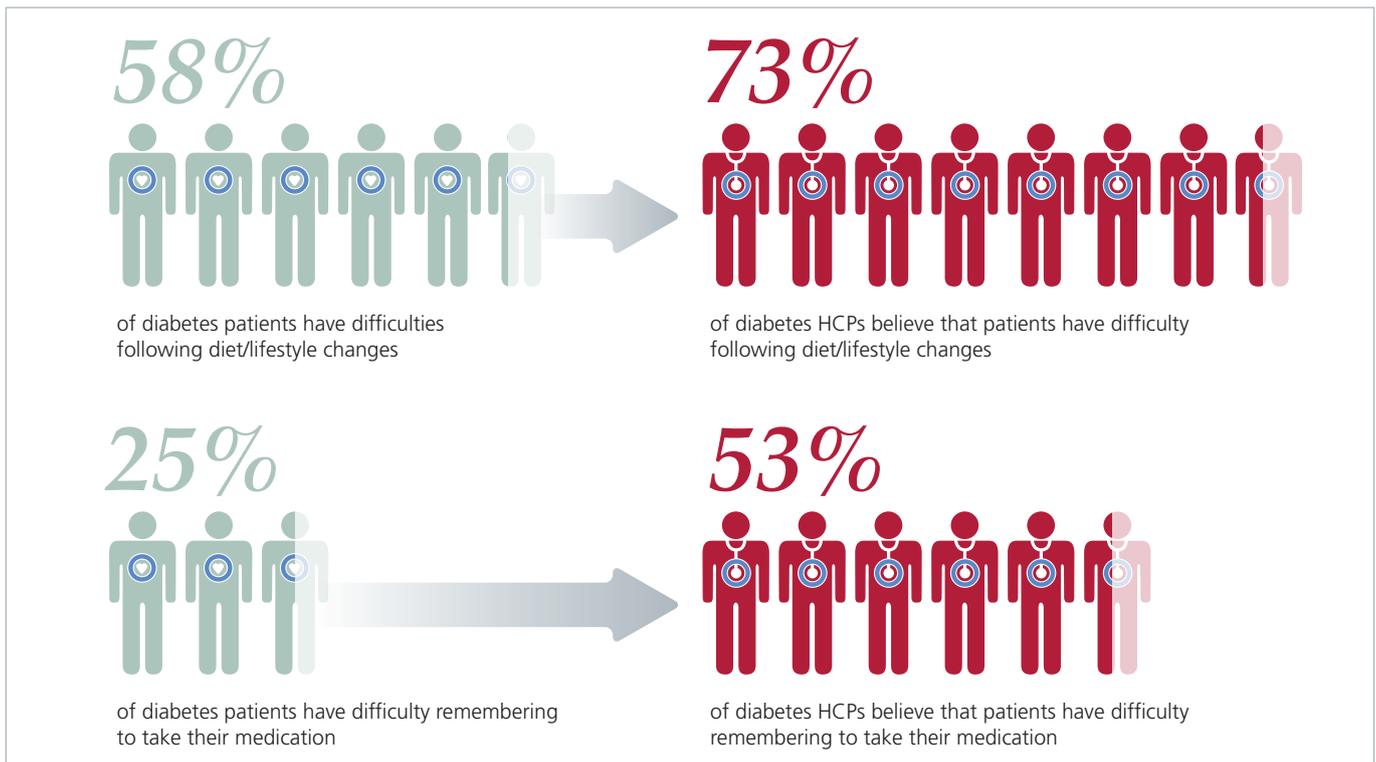
*Keith J. Petrie, Professor of Health Psychology, University of Auckland, New Zealand, says, "Without our patients taking the drugs that regulators pay for, we will get nowhere with today's health challenges. We need to find ways to encourage sustained medicine-taking so that patients benefit from the drugs available."*

*Dr Petra Wilson, Senior Director, Connected Health (Europe), Internet Business Solutions Group, Cisco Systems Belgium BVBA/SPRL, comments, "Behavioural change is hard - it requires a great deal of commitment from the patient and support from the HCP, as well as the patient's wider circle of support. mHealth allows HCPs and others to provide individualised support - giving patients the information, encouragement and guidance where, when and how they want it. Using mHealth solutions, such as location sensitive messaging or social network based information and coupling that with real time medical data, the patient's medical support network is brought into their everyday life, making it easier to make better health and lifestyle decisions. mHealth could be a key part of the human network response to chronic disease to support personalised behavioural change."*

#### **This is important to regulators for several reasons.**

Bad diet/lifestyle habits are fuelling chronic disease epidemics, such as diabetes, obesity and heart disease, all of which are costly conditions. In this end-user research, three quarters of HCPs surveyed believed that the number one challenge for their patients was difficulty in following diet/lifestyle changes. This was true in three of the four countries surveyed (the exception being India where their number one perception of their patients' biggest challenge was non-adherence to keeping appointments, possibly due to geographical challenges and their perceived lack of understanding of their condition). In the US, three of the top five challenges perceived by HCPs related to patient behaviours, including failure to follow diet and/or lifestyle changes and medication compliance. In the diabetes end users questioned, both HCPs and patients acknowledged the considerable behavioural challenges of this chronic condition.

Poor compliance is a well-known challenge in chronic disease. Adherence for patients with chronic disease is about 50% in developing countries.<sup>36</sup> Of patients prescribed a medication for a chronic condition, after only 10 days, 45% reported intentional non-adherence (i.e., due to incorrect beliefs and perceptions of their condition and the prescribed treatment) and 55% reported unintentional non-adherence.<sup>37,38</sup> Furthermore, data show that, in medication-naïve patients, discontinuation rates after 30 days are higher than in medication-experienced patients, especially in those with diabetes, asthma and glaucoma, showing that new patients need additional support.<sup>39</sup> In diabetes, poor adherence rates have been quoted to be over 75%.<sup>40</sup> The WHO states that almost 50% of patients do not adhere to insulin regimens in some population groups,<sup>36</sup> and that 67% of patients with type 2 diabetes report not performing self-monitoring of blood glucose as frequently as recommended.<sup>36</sup> One study showed that two thirds of patients with type 2 diabetes fail to take their medication as prescribed, with significant linear trends for poorer adherence with each increase in the daily number of tablets taken ( $p=0.001$ ) and increase in additional medication ( $p=0.0001$ ).<sup>41</sup> In patients taking two drugs, compliance rates were as low as 13%.<sup>41</sup> In this research, in the diabetes end users questioned, both HCPs and patients acknowledged the considerable behavioural challenges of this long-term condition.



### Why compliance is your concern – the true costs

Why does this matter to regulators?

Non-adherence has been estimated to cost the US economy up to US \$100 billion per year.<sup>42,43</sup> Medication non-compliance is a known contributor to excess unplanned hospitalisations, currently estimated at between 6% and 10% of all admissions in the UK. Non-adherence has a significant impact not only on clinical sequelae but also on the cost-effectiveness of pharmaceuticals.<sup>44</sup> Whilst this is hard to quantify across different studies, it is evident that non-compliance always results in a reduction in efficacy and cost-effectiveness.<sup>44</sup>

Improved medication adherence can prevent costly medicine waste.

Importantly, improved medication adherence can prevent costly medicine waste. A recent Department of Health report recognised that £150 million is spent by the NHS in the UK each year on medicine waste that could be prevented by avoiding unnecessary hospital admissions for medication misuse.<sup>45</sup> Non-compliance contributes to wastage and £100 million worth of drugs are returned to pharmacies every year.<sup>28,46</sup> The economic costs are not limited to wasted medicines but also include the knock-on costs arising from increased demands for healthcare if health deteriorates.<sup>28</sup>

In diabetes, medication adherence is made all the more complex as adherence to one aspect of the regimen is generally not correlated to another aspect of the regimen; each aspect represents different skills and requires different levels of patient motivation.<sup>47</sup>

Information on the healthcare costs associated with non-adherence to treatments for diabetes is both limited and inconsistent. A meta-analysis of 209 studies showed that low medication possession ratios were associated with higher costs, although variations in the costs were evident due to the numerous variables involved, such as codes used to identify patients and their diagnoses, data sources, analytic window period, definitions of adherence measures, skewness in cost data and associated statistical issues, adjustment of costs for inflation, adjustment for confounders, clinical outcomes and costs.<sup>43</sup>

However, it is clear that non-adherence to therapy in diabetes can lead to poor glycaemic control, increased complications and increased mortality, as well as increased healthcare costs.<sup>29,36,48</sup> In one study, the least compliant diabetes patients were more than twice as likely to be hospitalised compared to those who were most compliant, and their total healthcare costs were nearly double. The study noted that people who use their diabetes medications as directed were less likely to develop the short and long term health complications that require expensive care. The combined drug and medical costs for the most compliant diabetes patients average

Poor compliance should be everyone's concern - it leads to considerably increased healthcare costs, inefficiencies of care, high wastage and poorer outcomes.

\$4,570 per patient per year, which is almost 50% below the \$8,867 cost for the least compliant patients.<sup>49</sup> Furthermore, the direct costs of complications attributable to poor control of diabetes are three to four times higher than those of good control.<sup>36</sup>

**If regulators could be more effective in promoting adherence to diabetes self-management, the human, social and economic benefits would be substantial.<sup>36</sup>**

Non-compliance is directly associated with poor treatment outcomes in patients with diabetes, epilepsy, AIDS (acquired immunodeficiency syndrome), asthma, tuberculosis, hypertension, and organ transplants.<sup>36</sup>

In 2008, a Cochrane Review looked at interventions for enhancing medication adherence. It concluded, "Current methods of improving adherence for chronic health problems are mostly complex and not very effective, so that the full benefits of treatment cannot be realised. High priority should be given to fundamental and applied research concerning innovations to assist patients to follow medication prescriptions for long-term medical disorders."<sup>50</sup>

In 2009, the UK's National Institute for Health and Clinical Excellence (NICE) published guidelines on medication adherence which were reviewed in 2011. In terms of using technology to better support adherence, the NICE guidelines identified using records more constructively, better communication between professionals and using multi-compartment medicines systems.<sup>28,51</sup>

So poor compliance *should* be everyone's concern, particularly regulators, since it leads to considerably increased healthcare costs, inefficiencies of care, high wastage and poorer outcomes.

### mHealth solutions improve outcomes

This end-user research shows that around 60% HCPs and consumers and half of patients believe that mHealth solutions will influence behaviour (including support for diet/lifestyle changes, improving compliance with medications and patients taking greater ownership of their health).



"I think it would be good to have something that would warn you about the time to take your medicine. I can never take my medicine at the same time."

Research Respondent,  
Cardiology Patient

Indeed, several published studies have confirmed this.<sup>33,52</sup> For example, a targeted text message programme was shown to increase adherence to the use of an asthma preventer inhaler and was felt to be useful in other conditions where adherence is a major issue.<sup>33</sup>

*Marcia Verploet, Researcher, NIVEL Netherlands institute for health services, who was lead researcher in one of these studies, comments, "As we found in our recent research, SMS reminders were a driver of improved adherence in people with type 2 diabetes, especially the precision with which patients adhered to their prescribed regimen was improved. The SMS reminders were appreciated by patients. This simple mHealth intervention can strengthen patients' self-management. I urge regulators to roll out similar ways of providing adherence support for patients."*

## HCPs and patients should discuss the benefits of specific mHealth solutions

*Dr Wilson comments, “mHealth is by definition a two-way process which allows the HCP to support patients in their real lives. To be successful, mHealth needs three key ingredients: a safe and stable communication and collaboration platform, interoperable solutions which work together seamlessly, and a financial base within the healthcare system where patients and providers can be reimbursed for using mHealth solutions. Industry can drive the first two, through standards and guidelines and robust solutions; but we all need to pull together to change the political landscape to bring mHealth into the heart of everyday healthcare practice.”*

Studies have now confirmed that mHealth solutions can improve glycaemic control.

However, the real reason why regulators should take note of the potentially enormous benefits of mHealth solutions in diabetes is that numerous studies have now confirmed that mHealth solutions can improve glycaemic control in type 2 diabetes, the single biggest factor that significantly impacts on outcomes.<sup>53-56</sup> Furthermore, one of these studies<sup>54</sup> demonstrated the ability of mHealth solutions to address inequities of care. WHO has stated that inequities in access to care are a cause of major inequalities in the occurrence and outcome of chronic disease, and that poverty-reduction strategies and relevant social and economic policies should incorporate the prevention and control of chronic disease,<sup>11</sup> so this is an important finding.

Appreciation of these potential benefits of mHealth solutions with regard to compliance is reaching payers. Recent mHealth research by PwC confirms that compliance aids were high on the list of mHealth solutions that payers are willing to pay for.<sup>4</sup> For example, in China, 97% of payers plan to reimburse this in the next three years; in India, 83%; in Brazil, 80%; and in the US, 69%, illustrating the emphasis that is being placed in this arena.<sup>4</sup>

### UK services highlight value of improved compliance

Health policy is beginning to focus on ways of combating non-compliance and increasing adherence to drug regimens. For example, the UK's Department of Health has recognised the importance of controlling medicines management. In July 2011, the Pharmaceutical Services Negotiating Committee announced a £110 million advanced service for patients newly prescribed medications. Pharmacies will be asked to perform an initial educational intervention when a patient presents with their first prescription. Adherence features strongly in the Expert Patient Programme which trains people to manage their own conditions and in the National Service Frameworks.<sup>46</sup>

*“There are many advantages to applying mobile technology in health and wellness. Text messaging is widely available, low cost and requires minimal technological expertise. We are seeing texting programs that motivate behavior change, increase adherence and patient engagement. However, to make it more robust, connectivity to devices enhances the outcomes and experience. To make this easy to use for both patients and providers, these tools and apps must have ‘plug-and-play’ connectivity for wide-scale adoption,” says Chuck Parker, Executive Director, Continua Health Alliance. “Remote monitoring programs are also giving individuals the information they need to take control of their care and better manage their own health. Personal health devices can collect accurate, individual patient vital signs, including blood pressure, weight, heart rate and blood glucose levels, as well as quality of life data such as sleep patterns and daily activity. Individuals can then access their own data, presented in a user-friendly format, with easy-to-understand information and educational support messaging to help keep the individual on the right track. These data can also be easily shared with the patient’s healthcare provider and care team. As devices and technology services become easier to use with ‘plug-and-play’ connectivity, we will see even faster adoption of personal connected health.”*

*For regulators, medicines wastage is an important consequence of poor compliance. Knowing that mHealth solutions can address this, as well as inequalities in and access to healthcare, should encourage regulators to work together to develop effective mHealth solutions to meet the complex behavioural needs of patients and consumers, and to raise awareness of the considerable benefits that these solutions can bring to nations worldwide.*

**mHealth solutions can drive behavioural changes, including improved compliance, to reduce medicine waste**

## Key message 4. Prevention of chronic disease is a key focus for all governments – mHealth solutions support disease prevention

*“Prevention must be the cornerstone of the global response to non-communicable diseases.”<sup>1</sup>*

### Prevention of chronic disease is a significant health, social and financial focus for all nations

Prevention of chronic disease is the number one priority for the WHO.<sup>11</sup> WHO states that the prevention of chronic disease remains dramatically under-funded at the national and global levels and has been left off the global development agenda. Despite impacting the poorest people in low-income parts of the world and imposing a heavy burden on socioeconomic development, chronic disease prevention is currently absent from the Millennium Development Goals.<sup>11</sup>

Using diabetes again as an example, diabetes costs \$465 billion globally,<sup>7</sup> and healthcare expenditure due to diabetes accounted for 11% of total healthcare expenditure in adults in 2011.<sup>57</sup> The 10-year Diabetes Prevention Program (DPP) confirmed the benefits to health and finances of preventing diabetes in high-risk individuals. The benefits included lower costs for in-patient and out-patient care and prescriptions, and an improved quality of life.<sup>58,59</sup>

*Jonathan Anscombe comments, “The increase in prevalence of chronic disease, and the increasing time that patients live with chronic conditions, pose the greatest cost challenge to health systems across all developed countries. To date the cost of telehealth solutions has limited their use to patients who are quite ill. Mobile technologies offer the opportunity to offer a low cost channel to reach those at risk of developing chronic disease using SMSs, education, reminders and social networks.”*

The American Diabetes Association (ADA) estimated that, in 2007, the average medical expenditure in people with diabetes was 2.3 times higher than in those without diabetes.<sup>60</sup>

*With these figures in mind, prevention must be a primary aim for regulators globally.*

### Global and regional initiatives to address chronic disease prevention and control<sup>1</sup>

#### Global initiatives include:

- 2008-2013 Action Plan for the Global Strategy for the Prevention and Control of Non-communicable Diseases
- Global Strategy on Diet, Physical Activity and Health, and the Global Strategy to Reduce the Harmful Use of Alcohol
- World Health Organization Framework Convention on Tobacco Control

#### Regional initiatives include:

- The Declaration of the Heads of State and Government of the Caribbean Community entitled “Uniting to stop the epidemic of chronic non-communicable diseases”, adopted in September 2007
- The Libreville Declaration on Health and Environment in Africa, adopted in August 2008
- The statement of the Commonwealth Heads of Government on action to combat non-communicable diseases, adopted in November 2009
- The outcome declaration of the Fifth Summit of the Americas adopted in June 2009
- The Parma Declaration on Environment and Health, adopted by the Member States in the European Region of WHO in March 2010
- The Dubai Declaration on Diabetes and Chronic Non-communicable Diseases in the Middle East and Northern Africa Region, adopted in December 2010
- The European Charter on Counteracting Obesity, adopted in November 2006
- The Aruban Call for Action on Obesity of June 2011
- The Honiara Communiqué on addressing non-communicable disease challenges in the Pacific region, adopted in July 2011

## mHealth solutions support disease prevention

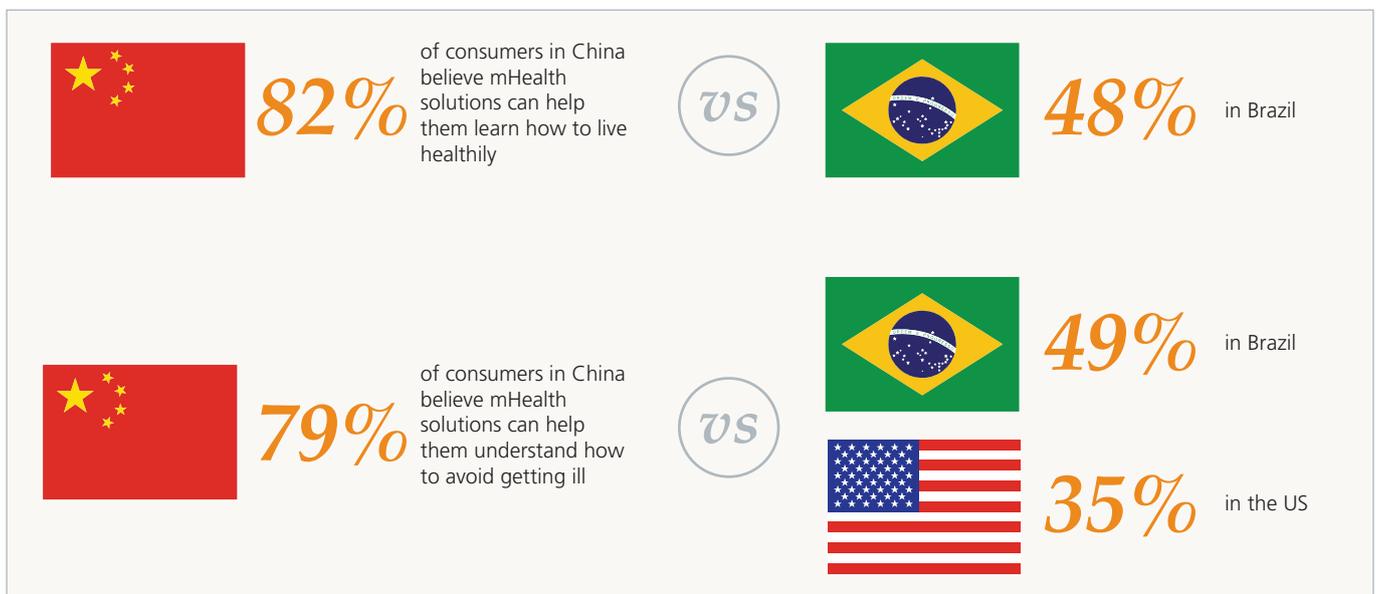
Consumers are becoming increasingly engaged in taking responsibility for their own health, often encouraged by governments. Around a quarter of the population aged 65+ in the US look for health advice online, with around 110 million North Americans classed as “cyberchondriacs”. As a result, expenditure on “wellness” related products is growing rapidly.<sup>2</sup>

mHealth solutions can help to achieve challenging disease prevention targets in several ways. For example, they can address the challenge of changing unhealthy behaviours that are proven difficult to change (see page 13). In this GSMA research, almost 40% of consumers believe that it is difficult to exercise regularly, and almost 30% find it hard to maintain a healthy diet. Furthermore, 34% of consumers believe that maintaining a healthy lifestyle is expensive.

Consumers in this research believe that mHealth can support healthy living and therefore, ultimately, disease prevention in several ways.



Whilst there were some noticeable differences between the countries surveyed in this regard (see below), overall, a considerable number of consumers believe in the power of mHealth solutions to change their behaviour and thereby drive disease prevention.



*There is a need for mHealth solutions that enable consumers to learn how to stay healthy affordably and maintain altered behaviour in the long term. Regulators are in an ideal position to drive the increased use of mHealth solutions for this purpose, and so increase access to this powerful potential driver of change in consumer behaviour.*

## mHealth solutions can support healthy living and disease prevention

## Key message 5. mHealth solutions require a collaborative, step-wise approach

### **mHealth solutions require all stakeholders to work together**

Chronic disease, such as diabetes, involves many people interacting with the person affected, but how should this interaction best be achieved to motivate individuals and sustain and monitor altered behaviour over many years? Traditionally, this has been arranged solely on a face-to-face basis. However, as regulators are well aware, this is a costly and inefficient method.

*Jonathan Anscombe notes, "One of the biggest challenges in any healthcare system is to co-ordinate the interactions of healthcare professionals. Health systems tend to be very institutionally focussed and struggle whenever patient pathways flow between institutions such as hospitals, primary care clinics and social services. The ability to share information is critical to achieving a truly patient-centred approach to patient management."*

Regulators can see from this GSMA research, as well as other research in mHealth,<sup>4,8</sup> that there is a strong belief in the potential benefits of mHealth solutions by HCPs, patients and consumers, as well as payers. If all stakeholders work together to raise awareness of and increase access to appropriate mHealth solutions, this will ultimately drive improved disease outcomes – a clear target for all stakeholders.

Solutions will need to be scalable, addressing multiple applications across global markets, and will need to be developed step-by-step as the value of each application is proven.<sup>2</sup>

Of course, there are differences in the incentives that will drive the use of mHealth solutions across different end users and stakeholders, and across different countries, as illustrated in this white paper, and these must all be taken into account when discussing and introducing new mHealth solutions.

# What next for mHealth?

*“...the rising prevalence, morbidity and mortality of non-communicable diseases worldwide can be largely prevented and controlled through collective and multi-sectoral action by all Member States and other relevant stakeholders at local, national, regional, and global levels, and by raising the priority accorded to non-communicable diseases...”<sup>1</sup>*

Delivering affordable healthcare is one of the most intractable challenges faced by any government. In countries with well-developed health systems, the challenge is to meet the rising expectations of citizens while controlling costs to a manageable level; in countries with less well-developed health systems, the challenge is to build a health infrastructure that is able to deliver an acceptable quality of healthcare to the mass population.

In 2011, the United Nations (UN) General Assembly issued a political declaration urging governments to address the global burden of chronic disease. It recognised that chronic disease is a threat to the economies of many UN Member States, and may lead to increasing inequalities between countries and populations. It also recognised the primary role and responsibility of governments in responding to the challenge of chronic disease.<sup>1</sup> It acknowledged the existence of significant inequalities in the burden of chronic disease and in access to chronic disease prevention and control, both between countries, and within countries and communities.<sup>1</sup> It also highlighted that chronic disease can be prevented and its impact significantly reduced, with millions of lives saved and untold suffering avoided.<sup>1</sup>

As this research shows, end users believe that mHealth is in a unique position to address all of these needs and transform healthcare; to reduce costs, reduce inequalities, improve access, address disease prevention and improve patient outcomes, these all being universal aims that regulators will appreciate the urgency of achieving.

*Alex Sinclair, GSMA, notes, “At a time when healthcare costs are consuming an ever increasing portion of GDP each year, mobile health services offer innovative alternative solutions for delivering better quality, at lower cost, and improving the quality of life for patients worldwide, particularly those suffering from long-term chronic conditions. The collaboration between mobile network operators and the healthcare sector is the key to the future of affordable healthcare for all.”*

A whole-of-government and a whole-of-society effort is needed.

However, while mobile health undoubtedly has huge potential, healthcare is a conservative industry. This means that there is a strong need for regulators and policymakers to stimulate innovation and uptake through adoption of international healthcare standards for information exchange and common approaches to management of clinical data. Furthermore, reimbursement regimens should be designed with mHealth solutions in mind to encourage remote interactions between patients and carers.<sup>2</sup>

Regulatory bodies need to drive the coming together of all stakeholders, at a national, local and individual level. As directed by the UN, steps need to be taken to promote, establish, support and strengthen multisectoral national policies and plans for the prevention and control of chronic disease, taking into account, as appropriate, the 2008-2013 WHO Action Plan for the Global Strategy for the Prevention and Control of Non-communicable Diseases.<sup>1,11</sup> In order to respond to the challenge, a whole-of-government and a whole-of-society effort is needed.<sup>1</sup>

For all of these reasons, mHealth will continue to move up the healthcare agenda worldwide, and regulators should focus on driving the benefits that mHealth solutions can bring locally, regionally, nationally and globally.

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### **About the GSMA**

The GSMA represents the interests of mobile operators worldwide. Spanning more than 220 countries, the GSMA unites nearly 800 of the world's mobile operators with more than 230 companies in the broader mobile ecosystem, including handset makers, software companies, equipment providers and Internet companies, as well as organisations in industry sectors such as financial services, healthcare, media, transport and utilities. The GSMA also produces industry-leading events such as the Mobile World Congress and Mobile Asia Expo.

For more information, please visit the GSMA corporate website at [www.gsma.com](http://www.gsma.com) or Mobile World Live, the online portal for the mobile communications industry, at [www.mobileworldlive.com](http://www.mobileworldlive.com).

