Assessing the effects of digital technologies on health financing and universal health coverage objectives

A guide with key questions
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I. Introduction and overview

Rationale and objective of this guide

Digital health is a rapidly expanding topic of interest for research, policy and practice. Within digital health, digital technologies (DTs) for health financing are receiving increasing attention. However, little robust evidence exists on the impact of DTs specifically on the objectives of health financing and universal health coverage (UHC). While the number of uses and studies is gradually growing, more rigorous research in this area is urgently needed since, even for some of the most ubiquitous applications (such as mobile financial services), evidence of impact on health financing is still scarce (1,2,3).

The aim of this guide is to support the generation of evidence on how DTs (positively or negatively) influence health financing functions and tasks, and how this may contribute to progress towards the UHC goals. The guide provides an orientation for the analysis of a use case of a DT and its effects — i.e. whether, how and why it contributes to the realization of desirable health financing attributes (6)¹ and the intermediate and final UHC objectives, or whether, how and in which circumstances it may harm these. For an outline of these objectives and guidance on health financing policy, see references (7,8) as well as various health financing policy briefs (9).

¹ A list of the desirable health financing attributes, as outlined in the WHO Health Financing Progress Matrix, is presented in Annex 1
This document focuses on DTs that are being used to support health financing functions or specific tasks. It does not cover DTs for adjacent topics such as general taxation, improved financial management in hospitals or costing exercises. There are obviously many other DTs outside of or adjacent to health financing that have indirect effects on or implications for health financing tasks.

In a nutshell, this guide consists of key questions and indicators and also provides examples of digital technologies for health financing (see Section II for more details). The development of the guide has been informed in the following ways: At the start, potential benefits and risks or challenges in relation to health financing and UHC objectives have been extracted from two overview documents (1, 3). Based on this, in a deductive approach, we reformulated the desirable health financing attributes as outlined in the WHO Health Financing Progress Matrix country assessment guide (6) into key questions. This was coupled with an inductive approach by testing and applying a first draft of the key questions and indicators in several country studies which assessed the application of existing DTs in health financing (10-13). In a next step, a (non-exhaustive) list of indicators has been deductively developed for each of the health financing functions in relation to the key questions, informed by the health financing indicators provided in WHO health financing policy material (6, 14).

The examples of digital technologies for health financing used for illustration have been taken from various overview papers on digital technologies for health financing (1, 3, 10) as well as from the WHO Classification of Digital Health Interventions (15).

The role of digital technologies for health financing

When assessing the effects of DTs for health financing and UHC, one should pay attention to both the potential benefits and possible risks and implementation challenges. DTs can change the nature and business processes of health financing functions and tasks and can modify the interactions between health financing actors (individuals, providers, purchasers, stewards, the ministry of health etc.). Depending on their design features and the way they are implemented, as well as broader contextual factors, DTs may affect health financing functions and tasks positively or negatively, which will ultimately have an impact on progress towards the intermediate and final UHC objectives.

For instance, the application of DTs can negatively affect existing health financing mechanisms that are conducive to UHC – because of inadequate design or as a result of suboptimal implementation or the lack of a conducive digital ecosystem. Caution is particularly required when DTs contribute to, simplify or enhance a pooling architecture with limited or reduced redistributive capacity. This may worsen or consolidate inequities in financial protection to the detriment of poor, vulnerable and disadvantaged population groups, as may be the case with DTs.

2 Individuals may include patients, users of health services, health insurance members and/or beneficiaries of health coverage schemes.
used in non-aligned or substitutive voluntary health insurance. It may also be problematic if DTs are used to facilitate and enhance the assessment of individual health risks, as this information may be used to try to exclude high-risk persons from health coverage or to increase their contributions, thus potentially becoming unaffordable (1).

Fig. 1 shows how DTs are linked to – and could affect – health financing tasks and how this may have an impact on desirable health financing attributes and ultimately on the intermediate and final UHC objectives. However, it is important to emphasize that the most decisive positive factor is good design of health financing policy in order to progress towards the UHC objectives. The primary role of DTs is to support, simplify or facilitate health financing tasks and to inform sound health financing policy.

**Figure 1. Linkage between digital technologies and health financing functions, and the potential effects on desirable health financing attributes and UHC objectives**
Application of this guide

WHO provides a number of guidance documents for planning, implementing and strengthening digital health interventions (16-20). This guide adds to this guidance and focuses specifically on how to assess the benefits and risks of a DT for health financing in order to help fill the evidence gap in this domain.

This guide may be applied at different entry points. Primarily, it serves to assess an existing, already implemented DT to inform the improvement of its design and implementation in order to optimize the impact on health financing and UHC. The guide can also be used to estimate or anticipate the benefits and risks of a DT for health financing in order to inform the DT’s design and implementation prior to deciding whether to adopt and introduce it. Not all components of this guide will be equally applicable for such an initial assessment (the key questions probably being of more value than the indicators) so the guide can be used in combination with other WHO guidance documents (17-19).

This guide with its key questions can also contribute to the broader effort of increasing awareness of the possible effects (both positive and negative) of applying DTs to health financing. It therefore helps to define what questions to raise initially, throughout implementation and during review so that over-enthusiastic or over-cautious positions are avoided as far as possible.

Envisaged audience of this guide

The envisaged audience of this guide includes policy-makers, practitioners and researchers who are active at the intersection of health financing and DTs. The team that applies this guide is assumed to be familiar with health financing policy and concepts. Sound knowledge and understanding of DTs will also be required. The team should thus be composed of experts with a background in health financing as well as in digital health and DTs.

3 For example, these include guidance for exploring the feasibility, cost–effectiveness and scalability of a DT for health (19) and step-by-step guidance for governments and technical partners in designing and implementing digital health interventions (20).

4 For an overview of health financing concepts see references (6,14).
Assessing effects of digital technologies for health financing as part of a broader analysis

In order to be able to understand the effects of digital technologies on health financing, it is important to undertake this specific assessment as part of a broader analysis of the DT – namely of its context, design features, implementation practice and challenges, or its (non-)acceptance by intended users. An understanding of the operations of the health financing task in place prior to applying the DT will also allow for a better assessment of the new “business process” that results from the DT use.

A generic outline for a country case study on a DT for health financing could contain the following sections:

1. An introduction, explaining the study focus, country context and the health (financing) system.
2. The rationale for introducing the DT and its envisaged objectives, with a short description of the business process in place prior to the introduction of the DT.
3. A description of the design process and the design features of the DT as well as the new business process based on the DT.
4. An assessment of the implementation experience and the challenges encountered.
5. An analysis of the (positive and negative) effects of the DT on desirable health financing attributes and UHC objectives.
6. A conclusion, outlining lessons learned and policy recommendations for future use of the DT.

A more detailed outline is provided in Annex 2. This approach is suggested for a comprehensive country case study and may be further adjusted depending on the country context and the objectives of the analysis.
II. Logic and key components of the guide

Focus and structure

This guide focuses on assessing the effects of DTs on health financing and UHC objectives. The guide covers all types of DTs that are used for health financing functions in all types of health financing schemes – government programmes and health coverage schemes as well as public and voluntary health insurance schemes.

The guide uses a functional health financing approach and is organized in five sections, namely: revenue raising, pooling, purchasing, benefits design and entitlements, and public financial management (PFM).

Effects

DTs can have positive or negative effects on desirable health financing attributes and UHC objectives in a number of ways. In an ideal scenario:

- the application of a DT can enhance, simplify or support a health financing mechanism, function or task or help to inform health financing policy design that is conducive to UHC.

In a more negative scenario:

- the application of a DT can negatively affect an existing health financing mechanism, function or task that is in principle and overall conducive to UHC, due to inadequate design, as a result of suboptimal implementation or due to the lack of a conducive digital ecosystem, or

- the use of a DT can enhance, simplify or support a health financing mechanism, function or task or inform a health financing policy design that by itself is not helpful to progress towards UHC objectives in the first place.
Examples of digital technologies

Each section starts with examples of DTs, which help the reader to categorize the DT use case under consideration. The type of interaction (e.g. provider-purchaser, purchaser-steward) to which the health financing task relates is shown, as is the closest match with the classification of digital health interventions (15).

It is possible that the application of a DT in a specific country may relate to several health financing functions, in which case parts of several sections may need to be applied for the assessment.

As numerous DTs are used by (public) health insurance schemes, the examples relating to health insurance (-type) schemes feature more prominently in this guide.

Key questions

Each section provides a list of key questions relating to desirable health financing attributes and/or UHC objectives by asking about potential positive effects (benefits) as well as negative effects and risks. Yet these lists of possible questions are not exhaustive. The assessment team may further develop or modify these for their purpose and for the DT under study. It is also important to note that only a couple of questions in each subsection will be relevant for assessing a specific DT.

While all questions are formulated as closed questions calling for a “yes/no” answer (e.g. “does the DT...?”; “is the DT....?”), they are also meant to be understood as open questions. It is important to ask “how” and/or “why” or “why not” the DT under study has a certain effect.

Indicators

The key questions in each section are followed by a list of possible indicators.5 Indicators may vary in type: while some are process-related, others aim to assess performance or effect, or relate to progress in terms of intermediate and/or final UHC objectives. Many of the indicators are qualitative.

The indicators are intended to be illustrative and are by no means exhaustive. They are derived from the key questions and may inspire the assessment team to develop other indicators as needed. When using the indicators suggested here, or when developing new ones, it is important to acknowledge challenges related to attribution. It is often not possible to attribute changes in indicators and effects on health financing and UHC to just one factor, such as the introduction of a DT. Consequently, it is always advisable to interpret trends in indicators with caution and with due acknowledgement of contextual and potentially confounding

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5 In some cases, it may not (yet) be possible to observe or measure a change, but there may still be plausible indications to suggest or signal that the use of a DT has certain positive or negative effects.
Factors. While a DT may support, simplify or facilitate a health financing task, its role should typically be considered as a contribution to the task, rather than attributing an effect solely to the DT.

**Methods and data sources**

The assessment of a DT for health financing will often be primarily of a qualitative nature. The assessment will also be based on making plausible assumptions that the DT can contribute to a desirable health financing attribute because it supports, simplifies or facilitates one or several health financing tasks.

Relevant sources and methods include: literature review, document review (government policies and strategies, implementation and evaluation reports, donor publications etc.), key informant interviews and focus group discussions with relevant stakeholders (e.g. patients, health-care providers, ministry of health staff, other government officials, digital tool developers as well as staff of purchasing agencies).

The qualitative approach may be combined with a quantitative analysis, subject to the availability of quantitative data. This may involve primary data collection and/or secondary data analysis. The sources from which data can be obtained are diverse and will depend largely on the nature of the selected questions and indicators. Data sources may include: health expenditure data, health budgets, claims data, health-care utilization trends, DT user behaviour, administrative costs and other data related to health coverage schemes.
III. Proposed key questions and indicators

This section outlines key questions to guide the assessment of the effects of digital technologies on desirable health financing attributes and the UHC objectives. All questions are also meant to be understood as open questions by asking “how” and/or “why” or “why not” the DT under study has a certain effect.

Digital technologies used for raising revenue

Examples of application of DTs for raising revenue:

- **Internal management (within stewards or purchasers):** Digital financial management information systems (FMIS) (21) [CDHI 3.5.6]

- **Individual – purchaser interactions:** Mobile telephone applications for enrolment processes and re-enrolment reminders (22) [CDHI 3.5.1]

- **Individual – purchaser interactions:** Mobile telephone applications for payment of health insurance contributions (23) [CDHI 3.5.8]

Questions for identifying potential positive effects (benefits)

- Does the DT contribute to increased revenue raising from public/compulsory funding sources (prepayment)?
- Does the DT enhance predictability of funding over time?
- Does the DT support a stable flow of public (or external) funds?
- Does the DT support raising revenues in a more progressive (i.e. redistributive) way?
- Does the DT enhance (administrative) efficiency in revenue raising (saving either time or costs)?

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6 The examples are mapped against the WHO classification of digital health interventions (19); some examples may relate to more than one type of intervention.

7 These may include patients, users of health services, health insurance members and/or beneficiaries of health coverage schemes.
Assessing the effects of digital technologies on health financing and universal health coverage objectives

Questions for identifying potential negative effects and/or risks

– Does the DT lead to increased voluntary health insurance expenditure or out-of-pocket expenditure at the expense of relying mainly on public finance?
– Does the DT create or enhance inequities when parts of the population have no or limited access to the DT (e.g. due to a digital divide), and are thus not able to benefit from the advantages that the DT brings (such as simpler enrolment or simplified payment of contributions)?

Examples of indicators

Some of these indicators may be used for a trend analysis, or for a “before and after” comparison.8

• Number and/or proportion of households/individuals using the DT to enrol in (public) health coverage schemes
• (Self-reported) level of effort required by an individual/household to enrol digitally in the health coverage scheme (time, skills and knowledge, transportation and other costs)
• Number and/or proportion of persons who make contributory payments in a timely manner by using the DT designed for that purpose
• Total amount of health payments and proportion of these collected with the support of a DT under the health coverage scheme
• (Self-reported) level of effort required by an individual/household to make a contributory payment to the health coverage scheme through the DT (time, skills and knowledge, transportation or other costs)
• Proportion of the total operating costs of a health coverage scheme that is required for enrolment and management of beneficiaries with the use of a DT, compared to the operation costs without the use of the DT
• Proportion of total operating costs of a health coverage scheme that is required for managing payment collections with the use of a DT, compared to the operating costs without the use of the DT

8 i.e. a comparison of the situation before the application of the DT and after its introduction.
Questions for identifying potential positive effects (benefits)

- Does the DT help to reduce out-of-pocket expenditure (for targeted groups) and to increase pre-payment?
- Does the DT enhance equity in resource distribution?
- Does the DT contribute to reducing fragmentation and increasing redistributive capacity? For instance:
  - Does it help to make coverage compulsory or automatic?
  - Does it help to merge pools?
  - Does it help to improve cross-subsidization and/or risk adjustment across pools?
  - Does it help to contribute to “as-if pooling” (e.g. harmonization of benefits and payment methods through interoperability)?

Questions for identifying potential negative effects and/or risks

- Does the DT lead to an increased number of risk pools – i.e. further fragmentation and lower redistributive capacity (de-solidarization)?
- Does the DT contribute to enhancing risk selection (cream-skimming) of low-risk patients, concentrating them within one pool, and destabilizing other risk pools that are left with high-risk and high-cost patients?
- Does the DT allow for easier identification of high-risk/high-cost individuals, resulting in their loss of coverage (i.e. lack of financial protection)?
- Does the DT contribute to increasing or consolidating out-of-pocket expenditure?
- Does the DT create or enhance inequities when parts of the population have no or limited access to the DT (e.g. due to a digital divide), being unable to benefit from the advantages that the DT brings?

Examples of application of DTs for pooling:

- **Steward–purchaser, or internal purchaser operations**: Interoperability tools for information management systems across separate health coverage schemes for different population groups – for instance, an application programming interface (API) (10,11,24) [CDHI 4.4.2]
- **Steward–purchaser interactions, or internal purchaser operations**: Digital technology to support risk equalization (e.g. risk scoring ML approach) (3) [CDHI 4.1.4]
Examples of indicators

Some of these indicators may be used for a trend analysis, or for a “before and after” comparison.

- Out-of-pocket expenditure per capita (where possible disaggregated by income quintile or by other sociodemographic or socioeconomic characteristics)
- Per capita expenditure (adjusted for health risks) per health coverage scheme
- Size of risk pools (number of persons and share of the total population covered)
- Composition of risk pools (e.g., disaggregated by income quintile or by other demographic or socioeconomic characteristics, or according to geographical areas)
- Average contribution payments by different population groups (e.g., income quintiles, age brackets or geographical disaggregation)
Digital technologies used for purchasing

Examples of application of DTs for purchasing:

- **Internal management (e.g., within purchasers):** Digitalized information management, including “business intelligence” applications (25) [CDHI 4.1.3]

- **Individual–purchaser interactions:** Web-based platforms and/or mobile telephone-based portals for patient information, access to their own health data and for patient actions (such as disputing a bill) (10, 26) [CDHI 1.4.1] [CDHI 1.5.1]

- **Provider–purchaser interactions:** Open-source results-based financing software (26) [CDHI 3.5.5]

- **Provider–purchaser interactions:** Digital claims transmission and management, using tailored software and digital data exchange (10, 11) [CDHI 3.5.2] [CDHI 4.4.1]

- **Provider–purchaser interactions:** Artificial intelligence/machine learning in digital claims management and fraud detection in health coverage schemes (3, 10, 28), or for verification processes in P4P schemes (29) [CDHI 4.1.4] [CDHI 3.5.2] [CDHI 3.5.5]

Questions for identifying potential positive effects (benefits)

- Does the DT inform or support resource allocation to providers based on population health needs, thus ultimately contributing to equity in resource distribution, equitable access and utilization in line with need?

- Does the DT inform or support resource allocation to providers based on provider performance?

- Does the DT inform or support decision-making to make purchasing more strategic (e.g. in relation to provider payment methods and rates, contracting, provider selection, overall expenditure management, performance monitoring)?

- Does the DT facilitate harmonization of payment methods within and across purchasers to ensure coherent incentives for providers?

- Does the DT increase efficiency in claims management and claims analysis?

- Does the DT increase efficiency in fraud detection as a result of increased speed and/or precision?

- Does the DT support the work processes of health administration staff (e.g. by reducing the administrative burden and by saving staff time and/or effort)?

- Does the DT support provider payment processing and a timely and stable financial cash flow to providers, thus contributing to improved financial protection of patients?
- Does the DT support integration of health system and financing functions, or does it assist in the coordination of related health coverage schemes and/or programmes?

- Does the DT support the application of complementary administrative mechanisms that seek to address potential over-provision or under-provision of services by providers?

- Does the DT support patient registration with health providers, where this is needed? (e.g. in a capitation payment system)?

- Does the DT help to increase citizens’ trust in the purchasing agency?

Questions for identifying potential negative effects and/or risks

- Does the DT lead to the easier identification of high-risk/high-cost individuals, and is this used to exclude them from coverage (lack of financial protection) or to increase health insurance premiums (reduced fair financing)?

- Does the DT contribute to increasing inequity in access?

- Does the DT lead to duplication/fragmentation of administrative tasks or information management functions?

- Does the DT create or enhance inequities when parts of the population have no or limited access to the DT (e.g. due to a digital divide), thus not being able to benefit from the advantages that the DT brings?
Examples of indicators

Some of these indicators may be used for a trend analysis, or for a “before and after” comparison.

**DTs for claims management:**

- Costs for claims management as a share of the total operating costs of a health coverage scheme
- Average time needed to process a claim
- Proportion of claims that are processed in a timely manner (i.e. within the prescribed timeframe)
- Proportion of claims processed digitally
- Proportion of claims processed automatically and adjudicated successfully
- Number of staff required for claims management

**DTs for fraud detection:**

- **Accuracy:** the number of claims which are correctly classified, through the use of a DT, as either suspicious (i.e. potentially fraudulent or erroneous) or not suspicious, as a share of all classified claims
- **Precision:** the number of claims correctly classified as suspicious (i.e. potentially fraudulent or erroneous) through the use of a DT, as a share of all claims classified as suspicious

In addition to accuracy and precision, sensitivity/recall and specificity may also be considered as indicators for claims management (cf. the indicators for targeting of beneficiaries below).
Digital technologies used for designing benefits and entitlements

Examples of application of DTs for benefits design and entitlements:

- **Individual–purchaser or individual–provider interactions:** Digital tools for identity confirmation, or for the use of an algorithm to identify beneficiaries (helping to address errors or differences in names of geographical locations across multiple data systems) (30) [CDHI 2.1.1]

- **Steward–purchaser interactions:** Triangulation of data across different government programmes or systems to determine eligibility for subsidized health insurance (11) [CDHI 2.11.1] [CDHI 3.5.1] [CDHI 4.4.1]

- **Individual–purchaser or individual–steward interactions:** Mobile telephone or internet-based applications for easy reporting and grievance mechanisms (10) [CDHI 1.5.1]

Questions for identifying potential positive effects (benefits)

- Does the DT support targeting, identification and/or identity confirmation of beneficiaries of health coverage schemes?
- Does the DT reduce inclusion and exclusion errors in identifying beneficiaries for health coverage schemes?
- Does the DT help users to better understand their entitlements and obligations and/or reduce the administrative burden of accessing their entitlements and health services?
- Does the DT facilitate or simplify complaint or grievance reporting (e.g. by reducing effort, barriers, fears or costs)?
- Does the DT contribute to harmonizing eligibility requirements or benefits across different health coverage schemes?

Questions for identifying potential negative effects and/or risks

- Does the DT contribute to increasing inequity in access to health services?
- Does the DT create or enhance inequities when parts of the population have no or limited access to the DT (e.g. due to a digital divide) and are thus not able to benefit from the advantages that the DT brings?
Examples of indicators

Some of these indicators may be used for a trend analysis, or for a “before and after” comparison.

**DTs for targeting and identification of beneficiaries (in order to reduce inclusion/exclusion errors):**

- The proportion of the total operating costs of a health coverage scheme that is required for targeting and identification of beneficiaries

- **Accuracy**: the proportion of households/individuals which are correctly classified, through the use of a DT, as either eligible or non-eligible under a health coverage scheme

- **Precision (or “positive predictive value”)**: the proportion of those households/individuals that are classified through the use of a DT as eligible under a health coverage scheme, for which this classification is correct

- **Sensitivity (or “recall”)**: the proportion of those households/individuals that should be eligible under a health coverage scheme and which are correctly classified as such through the use of a DT

- **Specificity**: the proportion of those households/individuals that should not be eligible under a health coverage scheme and which are correctly classified as such through the use of a DT

**DTs for complaints and grievance mechanisms:**

- The number (and/or proportion) of users that have used the DT to file complaints or grievances about the health coverage scheme

- The (self-reported) level of effort required by a user to file a complaint or grievance (time, skills and knowledge, transportation and other costs)
Digital technologies used for public financial management

**Examples of application of DTs for public financial management (PFM):**

- **Health worker–ministry interactions:** Digital payments (mobile money) to health workers (32) [CDHI 3.5.4]
- **Provider–purchaser–steward interactions:** Digital financial management information systems (FMIS) (21) [CDHI 3.5.6]

**Questions for identifying potential positive effects (benefits)**

- Does the DT contribute to improving processes for formulating the health budget and the budget structure?
- Does the DT support spending which is timely and is aligned with sector priorities?
- Does the DT support a timely flow of resources to (frontline) health service providers?
- Does the DT support providers to flexibly manage funds?
- Does the DT support or improve comprehensive, reliable, timely and publicly available reporting on expenditure and outputs?
- Does the DT enhance the accuracy of health expenditure estimation?
- Does the DT help to increase transparency and accountability in financial management by providers and/or purchasers?

**Questions for identifying potential negative effects and/or risks**

- Does the DT complicate any of the above processes?
- Does the DT contribute to creating barriers in relation to auditing public spending on health?
- Does the DT support the operation of parallel government systems?
Examples of indicators

Some of these indicators may be used for a trend analysis, or for a “before and after” comparison.

To be further specified, where needed, in terms of time period, type of expenditure etc. For instance:

• timeliness of data provided for the national budget cycle
• budget execution rate
• health budget execution rate
• subnational health budget execution rates
References


### Annex 1. Desirable attributes of health financing systems

<table>
<thead>
<tr>
<th>Area</th>
<th>Code</th>
<th>Desirable health financing attribute</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health financing policy, process &amp; governance</td>
<td>GV1</td>
<td>Health financing policies are guided by UHC goals, take a system-wide perspective, and prioritize and sequence strategies for both individual and population-based services</td>
</tr>
<tr>
<td></td>
<td>GV2</td>
<td>There is transparent, financial and non-financial accountability, in relation to public spending on health</td>
</tr>
<tr>
<td></td>
<td>GV3</td>
<td>International evidence and system-wide data and evaluations are actively used to inform implementation and policy adjustments</td>
</tr>
<tr>
<td>Revenue raising</td>
<td>RR1</td>
<td>Health expenditure is based predominantly on public/compulsory funding sources</td>
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<tr>
<td></td>
<td>RR2</td>
<td>The level of public (and external) funding is predictable over a period of years</td>
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<td></td>
<td>RR3</td>
<td>The flow of public (and external) funds is stable and budget execution is high</td>
</tr>
<tr>
<td></td>
<td>RR4</td>
<td>Fiscal measures are in place that create incentives for healthier behaviour by individuals and firms</td>
</tr>
<tr>
<td>Pooling revenues</td>
<td>PR1</td>
<td>Pooling structure and mechanisms across the health system enhance the potential to redistribute available prepaid funds</td>
</tr>
<tr>
<td></td>
<td>PR2</td>
<td>Health system and financing functions are integrated or coordinated across schemes and programmes</td>
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<tr>
<td>Purchasing &amp; provider payment</td>
<td>PS1</td>
<td>Resource allocation to providers reflects population health needs, provider performance, or a combination</td>
</tr>
<tr>
<td></td>
<td>PS2</td>
<td>Purchasing arrangements are tailored in support of service delivery objectives</td>
</tr>
<tr>
<td></td>
<td>PS3</td>
<td>Purchasing arrangements incorporate mechanisms to ensure budgetary control</td>
</tr>
<tr>
<td>Benefits &amp; conditions of access</td>
<td>BR1</td>
<td>Entitlements and obligations are clearly understood by the population</td>
</tr>
<tr>
<td></td>
<td>BR2</td>
<td>A set of priority health-service benefits within a unified framework is implemented for the entire population</td>
</tr>
<tr>
<td></td>
<td>BR3</td>
<td>Prior to adoption, service benefit changes are subject to cost—effectiveness and budgetary impact assessments</td>
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<tr>
<td></td>
<td>BR4</td>
<td>Defined benefits are aligned with available revenues, health services and mechanisms to allocate funds to providers</td>
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<tr>
<td></td>
<td>BR5</td>
<td>Benefit design includes explicit limits on user charges and protects access for vulnerable groups</td>
</tr>
<tr>
<td>Public financial management</td>
<td>PF1</td>
<td>Health budget formulation and structure support flexible spending and are aligned with sector priorities</td>
</tr>
<tr>
<td></td>
<td>PF2</td>
<td>Providers can directly receive revenues, flexibly manage them, and report on spending and outputs</td>
</tr>
<tr>
<td>Public health functions &amp; programmes</td>
<td>GV1</td>
<td>Health financing policies are guided by UHC goals, take a system-wide perspective, and prioritize and sequence strategies</td>
</tr>
<tr>
<td></td>
<td>PR1</td>
<td>The pooling structure and mechanisms across the health system enhance the potential to redistribute available prepaid funds</td>
</tr>
<tr>
<td></td>
<td>PR2</td>
<td>Health system and financing functions are integrated or coordinated across schemes and programmes</td>
</tr>
<tr>
<td></td>
<td>PS2</td>
<td>Purchasing arrangements are tailored in support of service delivery objectives</td>
</tr>
<tr>
<td></td>
<td>PF1</td>
<td>Health budget formulation and structure supports flexible spending and is aligned with sector priorities</td>
</tr>
</tbody>
</table>

Source: (6)
Annex 2. Proposed generic outline for a country study on a digital technology (DT) for health financing and its contribution to desirable health financing attributes and UHC objectives

1. Introduction/background
   • Focus and objectives of the study
   • Brief context of the country’s health system and health financing arrangements
   • Recent key health system and/or health financing reforms in which DTs play a role.
   • Brief overview of the digital environment (digital infrastructure, internet and mobile telephone connectivity) as well as digital health policies and digital health reforms, if relevant

2. Rationale for the introduction of the DT under study and its policy objectives
   • Brief outline of the health financing-related problem for which the use of the DT is seen as (part of) the solution
   • Rationale for the introduction of the DT; objectives and intended effects of the DT:
     – Has an underlying theory of change been developed for the use of this DT? Has there been a clear problem analysis?

3. Design of the DT
   • Development and design process of the DT:
     – Who developed the DT? Have target users and stakeholders been involved in the design, development and testing of the DT? Was there resistance, were there supporters?
   • Description of the business process of the health financing task(s) prior to the introduction of the DT
   • Description of the design features and the new business process based on the DT
     – How does the DT-supported health financing task operate?
     – Who are the users of the DT, and who are the beneficiaries?
   • Extent of alignment with other relevant areas (health system information management, health financing, public financial management)
   • If relevant: adjustments made during the COVID-19 health sector response
   • If artificial intelligence and machine learning are used: description of governance policies or strategies in place to ensure that biased algorithm outcomes, discrimination of specific population groups as well as erroneous prediction are minimized or eliminated
4. Implementation of the DT for health financing

- Analysis of the DT implementation process:
  - Related actions to implement the DT, such as: awareness-raising among both clients and providers, administrative changes, changes in the digital environment at provider level, organizational changes, interoperability adjustments, introduction of legal and regulatory provisions etc.
  - Description and assessment of data governance and related procedures and digital features in place to ensure privacy and confidentiality, as well as to ensure data security and protection
  - Feasibility, acceptability and scaling up issues
  - Investment and operating costs related to the introduction and implementation of the DT
  - Mechanisms in place to monitor and evaluate the impact of the DT
  - If relevant: effects of the COVID-19 pandemic on the implementation of the DT
  - Analysis of enabling and hindering factors to implementation, such as:
    - Capacity of users (providers, patients, purchasers etc.) to apply the DT and/or to use the data produced by the DT
    - Support or resistance from key actors during implementation
    - The digital environment and whether it was/is conducive to the implementation of this DT

5. Analysis of the effects of the DT on health financing and UHC objectives

(This is the core part of the country study)

- Benefits and risks/negative effects of the DT on desirable health financing attributes and UHC objectives
  
  *For this section, please use the guide presented in this document (Section III) and select the relevant questions for the respective health financing function.*
  
- The extent to which intended effects of the DT have been achieved
  
  *If previously absent, the study team could elaborate a theory of change, or otherwise they confirm/modify the one which was developed at the design stage by policy-makers and developers.*
  
- Unintended effects (health financing-related or otherwise) of the application of the DT
  
- If relevant, effects on the COVID-19 health sector response
  
- Other indirect effects on health financing arrangements

6. Conclusion: Lessons and policy recommendations

- Overall implications of the DT for health financing
  
- Recommendations for the improved design and implementation of this DT (in order to increase the contribution to desirable health financing attributes and UHC objectives), as well as health financing policy options
  
- Implications for legal and regulatory provisions
  
- Measures needed to overcome the digital divide and other challenges (e.g. in relation to data security and data protection to guarantee confidentiality and privacy)
For additional information, please contact:
Department of Health Systems Governance and Financing
Health Systems & Innovation cluster
World Health Organization
20, avenue Appia
1211 Geneva 27
Switzerland
Email: healthfinancing@who.int
Website: http://www.who.int/health_financing