HIV Prevention Cascades

Stakeholder Consultation Meeting and Workshop

31 July – 2 August 2017, Harare, Zimbabwe

Report on a consultation and workshop organised by the Manicaland Centre for Public Health Research*

Biomedical Research and Training Institute

Imperial College London

*** In association with UNAIDS, Zimbabwe Ministry of Health and Child Care, and Zimbabwe National AIDS Council; with funding from the Bill and Melinda Gates Foundation**

September 17, 2017

Contact: Robin Schaefer, Imperial College London, r.schaefer@imperial.ac.uk

Table of contents

Executive Summary

Despite good progress in increasing the coverage of antiretroviral treatment and in increasing the range of efficacious methods for primary HIV prevention, recent declines in HIV incidence in sub-Saharan African countries and elsewhere have fallen a long way short of international targets. Using HIV prevention cascades, as has been done with care and treatment cascades, to measure progress in implementing primary prevention and to make comparisons across countries has been suggested as an approach to advocate for greater resources and efforts to reduce new infections. HIV prevention cascades could also be useful to identify particular gaps in programme implementation and the interventions needed to address these gaps. However, international guidance is needed on the forms that HIV prevention cascades should take, on data sources and methods for measurement, and on how cascades can be translated into programmatic action. As a step towards developing this guidance, the Bill and Melinda Foundation is making an investment, through the Manicaland Centre for Public Health Research (a long-term collaboration between Imperial College London and the Biomedical Research and Training Institute, Zimbabwe), to develop methods for measuring and interpreting HIV prevention cascades in general population surveys and to test these methods in a pilot survey in Manicaland, east Zimbabwe.

As part of this investment, a one-day stakeholders meeting was held in Harare, Zimbabwe (July 31, 2017) to consult high-level policy-makers from the Zimbabwe government, international organisations and NGOs, and other key stakeholders on the utility of possible generic formulations and explanatory frameworks for HIV prevention cascades. This was followed by a two-day technical workshop (August 1-2, 2017) with international and local researchers, programme managers, and M&E specialists to develop the formulations for generic HIV prevention cascades (i.e. the bars and overarching headings to be included in all cascades), applications of the generic formulations to specific prevention tools and population risk groups, and methods of measurement of these cascades to be tested in the pilot survey. Pre-existing formulations and new versions developed by researchers at the Manicaland Centre were presented, critiqued and discussed in plenary and group discussions, and proposals were developed for formulations and visualisation approaches. Preliminary suggestions were made for methods and questions that could be used in the pilot survey in Manicaland, Zimbabwe.

General proposals from the workshop for developing generic formulations of HIV prevention cascades included to use a simple 3-bar cascade for advocacy and for routine monitoring, and a more detailed version to identify specific gaps in programme implementation that can be linked to particular interventions. To reduce complexity and to make it more feasible to develop a unified cascade for combination prevention (in addition to cascades for individual prevention tools), it was felt that 'efficacy' and 'infections prevented' should not be included as bars in the cascades themselves – but, importantly, that these elements should be evaluated in mathematical models to compare the impact of intervening at different stages of the cascade. It was proposed that the simplified version of the generic HIV prevention cascade should use the categories of 'motivation' (demand), 'access' (supply), and 'effective use' as the main bars of the cascade (Figure 13); these bars could, potentially, have targets assigned to them (or rather to their ratios) in a similar way to the UNAIDS 90-90-90 targets for treatment cascades. While motivation and access are linked and there is no inherent order in these dimensions (bars), it was felt that they cover the two key dimensions of demand and supply which are both necessary requirements for effective use, and that there is little harm in drawing these as a conditional cascade, starting from the user who has to 'want' to use the prevention method. In the more detailed version, the major reasons that collectively explain the shortfalls between successive bars in the simplified cascade – i.e. the reasons for lack of motivation, lack of access, and lack of use (=lack of capacity) – would be shown as 'sub-bars'. These reasons would then provide the basis for selection of relevant intervention strategies.

This report will be circulated to meeting participants and to other interested international and local stakeholders, and the recommendations and ideas contained within it – together with any further inputs received in response to the report – will be used to develop the questionnaire modules and data analyses applied in the pilot survey in Manicaland, east Zimbabwe. The results of these analyses will be published and the data from the pilot survey will be made available for use by other researchers interested in evaluating alternative approaches to HIV prevention cascades.

Introduction

Background

Following increased scientific evidence for the clinical[1] and prevention[2] benefits of early antiretroviral therapy (ART), World Health Organisation guidelines now recommend that all people living with HIV receive treatment[3]. ART can be highly efficacious in preventing HIV transmission from infected individuals[2,4]. However, while ART has the potential to reduce new infections in populations subject to generalised HIV epidemics, just about half of all HIV-positive people are on treatment, and HIV incidence has been declining only slowly, with about 2 million people newly infected each year since 2010[5]. Therefore, there have been calls to increase the attention, and funding, given to HIV prevention beyond treatment-as-prevention[6-10].

While efficacious HIV prevention strategies for HIV-negative populations exist (pre-exposure prophylaxis [PrEP], condoms, voluntary medical male circumcision [VMMC], partner reduction), the uptake of these strategies remains limited[11]. In many instances, opportunities to prevent new HIV infections have been missed due to lack of perceived risk of HIV infection and demand for HIV prevention, lack of actual or perceived availability of appropriate effective interventions, or lack of uptake or adherence to available interventions. Recently, HIV prevention cascades have been proposed as a tool to improve uptake of and adherence to HIV prevention methods similar to HIV treatment cascades used to track ART programmes[12,13]. HIV prevention cascades conceptualise the use of HIV prevention methods as a series of stages to identify missed opportunities in HIV prevention. Preliminary studies have demonstrated the feasibility of populating HIV prevention cascades with data from population-based surveys using pre-existing surveys[12]. However, more testing and development is needed to establish the practical utility of prevention cascades and to establish optimal formulations for different purposes. Tailored-made questionnaire modules are also needed to improve measurement and to guide interpretation to inform programme development, reflecting the nature of each prevention method and implementation strategy, the characteristics and needs of the primary target groups, and the local social and epidemiological context. These modules should be made as generalisable as possible to facilitate their wider use including in making comparisons across populations and over time.

The Manicaland Centre for Public Health Research organised this stakeholder consultation meeting and workshop as part of a Bill and Melinda Gates Foundation investment on HIV prevention cascades that aims:

1. To develop formulations and theoretical frameworks for HIV prevention cascades
2. To develop questions to measure and interpret HIV prevention cascades in general population surveys; and
3. To test these cascades and questions in a pilot survey in Manicaland, Zimbabwe.

Structure

The stakeholder consultation meeting (July 31, 2017) consisted of presentations on the possible role of HIV prevention cascades in contributing to ongoing efforts to intensify primary HIV prevention, and on existing and new HIV prevention cascade formulations and explanatory frameworks; and a group exercise to obtain feedback from international and Zimbabwean national policy-makers and programme managers on the utility of the concept. A workshop held over the following two days (August 1-2, 2017) consisted of a range of group exercises that focused on developing, applying, and measuring HIV prevention cascades. Participants in the stakeholder consultation included high-level

policy-makers and programme managers, representatives of international organisations and NGOs, local and international researchers (including representatives from the London Working Group on HIV Prevention Cascades), programme implementers, and M&E specialists. Participants in the workshop included primarily researchers, programme implementers, and M&E specialists. Lists of participants are provided in the Appendix.

This report summarises the presentations, discussions, and results of the plenary and group exercises. The agendas for the different days are attached in the appendix. The presentations have been shared separately with all participants, and can be provided to other interested partners on request.

Stakeholder consultation meeting

Objectives

The overall objective of the stakeholder consultation meeting was to sensitise and seek support from key international and national partners on this project to develop methods for measuring and interpreting HIV prevention cascades. The specific objectives of the stakeholder consultation were to:

1) Review potential uses and limitations of existing formulations of HIV prevention cascades
2) Review possible alternative generic formulations of HIV prevention cascades
3) Consider possible explanatory frameworks for interpreting HIV prevention cascades
4) Consider different possible data sources and methods for estimating and interpreting HIV prevention cascades
5) Review the plans and design of the pilot project to develop and test methods for measuring and interpreting HIV prevention cascades in a population-based survey

Current status of HIV prevention and introduction to HIV prevention cascades

Introduction by Dr Owen Mugurungi, Zimbabwe Ministry of Health and Child Care

Cascades have been used as a tool in Zimbabwe for a long time, starting with tuberculosis (TB) control. They are a useful concept to identify gaps in a process and so may be useful in HIV prevention. Success in HIV prevention really means no new HIV infections, and so it is important to identify where the gaps are in current HIV prevention efforts. Therefore, the development of a cascade model for HIV prevention is welcomed by the Zimbabwean Ministry of Health and Child Care.

The state of HIV prevention – a global view; presentation by Dr Sarah-Jane Anderson, Imperial College London

HIV treatment programmes are on track to meet the 90-90-90 global targets by 2020, particularly in eastern and southern Africa (90% of those HIV-positive being tested, 90% of those tested initiated into treatment, and 90% of those in treatment reaching viral suppression through treatment adherence). In contrast, HIV prevention is not on track. Not only has the decline in HIV incidence over the past 5-10 years been too slow to meet targets but there have been increases in the number of new infections in some regions. Reasons underlying this slow decline in HIV incidence include: Limited coverage of HIV treatment (as prevention); low levels of HIV education and testing among young people; low uptake of VMMC in many regions; limited availability of PrEP; and limited availability of needle exchange programmes for injecting drug users. HIV prevention programmes are often not allocated sufficient funding, although investments in HIV prevention can also improve treatment services and create synergies as they can have similar points of access (HIV testing). Ultimately, access to HIV prevention is a human right.

The state of HIV prevention – a Zimbabwean view; presentation by Sinokuthemba Xaba and Brilliant Nkomo, Zimbabwe Ministry of Health and Child Care

Zimbabwe has seen strong declines in HIV prevalence over time and is considered a success story in southern Africa. Responses to the HIV epidemic are increasingly locally adapted given the differences in HIV incidence between provinces and districts. Initial responses have been focused on the health sector but this has changed into a multi-sectorial response. Zimbabwe offers all forms of HIV prevention (treatment-as-prevention, treatment of sexually transmitted infections [STIs], male and female condoms, HIV testing and counselling, behavioural interventions, VMMC, PrEP, and post-exposure prophylaxis [PEP]), apart from microbicides for women. HIV testing is considered an HIV prevention tool in Zimbabwe, particularly because it is needed for initiating treatment and so for treatment-as-prevention. However, a major gap for HIV prevention in Zimbabwe is that only 52% of adolescents and young people know their HIV status. Similarly, there is limited uptake of couples testing, although an estimated 14% of people are in sero-discordant relationships. There are also legal barriers for HIV testing for children under the age of 15. Further challenges to HIV prevention include dwindling resources for condom programmes, low condom use in stable relationships, low demand for VMMC services among older males, and limited resources to provide PrEP. There are also programmes for key populations, including sex workers, transgender individuals, men who have sex with men, and prisoners, but challenges to reach these populations remain, particularly given the lack of data on these populations.

An introduction to HIV prevention cascades and the current study; presentation by Prof Simon Gregson, Imperial College London

An HIV prevention cascade shows the steps needed to prevent uninfected individuals at risk of acquiring HIV from becoming infected. At a population-level, prevention cascades show the missed opportunities in HIV prevention by quantifying the number of people lost at each step (Figure 1). These cascades can be created from the perspectives of the user of a prevention method or the provider.

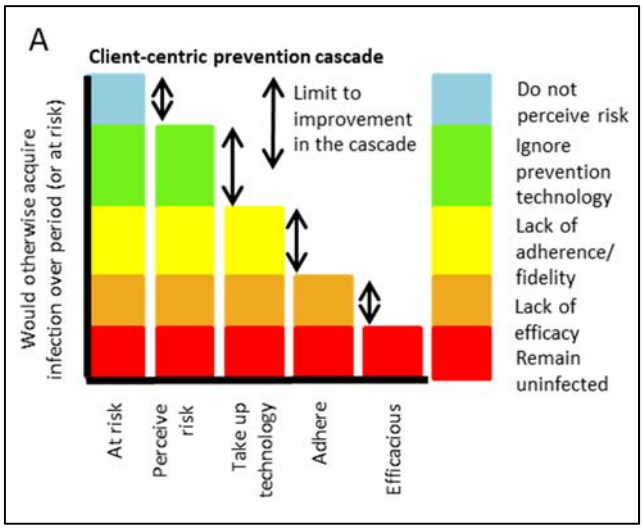

Figure 1: An illustration of a user-centric HIV prevention cascade (Garnett *et al.*, Lancet HIV, 2016).

HIV prevention cascades are a useful tool for evaluating HIV prevention programmes, analogous to HIV treatment cascades. They highlight gaps in prevention programmes and so where extra effort is needed to increase impact. They are also a helpful system to organise data on M&E indicators, and can be easily integrated into mathematical modelling frameworks. However, while various formulations of HIV prevention cascades have been proposed, most versions are not really cascades in the sense that all steps are dependent on each other. Moreover, steps in the cascades may not necessarily be binary in nature, e.g. risk perception or adherence, and unlike for treatment, there are different prevention methods that suit different population sub-groups differently and may be used in various combinations, making the use of HIV prevention cascades more challenging and complex, particularly for generating an overall estimate of prevention coverage.

Preliminary studies have demonstrated the feasibility of populating HIV prevention cascades with data from pre-existing population surveys[14] but tailor-made questionnaire modules are needed to improve

measurement and guide interpretation of HIV prevention cascades to inform programme development. The Bill and Melinda Gates Foundation is funding this Manicaland Pilot Study to develop methods for measuring and interpreting HIV prevention cascades and test these in a population-based survey in Manicaland, Zimbabwe, in study sites with extensive baseline data on the local populations and HIV epidemic dynamics.

A generic HIV prevention cascade model and theoretical framework

Generic HIV prevention cascades; presentation by Robin Schaefer, Imperial College London

A range of formulations have been proposed for HIV prevention cascades, for both provider- and user-centric perspectives (Figure 2). Provider-centric models tend to have HIV testing as the starting step in the cascade, while user-centric models tend to have cognitive factors like risk perception as the starting step. However, a large proportion of the previously proposed cascade models were developed in rapid brainstorming sessions in a UNAIDS-organised workshop (December 2016). Among those in the published literature, most cascades were developed in the context of a developed country health system and tend to focus on PrEP. Only the models proposed by Garnett et al. (Lancet HIV, 2016)[14] are generic and more applicable to developing country settings like Zimbabwe. Many of the proposed models mix provider- and user-centric elements, and include steps in the cascade that are not necessarily dependent on each other. This is also applicable to the models by Garnett et al., with the user-centric cascade including risk perception, which is not a necessary requirement for uptake of prevention methods, and the provider-centric model mixing elements of the provider and user of prevention methods.

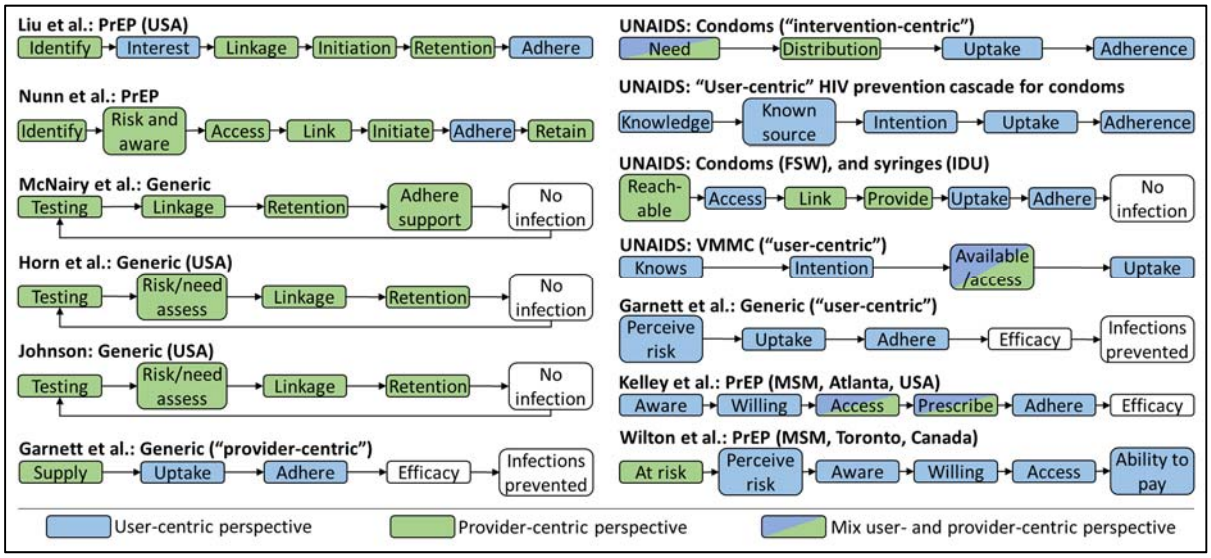

Figure 2: Previously proposed HIV prevention cascades models.

One objective of the current project is to develop generic HIV prevention cascade models. The advantages of a generic model are that it is promotes comparability over time, across populations, between sub-groups of a population, and between methods. The proposed model is a 'true cascade' meaning that all stages are fully interdependent, and focuses on the user of prevention methods as it is the user's behaviour that determines outcomes and the user provides data in population-based surveys. The model is divided into a minimal and extended model, and infections prevented is the end-point to measure missed opportunities in reducing HIV incidence (Figure 3). The minimal model consists of the steps that most proximately determine whether or not HIV infections occur: uptake of the prevention methods, adherence to it, and efficacy of the method. In the extended model, there

are further steps which are requirements of the minimal model: intention to use the prevention method, perceived availability of the method (meaning that the individual generally perceives the method to be available, although it may not be accessible for the individual), and knowledge of the method.

This generic model needs to be applied to a specific population and HIV prevention method, and definitions need to be specified for each step in the cascade. Limitations of the model include that the full model requires detailed data and there is a strong focus on the individual. Many factors, particularly relating to the prevention provider, cannot be captured in a linear way and so need to be considered as explanatory factors that facilitate or obstruct progress along cascade. There is also a focus on one prevention method, which does not reflect realities of HIV prevention use, so there is a need to combine HIV prevention cascades for different methods. However, combining cascades is difficult with the number of HIV infections prevented as the end-point given different levels of adherence and uncertainties around the efficacy of combinations of prevention methods. Despite these limitations, the proposed generic cascade can identify gaps in HIV prevention efforts, offers comparability and flexibility with the minimal and extended model, and is a 'true cascade', so that there is no need to make significant assumptions when estimating cascades (i.e. if it is assumed that everyone who has taken up a prevention method must have perceived a risk of HIV infection in the past).

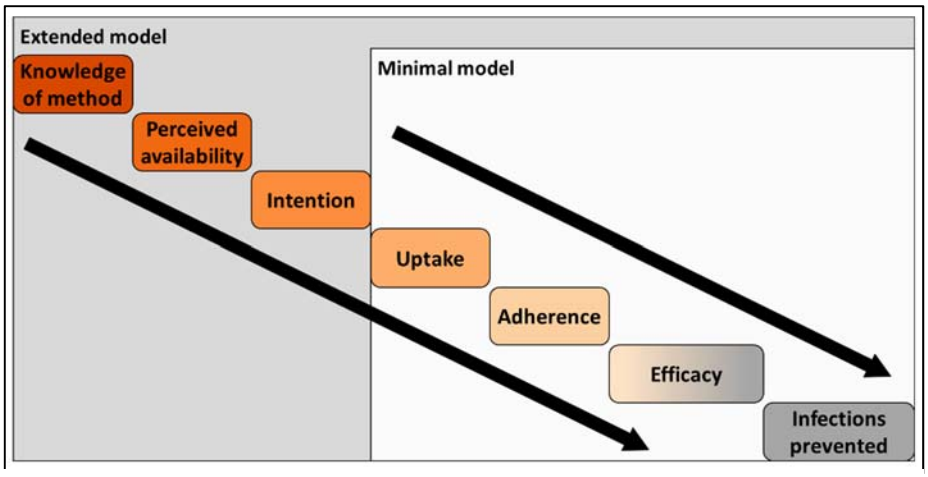

Figure 3: A generic HIV prevention cascade.

A multi-level explanatory framework for HIV prevention cascades; presentation by Robin Schaefer, Imperial College London

HIV prevention cascades can help in identifying gaps in HIV prevention efforts but there is limited explanation of uptake and adherence, since there are many determinants of these outcomes that cannot easily be captured in a cascade. Therefore, an explanatory framework is needed to guide interpretation of prevention cascades and interventions to improve uptake and adherence, which needs to cover a range of different cascade stages. The development of such a framework is an objective of the current study.

The framework proposed here integrates individual-level theories of behaviour, particularly social cognition models and behavioural economics, and multi-level frameworks that recognise the importance of the partner (e.g. approval of prevention methods), family and friends (e.g. peer norms), the community (e.g. social norms), the healthcare provider (e.g. accessibility), and structural factors (e.g. laws and policies). These factors are of varying importance as determinants of the different steps in generic HIV prevention cascades (Figure 4). For example, knowing about a prevention method may be influenced by background characteristics, social networks, and the promotion of healthcare providers, while forming the intention to take up a prevention method may be more influenced by cognitive factors like risk perception as well as social norms.

As for the generic HIV prevention cascade model, the explanatory framework needs to be applied to a specific population and prevention method. By doing this, the explanatory framework can not only help in understanding the gaps in HIV prevention cascades but also points to possible forms of intervention for different levels of influence. For instance, if the biggest gap in the cascade is found to be limited knowledge of the prevention method, possible interventions may include the use of peer educators (social network level), promotion by the healthcare provider (healthcare provider level), or information campaigns in schools (structural level). On the other hand, if the biggest gap in the cascade is found to be limited intention to take up a prevention method, possible interventions may include community-based interventions to address social norms (community level) or improving accessibility (healthcare provider level). Therefore, if this framework is applied to a specific prevention cascade in an action-oriented fashion, it can explain the gaps identified in the cascade and guide interventions to improve movement along cascades, even if the pathways of influence of different factors and their interactions may not be clear.

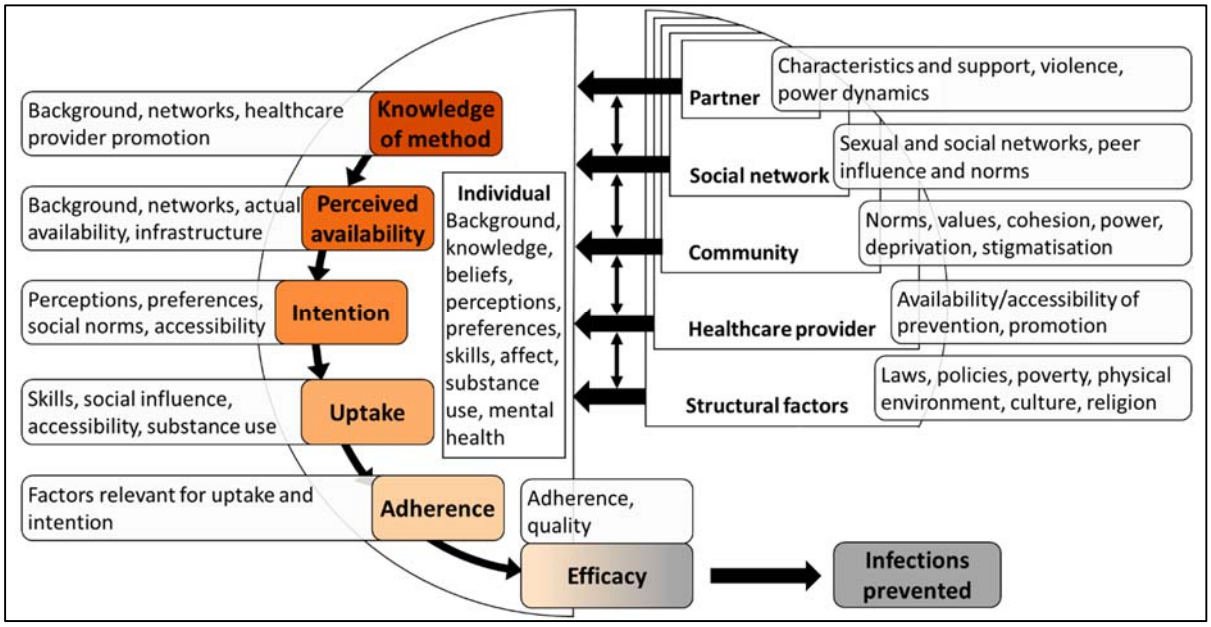

Figure 4: A multi-level explanatory framework for HIV prevention cascades.

Group work and discussion

Meeting participants were divided into six groups and asked to discuss the concept of the HIV prevention cascades. Specifically, participants were asked to evaluate whether HIV prevention cascades are a useful tool in the context of HIV prevention in Zimbabwe and whether and how they would change the proposed generic HIV prevention cascade model.

From the presentations of the groups and discussions, several common themes emerged:

- HIV prevention cascades are a useful tool to identify gaps in HIV prevention programmes. As such, they can support the Zimbabwean agenda of “closing the tap”, can be useful for M&E, and can help in setting priorities.
- A generic HIV prevention cascade is useful for comparisons across methods, over time and for different populations. It also has the advantage that it can be used at various levels – from local to national.
- The proposed extended model may be too complex to apply at a local level (“too academic”).
- Estimating the number of HIV infections prevented as the end-point of the cascade poses

significant challenges, which may make the tool less useful. Estimating HIV infections prevented can be considered a separate modelling exercise.

- There is a dilemma between having a pragmatic, useful HIV prevention cascade that is easy to measure and is suitable for advocacy purposes (i.e. as is the case with the HIV treatment cascade) and having a more complex model which provides more detailed information on reasons for limited coverage and impact of prevention methods. This dilemma may be resolved by making the aims of the cascade explicit (e.g. advocacy, routine measurement, and interpretation) and developing different but complementary versions for each aim
- There is a need to combine cascades for different HIV prevention methods, particularly since national policies promote combination prevention. However, a balance needs to be struck between a combination of cascades to show the proportion of the population that is covered by any prevention method and maintaining the pragmatic and simple nature of the concept that makes it useful for advocacy and monitoring.
- The steps in the cascade may be less linear than presented in the generic HIV prevention cascade model (e.g. there may be a reverse order between perceived availability and intention). There may also be problems with accurately measuring perceived availability and intention, and there may be limited data available on these (particularly routinely collected data).

HIV prevention cascade workshop

Objectives

The workshop following the stakeholder consultation aimed at working in more detail on the generic model for HIV prevention cascades and explanatory frameworks, and on applications of and questions to measure these. The specific objectives were to:

1) Develop a valid generic formulation for HIV prevention cascades in national multi-purpose population surveys (e.g. Demographic and Health surveys [DHS])
2) Develop applications of this formulation for specific HIV prevention methods and at-risk populations
3) Develop explanatory frameworks for interpreting HIV prevention cascades
4) Develop questionnaire modules to measure HIV prevention cascades for possible inclusion in population surveys

Exercises

Workshop participants were divided into five groups for the exercises. A list of participants, group allocations, and exercises are provided in the appendix. Participants were asked to consider the proposed generic HIV prevention cascade (Figure 3) and how they would change it. The groups were then asked to apply their HIV prevention cascade formulation to a specific HIV prevention method and population of interest and to develop questions to measure the steps in the cascade. The questions should be differentiated between:

1. Essential questions for the HIV prevention cascade modules proposed for inclusion in national surveys
2. Questions (and other procedures) for use in the pilot for validation and to improve the essential questions; and
3. Additional questions to include in the pilot to assist with in-depth interpretation of the

HIV prevention cascades as measured in Manicaland, which would probably not be feasible to include in national multi-purpose surveys

Group 1: Condom use by males

How to change the cascade: No consensus was reached in the group whether or not efficacy and HIV infections prevented should be part of the cascade (Figure 5) as this has advantages for advocacy and for quantifying gaps in HIV prevention efforts but makes the cascade concept more complex. The steps in the cascade may differ between prevention methods. For condoms, accessibility is more important than availability; for PrEP, a risk assessment may be a necessary step if this is a requirement for provision with PrEP by the healthcare provider. Adherence may not be relevant for VMMC in the usual sense but can be defined in terms of procedure protocol adherence and occurrence of adverse events.

Application and measurement: This cascade model was applied to condoms among males. A target population was more explicitly defined as men who have sex with a partner not known to be HIV-negative. This was considered an important qualification as a policy would not state that everyone should use condoms but only those considered at risk. Knowledge was defined not only as knowing condoms in general, but also that condoms reduce the risk of HIV infection. Uptake was defined as having used a condom at last sex with a partner not known to be HIV-negative, and adherence can be determined by asking if there was any occasion of condom-less sex in the past month. If participants answered 'no' to the uptake question, questions should be posed about availability of condoms in general, of a particular brand, partner refusal, self-refusal, inability to use, and knowledge of partner being virally suppressed. Additional data on supply of condoms may be gathered from a survey of venues from which condoms can be obtained. It was noted that uptake should cover more than just last sex as an individual may still use condoms frequently, only not the last sex. On other hand, condom use at last sex has been found to be a good predictor of adherence.

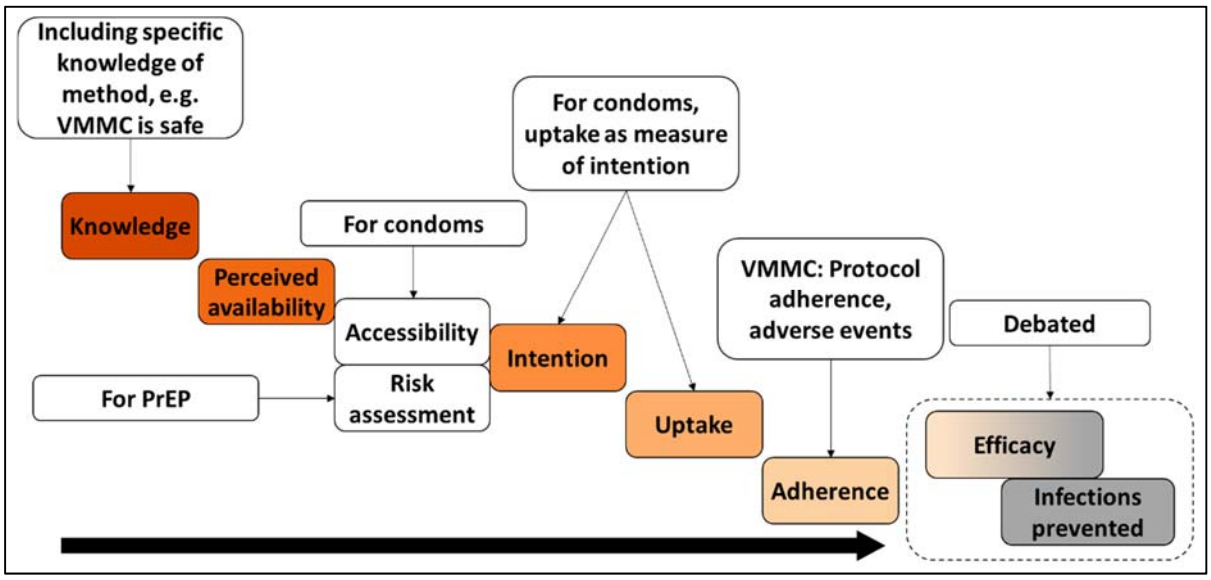

Figure 5: The generic HIV prevention cascade model by group 1.

Group 2: VMMC among young men

How to change the cascade: The originally proposed model structure was considered too complex for programme planning, so a simpler model was proposed (Figure 6). Efficacy and infections prevented as the endpoint may make combinations of cascade too complicated. Knowledge and uptake of the prevention method can be clearly defined, while the gap in between is important. Perceived availability is only one determinant of intention and should not be singled out. The target group should be made explicit in the cascade.

Application and measurement: This cascade model was applied to VMMC among young men. It was pointed out that the target group for VMMC needs to be defined to differentiate between children for which the caregiver needs to give consent for VMMC, although caregivers' intentions do not necessarily translate into uptake. Knowledge was considered to be a complex category that should be determined by a range of questions, including knowing the benefits of VMMC. Intention was defined as the plan to take up VMMC in the next three months. For uptake, in addition to a question on whether the individual has been circumcised, it is important to show visuals for standardisation and to clearly distinguish between partial and full circumcision. Adherence may either cover a different prevention method (e.g. condoms) or adherence to the procedure protocol, including possible adverse events.

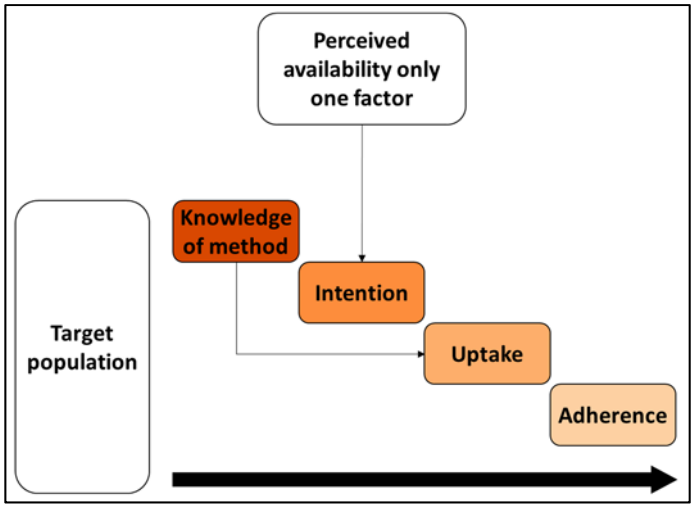

Figure 6: The generic HIV prevention cascade model by group 2.

Group 3: Combination prevention

How to change the cascade: The generic cascade model this group proposed was similar to the originally proposed one but the stages of efficacy and infections prevented are removed and intention is placed before availability (Figure 7). Knowledge includes awareness of HIV, perception of risk, and comprehensive information about the particular HIV prevention method, which are all considered general requirements for the use of HIV prevention methods ("recognition of benefits"). Availability is defined as a function of accessibility, affordability, and actual supply. Adherence is the consistent use over a period of risk.

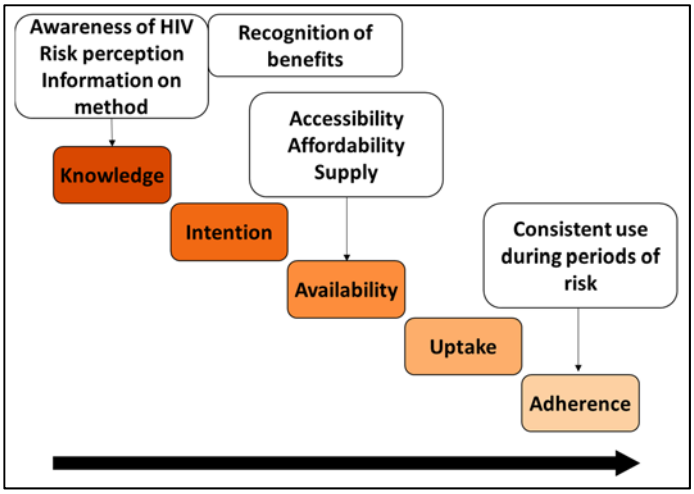

Figure 7: The generic HIV prevention cascade model by group 3.

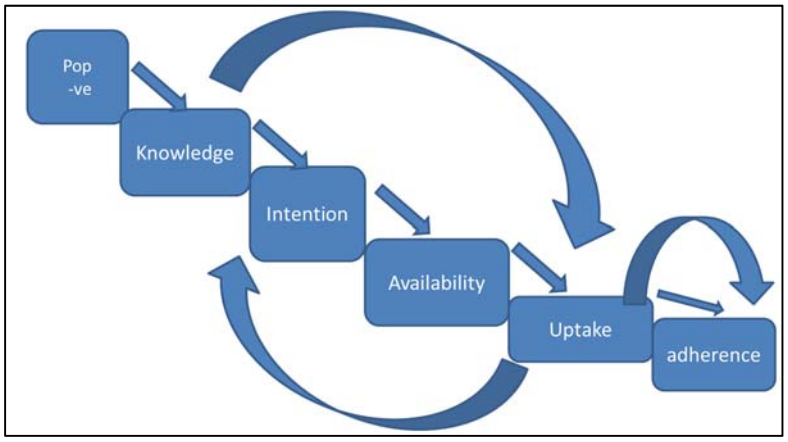

Figure 8: Schematic display of a question 'loop' for a cascade covering several HIV prevention methods

Application and measurement: This group had the task to create a cascade model that can cover a range of HIV prevention methods in the form of combination prevention. Questions for this should be posed in a 'loop' (hod that led to this coverage.). An initial question should ask about whether the individual knows any method to prevent HIV infections and if so, which method (which may first be asked in an open question and then a list may be given). For each

method an individual knows, a question should be asked about whether they use the method. If not, questions on intention ("plan to use within 6-12 months") and availability (general availability, accessibility [distance], affordability/willingness to pay) should be asked. The 'aim' is to reach a category of coverage in the sense of having a high level of protection against HIV, regardless of the specific method that led to this coverage.

Group 4: Condom use among young women

How to change the cascade: The group proposed a model with efficacy and infections prevented removed (Figure 8). Knowledge of the method contains awareness of the existence of the prevention method and possibly knowing the benefits of its use. However, unlike the previous groups, it does not include perceived risk. Intention is included as a step after perceived availability and is more strictly defined compared to the earlier groups – i.e. a firm commitment to take up the prevention method, for which it must be perceived to be available. The first three steps in the cascade (knowledge, perceived availability, intention) can be collapsed under demand ("wanting to use the method", for which all three steps have to be met).

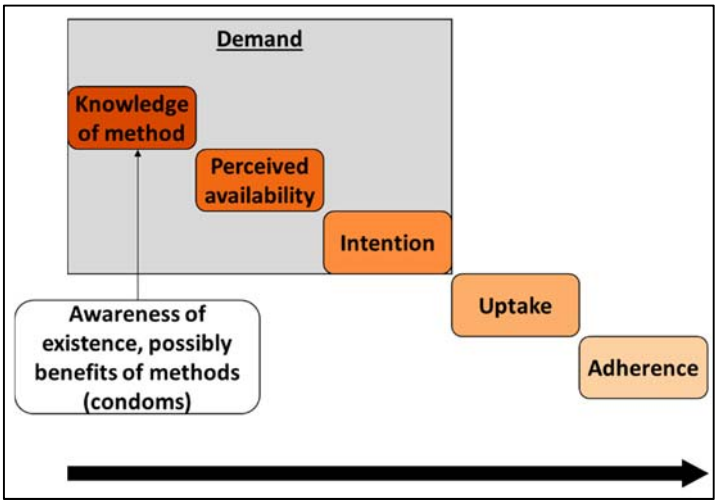

Figure 8: The generic HIV prevention cascade model by group 4.

Application and measurement: The model was applied to condom use among young women. Since condoms are commonly known, knowledge of condoms should not only cover knowledge of the existence ("heard of condoms") but also the benefits of condom use for HIV/STD and pregnancy prevention ("what are the benefits of using condoms?" – open question, then probe). Perceived availability is defined only as general knowledge of a local place where condoms are available ("do you know a local place where condoms are available?"), and intention is defined as planning to use a condom at the next sexual act when at risk of HIV/STD infection or pregnancy. Knowledge, perceived availability, and intention can be subsumed under 'demand'; and a question on intention could be used to capture this variable as knowledge and perceived availability are considered prerequisites for intention. Uptake is defined as having used a condom at least once when otherwise at risk of HIV/STD or becoming pregnant in the past year, and adherence is defined as having used a condom nearly all of the time when at risk of HIV/STD or becoming pregnant in the past three months. The chosen time frame for uptake and adherence depends on the specific target population (adolescent girls are likely to be less sexually active than female sex workers, for example, so a longer time frame should be used). Similar to group 1, condom use was defined in relation to a particular risk (HIV/STD infection or pregnancy). Further questions that could be included in a longer survey could be a range of questions on intention to create an intention index, different time frames for uptake and adherence, and sexual behaviour patterns over time to determine periods of risks. Data on actual availability of condoms may also be gathered from providers.

It was noted that questions about intention ("plan to use condoms the next time you have sex") can be asked for a list of different kinds of partners. Moreover, for a longer survey, detailed questions can be asked about the last three sexual partners, including their characteristics and plans to use condoms with these partners. Questions about uptake and adherence can follow a similar pattern. To address

possible reporting bias, a secret voting box could be used as previously in the Manicaland survey, and an experiment could compare the responses if the secret voting box is offered against not offered.

Group 5: PrEP among young women

How to change the cascade: The structure was changed away from a cascade and the endpoint is optimal use, not efficacy and HIV infections prevented (Figure 9). There are three dimensions that all have to be met for optimal use, and these do not necessarily have an inherent order: motivation, access, and capacity. Motivation covers demand, while access covers supply. Capacity includes the individual's ability to perform the behaviour, which was considered missing from the originally proposed cascade.

It was noted that due to the complexity of the model, the advocacy aim of the cascade may be lost and there may be limited comparability. While the motivation, access, and capacity dimensions are the 'cascade', which are actionable drivers and onto which interventions can be mapped, the number of questions underlying each of these dimensions may make the concept too complex for programme planners. The simplicity of the treatment cascade was powerful for advocacy, which is lost if the concept becomes too complex. The questions underlying each dimension may also too context specific, which reduces comparability.

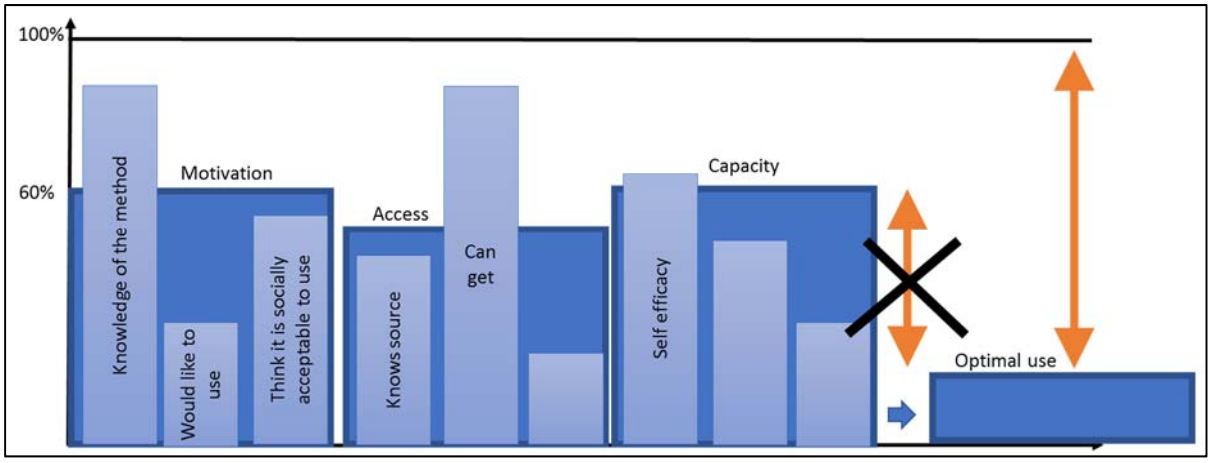

Figure 9: The generic HIV prevention cascade model by group 5.

Application and measurement: This 'cascade' model was applied to PrEP among young women. The group considered a range of questions for each of the three dimensions of prevention use (motivation, access, capacity) (Table 1). These questions may be asked as a series of questions on the same scale to create indices. Optimal use can be determined by asking about ever and current use of PrEP as well as missing any pills in the last X days. The target population (denominator) should only consist of those defined as the target group by the country's policy and should mirror eligibility criteria for PrEP (at least sexually active, HIV-negative, and at a certain risk of infection from risky sexual behaviour); questions on these criteria need to be asked. Questions on PrEP should only be asked if the individual knows about PrEP (after "what methods of HIV prevention do you know"). Additional data that can be obtained to measure optimal use could include data on pill counts and on blood drug levels. Focus group discussions, ranking exercises, and other qualitative work can address the questions on why individuals do not take PrEP. The measures for motivation, access, and capacity need to be validated statistically to correlate with use of PrEP.

It was noted that a current PrEP user is considered someone who has taken PrEP in the past three months, so uptake questions should use this timeframe, and to determine adherence (optimal use), the longest period of not taking pills in the past months should be determined. This is because high

levels of efficacy can be achieved even if PrEP was forgotten on one day. Finally, if a risk assessment is part of the country policy for PrEP eligibility, the same questions should be included in the survey.

Table 1: Questions to measure motivation, access, and capacity for PrEP use.

Motivation	Access	Capacity
• Have you heard of PrEP? • Do you think (people like) you would use PrEP? • Do you think (people like) you would benefit from PrEP? • Do you think taking PrEP has benefits? • Would you (like to) use PrEP? • Do you know anyone using PrEP? • Do you think taking PrEP has negative consequences? (health, social)	• Do you know where to get PrEP? • How far is the nearest place where you can get PrEP? • If you wanted to use PrEP, would you be able to get it? • The government has said that X type of people are eligible for PrEP. Do you think you are eligible? • On a scale – How difficult would you say it is for you to access PrEP? • Can you afford to get PrEP? • Have you been offered PrEP?	If you were given PrEP to take every day… • Would you be able to take it every day? • Would have to hide your pills? • [Open] What things would prevent you from taking it? • Would your partner(s)/family/anyone object to you taking it every day? • On a scale – if you had been given PrEP to take – how easy would it be for you to take it every day?

Discussion

Points of agreement emerging from group presentations and further discussion

- Efficacy and infections prevented should be removed as steps at the end of the cascade to reduce complexity and confusion in interpretation – but would be useful to explore in mathematical models.
- Specific steps in the generic cascade may not be relevant for some prevention methods and how each step is defined will differ across methods and populations.
- The target group should be made explicit in each cascade.
- Intention is an important step in the cascade but the order between intention and availability is subject to debate.
- Intention, uptake and adherence need to be defined in relation to a specific reference time.
- Uptake and adherence may not be the best terms – 'optimal use' and 'sub-optimal use' may be better.
- Adherence needs only to be "high enough" for use to be effective (i.e. to achieve a pre-determined high level of efficacy for the method) rather than perfect.
- A simple cascade model with summary measures is necessary for advocacy. However, a more nuanced model is also needed to show specific gaps in prevention programme efforts. A hierarchical structure – with several determinants or variables organised under larger categories – may be a useful approach for this.

Visualisation of HIV prevention cascades

The benefits of the approach presented by group 5 (Figure 9) – consisting of different dimensions – were recognised as it provides more comprehensive information. A "prevention plane" was proposed as a similar model (Figure 10) and discussed. The outside square represents the target population while the sizes of the circles in the square represent the proportions of the population in the categories of motivation, access, and means (=capacity). The overlap between all three circles represents the optimal use category. It was debated whether a 'means' category is needed because those who use a

prevention method optimally can be assumed to have had the means. However, the 'means gap' is often ignored and there may be benefits in making it explicit, particularly because motivation and access is often fulfilled. Nevertheless, similarly to the group 5 model with three dimensions, this representation may not support the advocacy goal of a 'cascade'. In this representation, the sizes of the three categories are not as immediately obvious as in a bar chart format, and the complexity may make it hard for programme planners to use.

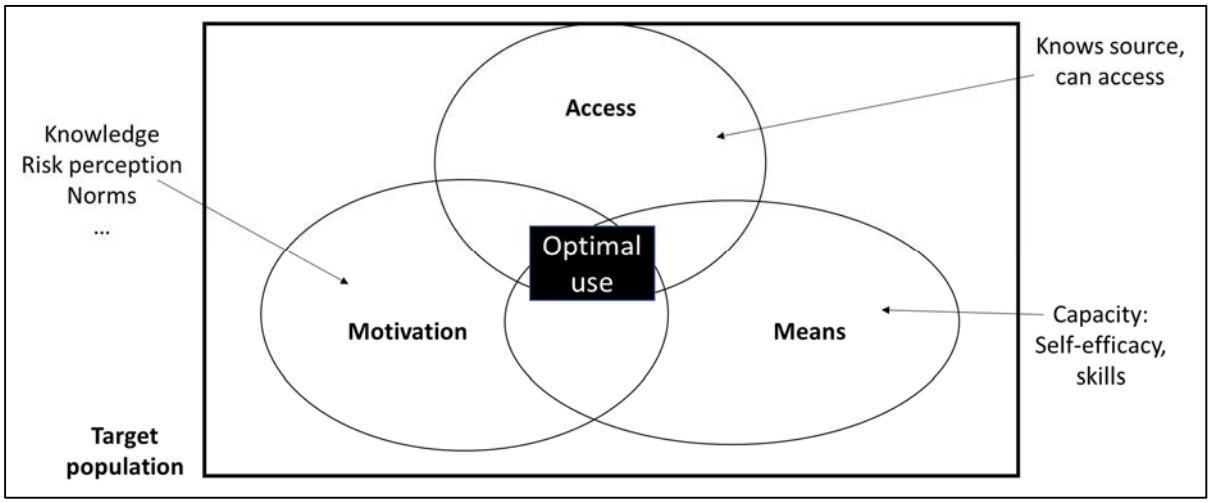

Figure 10: A proposal for an "HIV prevention plane"

Simpler representations were suggested (e.g. a matchstick plot / scarf chart) and further discussions on the best approach to visualisation of HIV prevention cascades took place following the workshop and are summarised in the next section (Postscript and Conclusion).

Measurement, validation, and interpretation

Workshop participants suggested a number of pre-existing questions and procedures that have been developed and validated for use in measuring key indicators of HIV prevention that can be considered for use in measuring HIV prevention cascades in the planned pilot study. These included questions developed and used by Demographic and Health Surveys, Population Services International, the Centre for Sexual Health and HIV/AIDS Research, and in past studies conducted by the Manicaland Centre.

Validation procedures can include additional questions and procedures in the pilot survey to test internal and external consistency, and reliability. Procedures for external consistency can include verification with programme documentation (e.g. VMMC certificates) and triangulation with programme data. Further validation could be external to the survey – possibly including stakeholder consultations, workshops, group discussions, interviews, and discrete-choice exercises.

The current protocol for the pilot study in Manicaland includes qualitative work to obtain input from local providers and users on the design of the survey questions. It was suggested that, in addition, it could be useful to conduct further qualitative work over the course of the pilot study to support the study's objective to explain HIV prevention cascades.

Postscript and Conclusion

Continuing discussions following the workshop

After the workshop, further discussions took place between some of the workshop participants. It was proposed that the categories of 'motivation', 'access', and 'effective use' can be arranged as bars in a cascade while also including the reasons for lack of motivation, lack of access, and lack of use (=lack of capacity) as 'sub-bars' on top of the main bars (Figure 12). The three main bars in the cascade would serve the advocacy and programme monitoring purposes (Figure 12) and could, potentially, have targets assigned to them (or rather to their ratios) in a similar way to the UNAIDS 90-90-90 targets for treatment cascades. The additional sub-bars for each main bar shown in Figure 11 show the main reasons that have been suggested as contributing to the shortfalls between successive bars in the cascade that can be targeted though different programme strategies[13]. This arrangement would resolve the question of whether a capacity or means category is necessary, as it is implicit that those who use a prevention method effectively must have the capacity to do so.

While motivation and access are linked (i.e. the provision and promotion of a prevention method by the healthcare provider can motivate people), they cover the two dimensions of demand and supply which are each necessary requirements for effective use. While there is no inherent order in these dimensions (bars), there is little harm in drawing these as a conditional cascade, starting from the user who has to 'want' to use the prevention method. Here motivation is less strictly defined than intention in the work by group 4 (Figure 8), so an individual may be motivated to use a prevention method without necessarily having access to it (i.e. similar to the work by group 3 [Figure 7]).

For routine operationalisation of the cascade, there need to be single summary measures for each of the three main bars (motivation, access, and effective use). The simplicity of the cascade as a tool for measurement and advocacy cannot be lost by a too strong focus on the additional explanatory 'sub-bars'. Simple questions to measure each of the three main bars could be along the lines of:

- Motivation: 'Do you want to use … / go for… ?'
- Access: 'If you wanted to use … / go for …, would you know where to get this?'
- Effective use: 'Do you use … nearly all of the time you have sex / nearly every day?'

Alternatively, where the required data are available, cascades could be constructed by measuring the explanatory sub-bars that determine the levels for each main bar. For example, by calculating indices for lack of motivation, lack of access, and lack of capacity (to use effectively) using data on the sub-bars for each dimension, and then multiplying these successively to the target population, the motivation bar, and the access bar, to obtain the values for each subsequent bar in turn. Possible explanatory factors (sub-bars) considered to underlie each of the three dimensions (main bars) are listed in Table 2. This approach has the advantage of incorporating visualisation of key explanatory factors directly within the generic cascade diagram (as in Figure 11). However, these factors can also be considered in similar or greater detail outside of the main cascade (e.g. as in the approach taken in Figure 4).

Finally, this simplified cascade model could be applied to HIV combination prevention. The motivation and access steps could cover motivation to use and access to any one or more of a number of different prevention methods, while effective use could cover the use of one or more of these methods to achieve a high level of protection against HIV.

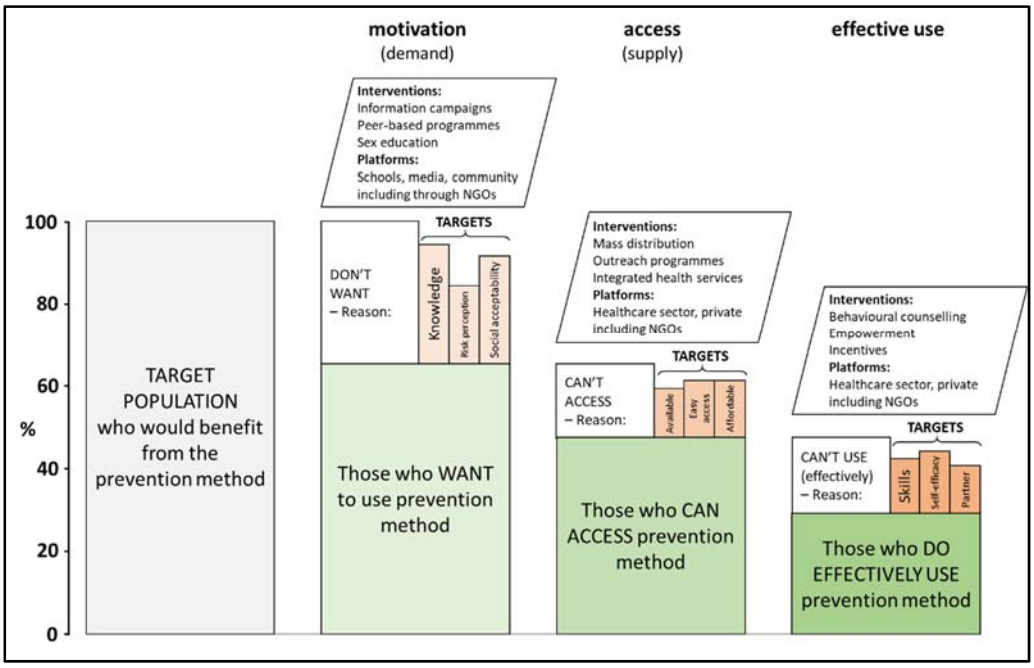

Figure 11: An HIV prevention cascade that incorporates reasons for lack of motivation, access, and effective use.

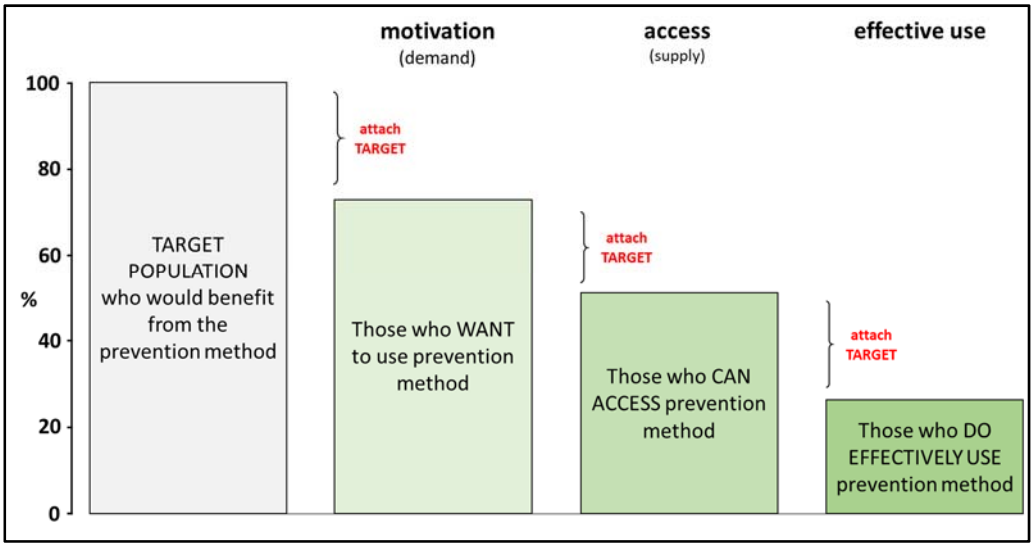

Figure 12: Summarised HIV prevention cascade for use in advocacy and routine monitoring.

Table 2: Explanatory factors for motivation, access, and optimal use of HIV prevention methods.

Motivation	Access	Effective use
• Knowledge of existence and uses of prevention method • Perceived positive and negative consequences of using the method – including risk perception for HIV or other relevant risks • Social acceptance of using the prevention method (family, friends, community)	• Knowledge of a place where the prevention method can be accessed – including distance, opening hours • Knowledge of eligibility criteria (where applicable) • Ease of access • Perceived quality of available service provision • Affordability of prevention method	• Skills – practical skills needed to use method effectively • Self-efficacy and agency – perceived ability to use prevention method optimally • Partner's (or family's) approval or refusal to permit use of prevention method

Next steps

Between August and December 2017, the recommendations and ideas generated in the stakeholders meeting and workshop will be used to develop the questionnaire modules and procedures to be used in the pilot study on HIV prevention cascades in Manicaland, Zimbabwe. Small-scale qualitative studies will be conducted with local community members and service providers in the study areas to solicit their opinions and to ensure that the questions, translations etc. are locally appropriate. Institutional Review Boards approvals will be sought, following which the pilot survey will be conducted (probably from early in 2018).

The pilot survey will focus on the formulations of HIV prevention cascades and explanatory factors proposed at the Harare workshop and summarised in this report. However, there is a high degree of overlap between factors considered in these and other proposed versions of HIV prevention cascades. Therefore it is hoped that the data will be suitable for use in measuring and comparing the validity and utility of a range of different conceptualisations of the HIV prevention cascade.

This report and the presentations made at the Harare meeting and workshop will also be shared with participants and with other interested parties including other international and local stakeholders in major international programmes for implementation and use of population-based surveys (e.g. the PEPFAR technical advisory group on HIV prevention cascades that is due to report in October 2017, and a WHO HIV cascade workshop to be held in Harare at the end of October 2018).

References

1. The INSIGHT START Study Group. Initiation of Antiretroviral Therapy in Early Asymptomatic HIV Infection. *New England Journal of Medicine* 2015; **373**(9): 795-807.
2. Cohen MS, Chen YQ, McCauley M, et al. Prevention of HIV-1 Infection with Early Antiretroviral Therapy. *New England Journal of Medicine* 2011; **365**(6): 493-505.
3. World Health Organization. Guideline on when to start ART and on pre-exposure prophylaxis for HIV. Geneva: World Health Organization; 2015.
4. Donnell D, Baeten JM, Kiarie J, et al. Heterosexual HIV-1 transmission after initiation of antiretroviral therapy: a prospective cohort analysis. *The Lancet* 2010; **375**(9731): 2092-8.
5. UNAIDS. Ending AIDS: Progress Towards the 90-90-90 Targets. Geneva: UNAIDS; 2017.
6. Nguyen V-K, Bajos N, Dubois-Arber F, O'Malley J, Pirkle CM. Remedicalizing an epidemic: from HIV treatment as prevention to HIV treatment is prevention. *AIDS (London, England)* 2011; **25**(3): 291-3.
7. Baggaley R, Dalal S, Johnson C, et al. Beyond the 90-90-90: refocusing HIV prevention as part of the global HIV response; 2016.
8. Isbell MT, Kilonzo N, Mugurungi O, Bekker L-G. We neglect primary HIV prevention at our peril. *The Lancet HIV* 2016; **3**(7): e284-e5.
9. Dehne KL, Dallabetta G, Wilson D, et al. HIV Prevention 2020: a framework for delivery and a call for action. *The Lancet HIV* 2016; **3**(7): e323-e32.
10. UNAIDS. Invest in HIV Prevention: A Quarter for HIV Prevention. Geneva: UNAIDS; 2015.
11. UNAIDS. Prevention Gap Report. Geneva: UNAIDS; 2016.
12. Garnett GP, Hallett TB, Takaruza A, et al. Providing a conceptual framework for HIV prevention cascades and assessing the feasibility of empirical measurement with data from east Zimbabwe *The Lancet HIV* 2016; **3**(7): e297-e306.
13. Hargreaves J, Delany-Moretlwe S, T.B. H, et al. The HIV prevention cascade: integrating theories of epidemiological, behavioural, and social science into programme design and monitoring. *The Lancet HIV* 2016; **3**: e318-e22.

Appendix

Agenda for the stakeholder consultation meeting (July 31, 2017)

08:00-08:30	Registration	BRTI
08:30-09:00	Welcome and Introduction	Constance Nyamukapa
09:00-09:30	Opening Remarks	Zimbabwe MOHCC / BRTI
09:30-09:45	Meeting Objectives	Simon Gregson
09:45-10:30	The Need to Intensify Primary HIV Prevention	
	- The status of HIV prevention – a global view	Sarah-Jane Anderson & Tim Hallett
	- The status of HIV prevention – the Zimbabwe picture	Brilliant Nkomo & Sino Xaba
10:30-11:00	Coffee Break	
11:00-11:30	Introduction to HIV Prevention Cascades	Simon Gregson
	- What is an HIV prevention cascade?	
	- Potential added value and limitations	
	- Data sources: population surveys vs. routine programme data	
	- Illustrative example (feasibility study)	
11:30-11:45	Manicaland Pilot Study – Objectives	Simon Gregson
11:45-12:30	Generic HIV Prevention Cascades	Robin Schaefer
	- Overview and critique of existing formulations	
	- Proposed generic user-centric HIV Prevention Cascades and illustrative application	
	- Combining HPCs for different prevention methods (including mathematical models)	
	- Methods to measure and evaluate in population surveys	
12:30-13:30	Lunch Break	
13:30-14:00	Explanatory Framework to Interpret HIV Prevention Cascades	Robin Schaefer
	- Multi-level influences	
	- Individual level factors: social cognitive and behavioural economics perspectives	
	- Role of the provider	
14:00-15:00	Group Work	NAC
	- Relevance to HIV prevention in Zimbabwe	
	- Suggestions for improvements, variants and alternatives to proposed generic HPCs	
15:00-15:30	Tea Break	
15:30-16:30	Feedback and Discussion	NAC
16:30-16:45	Next Steps	Mutsa Mhangara (USAID)
16:45-17:00	Vote of Thanks	ZMOHCC/NAC

Agenda for the workshop day 1 (August 1, 2017)

08.15 – 08.45	**Registration**
08.45 – 09.45	**Introduction**
08.45 – 09.00	*Introduction (Constance Nyamukapa)*
09.00 – 09.15	*Introduction to BRTI (Shungu Munyati)*
09.15 – 09.25	*Structure of the workshop (Simon Gregson)*
09.25 – 09.30	*Funder's perspective (Michelle Morrison)*
09.30 – 09.45	*A generic HIV prevention cascade model (Robin Schaefer)*
09.45 – 11.00	**Exercise 1:** Discussion of the generic HIV prevention cascade model and definitions of steps in the cascade.
11.00 – 11.15	**Break**
11.15 – 12.30	**Discussion 1:** Agreements and disagreements of the generic HIV prevention cascade model.
12.30 – 13.30	**Lunch**
13.30 – 13.45	**Wrap up morning session**
13.45 – 15.00	**Exercise 2:** Apply HIV prevention cascades to specific prevention methods and develop measurements.
15.00 – 15.15	**Break**
15.15 – 16.30	**Discussion 2:** Discuss specific HIV prevention cascades and measures.
16.30 – 16.45	**Wrap up afternoon session**
16.45 – 17.00	**Conclusion and next steps**

Agenda for the workshop day 2 (August 2, 2017)

08.15 – 08.30	**Arrival**
08.30 – 09.40	**Introduction**
08.30 – 08.45	*Review of day 1 of the workshop and introduction to day 2 (Simon Gregson)*
08.45 – 09.00	*A multi-level HIV prevention cascade framework (Robin Schaefer)*
09.00 – 09.20	*The social determinants and effect of male gender norms on HIV testing, treatment and avoidance in Zimbabwe (Morten Skovdal)*
09.20 – 09.40	*The HIV prevention cascade: integrating theories of epidemiological, behavioural, and social science into programme design and monitoring (James Hargreaves)*
09.40 – 11.00	**Exercise 3:** Discussion of explanatory factors for HIV prevention cascades in general and for specific prevention cascades, including measurement.
11.00 – 11.30	**Break**
11.30 – 12.30	**Exercise 3 continued**
12.30 – 13.30	**Lunch**
13.30 – 15.00	**Discussion 3:** Perspectives on explanatory factors for HIV prevention cascades and explaining specific HIV prevention cascades.
15.00 – 15.30	**Break**
15.30 – 15.45	**Wrap up explanatory factors**
15.45 – 16.45	**Discussion 4:** Bringing everything together.
16.45 – 17.00	**Conclusion and next steps**

List of participants of the stakeholder consultation meeting

Participant	Organisation
Michelle Morrison	Bill and Melinda Gates Foundation
Simon Gregson	Imperial College London
Constance Nyamukapa	Imperial College London
Robin Schaefer	Imperial College London
Ranjeeta Thomas	Imperial College London
Timothy Hallett	Imperial College London
Sarah-Jane Anderson	Imperial College London
Helen Ward	Imperial College London
James Hargreaves	London School of Hygiene and Tropical Medicine - MESH
Holly Prudden	London School of Hygiene and Tropical Medicine - STRIVE
Emma Slaymaker	London School of Hygiene and Tropical Medicine - ALPHA
Saul Johnson	Genesis
Morten Skovdal	University of Copenhagen
Dr Mafaune	Zimbabwe Ministry of Health and Child Care
Dr Fonte	Zimbabwe Ministry of Health and Child Care
Sr Gwasira	Zimbabwe Ministry of Health and Child Care
Raymond Yekeye	National AIDS Council Zimbabwe
Noah Taruberekera	Population Services International
Joachem Nyamande	Diocese of Mutare Community Care Programme
Henry Nyapokoto	Diocese of Mutare Community Care Programme
Auxilia Muchedzi	FHI360
Jane Batte	UNAIDS
Dr Buhle Ncube	WHO
Shungu Munyati	Biomedical Research and Training Institute
Rashida Ferrand	Biomedical Research and Training Institute
Owen Mugurungi	Zimbabwe Ministry of Health and Child Care
Sinokuthemba Xaba (VMMC)	Zimbabwe Ministry of Health and Child Care
Brilliant Nkomo	Zimbabwe Ministry of Health and Child Care
Lawrence Nyazema	Zimbabwe Ministry of Health and Child Care
Beatrice Dupwa	Zimbabwe Ministry of Health and Child Care
Anna Machiha	Zimbabwe Ministry of Health and Child Care
Geraldine Chipendo	Zimbabwe Ministry of Health and Child Care
Amon Mpofu	National AIDS Council Zimbabwe
Isaac Taramusi	National AIDS Council Zimbabwe
Mr Mujuma	National AIDS Council Zimbabwe
Simba Maquina	PAC
Mr Pemberai Zambezi	FACT
Portipher Guta	FACT - Rusape
Frances Cowan	Centre for Sexual Health and HIV/AIDS Research Zimbabwe
Sungai Chabata	Centre for Sexual Health and HIV/AIDS Research Zimbabwe
Ngabutho Nyathi	Clinton Health Access Initiative
Yemurai Magweredza	Clinton Health Access Initiative
Elizabeth Gonese	Center for Disease Control and Prevention
Mutsa Mhangara	USAID
Boaz Cheluget	UNAIDS
S Mapfumo	UNFPA
Rufu Maswera	Biomedical Research and Training Institute - Manicaland
Noah Kadzura	Biomedical Research and Training Institute - Manicaland
Tawanda Dadirai	Biomedical Research and Training Institute - Manicaland
Antony Chingosho	Biomedical Research and Training Institute - Manicaland
Dr Mashizha	Zimbabwe Ministry of Health and Child Care
Mr Uzande	Zimbabwe Ministry of Health and Child Care
Sr Nyanhongo	Zimbabwe Ministry of Health and Child Care
Dr Nyafeso	Zimbabwe Ministry of Health and Child Care
Sr Mapingire	Zimbabwe Ministry of Health and Child Care
Florence Mutevedzi	Biomedical Research and Training Institute - Manicaland

List of participants of the workshop

Participant	Organisation
Michelle Morrison	Bill and Melinda Gates Foundation
Simon Gregson	Imperial College London
Constance Nyamukapa	Imperial College London
Robin Schaefer	Imperial College London
Ranjeeta Thomas	Imperial College London
Timothy Hallett	Imperial College London
Sarah-Jane Anderson	Imperial College London
Helen Ward	Imperial College London
James Hargreaves	London School of Hygiene and Tropical Medicine - MESH
Holly Prudden	London School of Hygiene and Tropical Medicine - STRIVE
Emma Slaymaker	London School of Hygiene and Tropical Medicine - ALPHA
Saul Johnson	Genesis
Morten Skovdal	University of Copenhagen
Dr Mashizha	Zimbabwe Ministry of Health and Child Care
Mr Uzande	Zimbabwe Ministry of Health and Child Care
Noah Taruberekera	Population Services International
Shungu Munyati	Biomedical Research and Training Institute
Sinokuthemba Xaba (VMMC)	Zimbabwe Ministry of Health and Child Care
Brilliant Nkomo	Zimbabwe Ministry of Health and Child Care
Lawrence Nyazema	Zimbabwe Ministry of Health and Child Care
Beatrice Dupwa	Zimbabwe Ministry of Health and Child Care
Anna Machiha	Zimbabwe Ministry of Health and Child Care
Simba Makina	National AIDS Council Zimbabwe
Mr Mujuma	National AIDS Council Zimbabwe
Stephano Gudukeya	Population Services International
Frances Cowan	Centre for Sexual Health and HIV/AIDS Research Zimbabwe
Sungai Chabata	Centre for Sexual Health and HIV/AIDS Research Zimbabwe
Ngabutho Nyathi	Clinton Health Access Initiative
Alex Mkwamba	Clinton Health Access Initiative
Elizabeth Gonese	Center for Disease Control and Prevention
Mutsa Mhangara	USAID
Boaz Cheluget	UNAIDS
Rufu Maswera	Biomedical Research and Training Institute - Manicaland
Tawanda Dadirai	Biomedical Research and Training Institute - Manicaland
Antony Chingosho	Biomedical Research and Training Institute - Manicaland
Yemurrai Mangwendeza	Clinton Health Access Initiative

Group 1	Group 2	Group 3	Group 4	Group 5
Dr Mashizha	Morten Skovdal	Constance Nyamukapa	Robin Schaefer	Ranjeeta Thomas
Timothy Hallett	Sarah-Jane Anderson	Saul Johnson	Simon Gregson	James Hargreaves
Shungu Munyati	Noah Taruberekera	Helen Ward	Mr Uzande	Beatrice Dupwa
Anna Machiha	Sinokuthemba Xaba	Holly Prudden	Lawrence Nyazema	Sungai Chabata
Frances Cowan	Simba Makina	Brilliant Nkomo	Stephano Gudukeya	Elizabeth Gonese
Mutsa Mhangara	Ngabutho Nyathi	Mr Mujuma	Alex Mkwamba	Antony Chingosho
Yemurrai Mangwendeza	Boaz Cheluget	Rufu Maswera	Tawanda Dadirai	Emma Slaymaker
		Michelle Morrison		

Workshop exercises

Exercise 1

You have been presented with a generic model for a HIV prevention cascade, conceptualising the steps needed to prevent HIV infections through the use of prevention methods.

1.1 Discuss the proposed generic model for HIV prevention cascades. Do you agree with the structure? Would you change the model? If so, how?
1.2 Provide definitions for each step in the original model and for your changes, if applicable.

Exercise 2

You are provided with a specific HIV prevention method and population of interest.

2.1 Apply your prevention cascade model to this specific case. Define each step in the cascade for this case.
2.2 How would you measure each step in the cascade in a population-based survey? How could you validate survey responses? Are there any other data you would like to collect or methods to use?
2.3 Of these measures, which measures are most important if you had to prioritise?