

# BMJ Open Rationale and design of the violence, injury and trauma observatory (VITO): the Cape Town VITO pilot studies protocol

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## ABSTRACT

### INTRODUCTION

The establishment of violence and injury observatories elsewhere has been found to reduce the burden within a relatively short period. Currently no integrated system exists in South Africa to provide collated data on violence, to allow for targeted interventions and routine monitoring and evaluation. This research seeks to identify if bringing multiple data sources, including but not limited to data from the South African Police Service (SAPS), Forensic Pathology Services (FPS), Emergency Medical Services (EMS) and local hospital clinical databases, together are (1) feasible; (2) able to generate data for action, that is valid, reliable and robust and (3) able to lead to interventions.

### METHODS AND ANALYSIS

The violence, injury and trauma observatory (VITO) is a planned collaborative, multicentre study of clinical, police and forensic data for violence and injury in the City of Cape Town, where a local context exists of access to multiple source of health and non-health data. The VITO will initially be piloted in Khayelitsha, a periurban community characterised by increased rates of violence, where fatal and non-fatal injury data will be sourced from within the community for the period 2012–2015 and subjected to descriptive statistics and time-trend analyses. Analysed data will be visualised using story maps, data clocks, web maps and other geographical information systems-related products.

### ETHICS AND DISSEMINATION

This study has been approved by the University of Cape Town's Human Research Ethics Committee (HREC 861/2016). We intend to disseminate our findings among stakeholders within the local government safety cluster, non-governmental organisations working within the violence prevention sector and the afflicted communities through the SAPS and violence prevention through urban upgrading community forums. Findings from this work will serve to identify important issues and trends, influence public policy and develop evidence-based interventions.

### INTRODUCTION

Homicide rates in the Western Cape were greater than the national average for both men and women. In Cape Town, the

### Strengths and limitations of this study

- The observatories model is an internationally accepted tool that can provide a focused understanding of a particular issue or subtheme of violence.
- The integration of violence and injury data may allow a comprehensive view of the existing burden of violence and injury within a community.
- A potential limitation of certain datasets, for example, Health Systems Trust (HST), are their periodical survey collection, that is, biannual, not continuous, collection and the financial sustainability of these rapid assessments beyond 2015.
- Concerning prospective surveillance, given the financial constraints facing many research bodies, it is conceivable that survey-based research will be limited and not sustainable in the long term.

province's largest city and home to almost two-thirds of the provincial population, the highest homicide counts for the reporting period April 2015–April 2016 were recorded in the relatively impoverished subdistricts of Nyanga (279 homicides) and Khayelitsha (161 homicides).<sup>1</sup>

Since 1994, efforts to improve cause of death statistics in South Africa have been under way and have resulted in better coverage of death registration.<sup>2</sup> The Initial Burden of Disease Study that applied the burden of disease approach developed by WHO, used available information, presenting it in a format that is relevant for planning health and other services.<sup>3</sup> The District Health Information System has been employed in Kwa-Zulu Natal to track the hospital burden of trauma, with indicators collected governed by the District Health Management Information Systems policy.<sup>4</sup> A series of studies were undertaken in KZN in 2010 to determine the trauma burden in KZN which has provided valuable estimates of the burden of violence-related injury for the province.<sup>5–7</sup>



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While accurate and reliable reporting systems form the foundation of a surveillance system, the observatory model goes a step further in emphasising the collation and integration of multiple different data sources, including but not limited to the South African Police Services (SAPS) crime data; forensic data from the Forensic Pathology Services (FPS) and violence-related injury data from the Emergency Medical Services (EMS), to allow for a comprehensive picture of the burden of violence-related injury.

This has been demonstrated by data sharing in the UK between hospital emergency departments sharing information about violence locations, weapons and times with local Police services, which has come to be known as the Cardiff model. The Cardiff model, which is consistent with the data sharing principles of violence and injury observatories among stakeholders, has reported decreases of up to 40% in hospital admissions in Cardiff, where the approach was developed, compared with control cities.<sup>8</sup> The data sharing has revealed ‘invisible’ crime hotspots and gang crime activity and the targeting of these hotspots at the right times has improved police intelligence and the allocation of resources.<sup>8</sup>

The section below describes in detail the observatory model and the specific value, it provides with regards to the reduction of violence-related injury.

### Observatories for violence and injury

Observatories help in decision-making based on the principle that a better knowledge of situations affecting security will make it possible to ensure more targeted and thus more effective interventions. Although a diagnostic tool measuring the degree of violence in a defined region, over time an observatory also makes it possible to monitor and evaluate the impact of measures adopted. The model relies on collaboration between data stakeholders, government and non-government actors within the violence prevention and safety cluster.

The observatory seeks to collate and integrate all violence and injury-related data and not limit itself to a clinical perspective, but rather incorporates a public health approach which considers a broader contextual understanding of the data with regard to forensics (unnatural deaths), violence-related crimes, victim of crime surveys (unreported crimes), EMS violent incident data, structural correlates of violence (census data) and, finally, non-fatal trauma cases through hospital clinical databases.

As described in detail previously,<sup>9</sup> key functions of an observatory include the following.

### Observatory function 1: collection, integration and storage of secondary data and information

Agreement on information sharing facilitates the systematic data flow between information sources and the observatory central management unit. A fully functioning observatory will allow for the accumulation of electronically stored data, thereby providing the capacity to build

a historical database.<sup>10</sup> Textual information, databases, historical trends in data and indicators, profiles, reports and other sources may convert the observatory into a powerful information and knowledge management centre.<sup>10</sup>

### Observatory function 2: data analysis

A range of multisectoral, multidisciplinary sources of information may be analysed, using quantitative and qualitative analysis methods for the purposes of (1) identifying patterns and trends over time in the incidence of violence, (2) monitoring and evaluating interventions and policies, (3) understanding the causes and determinants of violence and (4) developing a set of common indicators and standardised definitions.<sup>11</sup>

### Observatory function 3: reporting on and disseminating information and knowledge

The objectives of the dissemination of information are to (1) inform stakeholders of important issues and trends, (2) influence public policy, (3) develop evidence-based interventions and policy recommendations and (4) assist collaborating agencies and other stakeholders to improve their operations and understanding of the issue through provision of an up-to-date, reliable evidence base.<sup>12</sup>

### Rationale

In a WHO report, injury was placed in the top 10 leading causes of mortality worldwide, with the majority of deaths attributed to road injury and violence-related injury.<sup>13</sup> Prevalence and incidence data on violence-related injury from African countries, including South Africa, are lacking when compared with industrialised nations.<sup>1</sup>

The Cape Town violence, injury and trauma observatory (VITO) study is a collaborative study that aims to establish the first violence and injury non-conflict registry in Africa, with one of its main objectives being to collect comprehensive clinical, police and forensic data for violence and injury in the City of Cape Town. The Cape Town VITO will serve as a platform for further investigations including the analysis of the current context and the evaluation of violence prevention interventions for the Western Cape.

## METHODS

### Study design

#### Study setting

This is a prospective, national, multicentre, University-based registry involving centres in the Western Cape, many of which are signatories to the integrated provincial violence prevention policy framework, which provides the overarching policy framework for the Western Cape Government’s violence prevention initiatives and focuses on the key strategies that are to be adopted in preventing violence in the Western Cape.

The Cape Town VITO seeks to document the prevalence, incidence, nature, type and location of violence-related

injury in the Western Cape. The pilot phase will focus on the Western Cape community of Khayelitsha. Khayelitsha is a periurban township with mixed informal and formal housing, with a population of approximately 400 000 people. Khayelitsha is one of the poorest areas of Cape Town with a median average income per family of ZAR20 000 (US\$1872) a year compared with the City median of ZAR40 000 (US\$3743).<sup>14</sup> Approximately half of the 118 000 households found within Khayelitsha are informal dwellings.<sup>14</sup> Police precincts within and in the surrounding areas routinely produce the highest homicide rates in the country.<sup>1</sup>

#### Surveillance objectives of the pilot VITO observatory

- ▶ To collect demographic, nature of injury and location data from cases of violence and injury in the community of Khayelitsha.
- ▶ To determine risk and protective factors that contribute to violence and injury in the local context.
- ▶ To evaluate ongoing violence prevention interventions in the Western Cape.
- ▶ To conduct studies that contribute to the growing body of knowledge informing violence prevention intervention.

#### Study eligibility

Participants for this study will include all persons who are located within the catchment area of the observatory. The different research priorities for interpersonal violence prevention produced by the Mikton *et al*<sup>15</sup> study are matched with current ongoing VITO pilot studies (see [table 1](#)). Within the scope of interpersonal violence, included research subcategories include elder abuse, sexual violence, intimate partner violence, violence-related injury and homicide.

#### Data collection

The study will rely on secondary data collected from routine systems and recent violence and injury research conducted in Khayelitsha (see [table 2](#)). The datasets and variables collected are described in [table 2](#). Secondary data formats include but are not limited to e-surveys, electronic records and public access websites. Clinical and non-clinical violence-related data will be entered into the Cape Town VITO registry. In addition, a retrospective collection of violence and injury secondary data will be made in order to form a historical database, to allow for retrospective data analysis and time-trend analysis.

**Table 1** Sample of data sources for proposed violence and injury observatory

Data source	Description
Health Systems Trust (HST)	<p>Repeated cross-sectional studies</p> <p>This rapid assessment of the injury morbidity burden at health services in three high violence communities in the Cape Town Metropole was conducted in Khayelitsha, Nyanga and Elsies River. Data were simultaneously collected (24 hours per day) at six facilities, from 27 September 2012 to 4 October 2012. Injury data specific to Khayelitsha was collected from the Khayelitsha Day Hospital, Site B community health centre (CHC) and the Michael Mapongwana CHC.</p> <p>Recorded measures include patient demographics, pattern of injury, location and time of injury.</p>
Violence prevention through urban upgrading (VPUU)	<p>Population and household-based rolling surveys</p> <p>The survey was conducted between September 2012 and July 2015 time period by the VPUU project. A total of 1500 dwellings were visited. 1200 of these were randomly selected from Khayelitsha and 300 were randomly selected from the Gugulethu-Nyanga areas. The sample of 1200 dwellings was drawn from GIS data of dwelling units in the designated study area in Khayelitsha.</p> <p>Recorded measures include the experience of violent crime as reported by the residents of Khayelitsha, household demographics and location.</p>
Forensic pathology service (FPS)	<p>Provincial mortality registry</p> <p>The Forensic Pathology Service is mandated by the National Health Act 61 of 2003 law to investigate all unnatural deaths.<sup>4</sup> FPS uses existing medico-forensic investigative procedures. Services of the Forensic Pathology Service pertinent to the collection of data for this study include the provision of mortality data to relevant stakeholders to inform research and prevention strategies, which is a shared goal of the observatory.</p> <p>Recorded measures include victim demographics, pattern of injury and incident location, time and context of incident.</p>
South African Police Service (SAPS)	<p>Public access database</p> <p>Homicide and injury-related crime data (eg, assault) available through two public access websites (saps.gov.za; <a href="https://www.issafrica.org/">https://www.issafrica.org/</a>).</p> <p>This dataset includes homicide count within Khayelitsha with data available within the two police precincts that constitute the Khayelitsha policing area for the period 2000–2012.</p> <p>Robbery data Residential robbery data available through the Witwatersrand University research affiliation</p>

[Table 1](#) describes a sample of data sources intended for use in the pilot study, while [table 2](#) describes the possible contribution of the Cape Town VITO to the South African National development plan 2030, adapted from the 2016 South African National health review.

**Table 2** Contribution of the Cape Town violence, injury and trauma observatory (VITO) to the National development plan 2030

National development plan priority 2030 <sup>15</sup>	Possible contribution of a VITO
Address the social determinants that affect health and diseases	Provide an analysis of social factors that play a key role in determining health status related to interpersonal violence
Improve the health information system	Collate data from a range of sources; stratify, repackage, translate and disseminate the information in ways that make it accessible for use by different violence prevention stakeholders
Prevent and reduce the disease burden and promote health	Contribute to the identification of the types and levels of the burden of disease related to interpersonal violence; make recommendations for their prevention, reduction and mitigation
Improve quality by using evidence	Analyse all data received and provide feedback for translation of research into practice; make findings accessible to all violence prevention stakeholders for improved quality of healthcare
Meaningful public-private partnerships	Vigilance on events and trends leading to balanced feedback to all sectors will enable development of meaningful partnerships between public and private sector stakeholders involved in violence prevention to help parties engage in using synergies for mutual benefit

### Analysis plan

The information to be collected will include (but not be limited to) participant demographics, mechanism of injury, victim perpetrator relationship, alcohol and drug use and location of robbery, injury and homicide among others. To protect the privacy of patients, a file will be created that will have no specific identifiers. Analysis will be conducted using Stata V.11.2. Descriptive statistics and time-trend analyses will be used to describe the epidemiology of violence and injury for the community of Khayelitsha.

Geographical information systems (GIS) software will be used to plot the incident address as well as the address of victims of violence with regard to journey to injury studies. Analysed violence and injury data will employ story maps, data clocks, web maps and other GIS-related products to visualise appropriate datasets. Identified high-risk areas will undergo environmental hot spot scans to determine the role of natural and built environmental factors in contributing to the burden of interpersonal violence, and its consideration when developing interventions.

### Ethical issues

An application for ethical approval to collect injury mortality data from the selected provincial state mortuaries and non-fatal injury data from the Khayelitsha Day hospitals and other relevant data stakeholders has been granted by the University of Cape Town's Human Research Ethics Committee (UCT HREC REF: 861/2016). This includes an application to establish a registry for the collection of violence and injury-related data titled 'the Cape Town VITO' (UCT HREC REF: R043/2016). Data drawn from other sources and research projects will seek ethics approval from their governing bodies accordingly, with applications for these datasets made to the National Health Research Database via its online portal (<http://nhrd.hst.org.za>). Respect for autonomy of the study participants are maintained as all identifiers for the different data sets used are removed, to protect study participants. This includes aggregated data from the SAPS which will also have all identifiers

removed to protect participants against criminal liability. In terms of non-maleficence, this study involves the analysis of secondary population data so that no anticipated harm is expected to the individual. As well as observing strict data privacy protocols, this study will be fully compliant with the Protection of Personal Information Act 4 of 2013 which regulates the processing of personal information.

### Dissemination plan

We intend to disseminate our findings among stakeholders within local government safety cluster which represents, inter alia, the police service, FPS; non-governmental organisations working within the violence prevention sector and local communities through the SAPS and violence prevention through urban upgrading community forums. Findings from this work will serve to (1) inform stakeholders of important issues and trends, (2) influence public policy, (3) develop evidence-based interventions and policy recommendations and (4) assist collaborating agencies and other stakeholders to improve their operations and understanding of the issue based through provision of an up-to-date, reliable evidence base.

### Status of the study and study participants

Following the commencement of the pilot studies on 1 June 2016, four studies described in [table 3](#) are under way including a systematic review, critical appraisal of Organisation of American States citizen security indicators, a Delphi study and a structural correlates of violence study. On conclusion of the pilot studies in July 2018, further sites within the Western Cape will be enrolled with eventual expansion to sites across the City of Cape Town. Interventions will be adapted to conditions highlighted by research at the local level.

### DISCUSSION

To the best of our knowledge, the Cape Town VITO study is the first study to collect comprehensive clinical, police



**Table 3** Global research priorities for interpersonal violence prevention<sup>16</sup> matched with ongoing violence, injury and trauma observatory (VITO) pilot studies

Global research priorities for interpersonal violence prevention <sup>16</sup>		Cape Town VITO pilot studies
Step 1 of the public health approach		
1. Defining and measuring violence		
2. Research on the magnitude and distribution of violence		The magnitude and distribution of violence-related crime in the community of Khayelitsha, South Africa
3. Research on the consequences of violence		
4. Research on the cost of violence		Economic cost of homicide
5. Research on the validity of administrative data		Comparison of structural correlates studies, Homicide (Forensic pathology service (FPS)) versus Experience of violence (International development research centre (IDRC) survey)
Step 2 of the public health approach		
1. Research on risk factors		Structural correlates of experience of violence for the community of Khayelitsha
2. Research on protective factors		Journey to injury studies for the community of Khayelitsha
3. Research on the relationship between collective violence and interpersonal violence		
Step 3 of the public health approach		
1. Evaluating the effectiveness of programmes that target actual violence		Is the introduction of violence and injury observatories associated with a reduction of violence in adult populations? A systematic review
2. Evaluating the effectiveness of promising programmes (eg, targeting risk factors)		
3. Evaluating violence prevention policies		
4. Developing primary prevention programmes based on country-specific risk factors		Modified Delphi study to determine optimal data inputs for Cape Town pilot VITO
5. Identifying subgroups within intervention populations		Spatial comparison of experience of intimate partner violence with HIV/TB prevalence for the community of Khayelitsha
6. Developing operational programme manuals		The Cape Town VITO implementation manual
7. Developing and evaluating approaches that help individuals in abusive relationships		
8. Determining prevention approaches for younger age groups		
Step 4 of the public health approach		
1. Research on scaling up programmes that have been shown to be effective		
2. Research on the feasibility and acceptability of programmes		
3. Research on adapting effective programmes to new contexts		Modified Delphi study Critical appraisal of Organisation of American States citizen security indicators for use in South African setting
4. Economic analysis, including cost-effectiveness analysis		Economic cost of homicide
5. Developing operational manuals for prevention programmes		
6. Developing a database summarising research to guide the general public		CT VITO data registry, CT VITO public website

and forensic data for violence and injury in South Africa. The study will through liaisons with local government and stakeholders within the violence and injury prevention community, seek to document ongoing violence prevention interventions, providing evaluations of current and prospective interventions. With other provinces within South African, including Gauteng, seeking to develop their own violence and injury observatories, the potential exists for examining and comparing regional similarities and differences for the burden of violence and injury.

## SUMMARY

Violence and injury and its consequences on society continue to be widely prevalent in the world. The overwhelming burden of violence and injury confirm the need for improved and effective surveillance and control strategies. The Cape Town VITO study represents the first attempt to collect contemporary and comprehensive data on violence and injury in the Western Cape. The study will help quantify the burden of violence and injury, document the prevalent subtypes of interpersonal violence presenting in the respective communities and, provide information that could inform the development of violence prevention interventions, future research programmes and policy development, all of which have the potential to improve the management of and prevention of violence and injury in the Western Cape.

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