Guinevere Gilbert, Keith Cattell, Peter Edwards & Paul Bowen

Dr Guinevere Gilbert, School of Property, Construction and Project Management, RMIT University, GPO Box 2476, Melbourne, Victoria 3001, Australia. Phone: +61 3 9925 3452, email: <Guinevere.gilbert@rmit.edu.au> (corresponding author).

Prof. Keith Cattell, Department of Construction Economics and Management, Level 5 Snape Building, Upper Campus, University of Cape Town, Private Bag, Rondebosch 7700, Cape Town, South Africa. Phone: +27 (0)21 650 2452, email: <Keith.cattell@uct.ac.za>

Adj. Prof. Peter Edwards, School of Property, Construction and Project Management, RMIT University, GPO Box 2476, Melbourne, Victoria 3001, Australia. Phone: +61 3 9925 2230, email: <Peter.edwards@rmit.edu.au>

Prof. Paul Bowen, Department of Construction Economics and Management, Level 5 Snape Building, Upper Campus, University of Cape Town, Private Bag, Rondebosch 7700, Cape Town, South Africa. Phone: +27 (0)21 650 3443, email: <paul.bowen@uct.ac.za>

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A sequential mixed methods research approach to investigating HIV/AIDS intervention management by construction organisations in South Africa

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Abstract

Sequential mixed methods research is an effective approach for investigating complex problems, but it has not been extensively used in construction management research. In South Africa, the HIV/AIDS pandemic has seen construction management taking on a vital responsibility since the government called upon the private sector to play a greater part in combating HIV/AIDS. However, the South African construction industry has been slow in responding to this call, and many organisations are not fully aware of what such involvement might mean. A sequential mixed methods research approach was used to investigate this problem. As the research is ongoing, it is described in this article as a research journey; the findings of each stage have determined the best method for the next. Findings of each stage are not presented in detail, since the main purpose of this article is to show the effectiveness of the research method. The approach commenced with a quantitative survey to establish base-line information. Semi-structured interviews then yielded richer qualitative data before quantitative datasets were revisited to exploit their potential for more complex analysis and modelling. Findings to date show that corporate knowledge about HIV/AIDS is inconsistent, that intervention management may miss the population most affected, and that the stigma of being HIV+ is a major barrier that frequently prevents disclosure and thus misses the benefits that employer organisations can bring. The construction industry needs to find better ways to promote disclosure and minimise stigmatisation. The applied example shows that the adoption of sequential mixed methods has responded to individual stage data needs and

provided essential flexibility for the research. It is an effective approach where end outcomes are not sufficiently clear at the outset of the research.

Keywords: Construction industry, HIV/AIDS, intervention management, sequential mixed methods research

Abstrak

Opeenvolgende gemengde metodes-navorsing is 'n doeltreffende benadering vir die ondersoek van komplekse probleme, maar is nog nie op groot skaal in konstruksiebestuurnavorsing gebruik nie. Die Suid-Afrikaanse regering het die privaat sektor gevra om 'n groter rol te speel in die hantering en betrokkenheid van MIV/VIGS, maar organisasies is nie bewus van wat hantering en betrokkenheid behels nie. Die Suid-Afrikaanse boubedryf is traag om te reageer. 'n Opeenvolgende gemengde metodes-navorsingsbenadering is gebruik om die probleem te ondersoek. Die proses word genoem 'n navorsingsreis, aangesien daar huidiglik steeds navorsing gedoen word. Die resultate van elke stadium voorspel die relevante metode vir die volgende navorsingsmetode. Die opeenvolgende gemengde metodes-navorsingsbenadering het ontstaan as gevolg van kwantitatiewe navorsing om basiese inligting te verkry. Kwantitatiewe datastelsels is verander om 'n meer ingewikkelde komplekse analise en modellering van gedeeltelik gestruktureerde onderhoude te verseker en het gelei tot beter kwalitatiewe onderhoude. Resultate tot op datum het bewys dat kooperatiewe kennis van VIGS nie konsekwent is nie. Inmenging het tot gevolg dat die meerderheid geaffekteerde mense nie geraak word nie en dat die stigma van MIV+ onttrekking veroorsaak. Werkgewers se invloed word gevolglik ondermyn. Individuele data behoeftes en buigsaamheid ten opsigte van navorsing het gelei tot die aanvaarding van opeenvolgende gemengde metodes. Dit is 'n effektiewe benadering wanneer die eindresultaat nie duidelik genoeg is tydens die verslaglewering van die navorsing nie.

Sleutelwoorde: Boubedryf, ingrypingsbestuur, MIV/VIGS, opeenvolgende gemengde metodes-navorsing

1. Introduction

The South African Department of Public Works (DPW, 2004: 3) reported that the construction industry ranked third in terms of the economic sectors most adversely affected by the HIV/AIDS pandemic. Given that the government cannot combat the pandemic alone (Gilbert, 2006: 309; Wouters, Van Damme, Van Loon, Van Rensburg & Meulemans, 2009: 1177), it is recognised that civil society (Kelly & Van Donk, 2009: 135) and the private sector (George, 2006: 179; Overseas Development Institute (ODI), 2007: 2) have to play an increasingly important role. In this sense, the private sector is expected to 'intervene' in the managed responses to HIV/AIDS in the workforce – businesses are called upon to help the government with the 'heavy lifting' needed to combat the spread of HIV/AIDS and treat the disease. However, the South African construction industry is the least responsive sector in this regard (Bureau for Economic Research/ South African Business Coalition on HIV & AIDS (BER/SABCOHA), 2004: 52; Rosen, Feeley, Connelly & Simon, 2006: 12; Meintjes, Bowen & Root, 2007: 255 [JP2007.1]. More recent research has not found any

substantial improvement in this situation (Bowen, Cattell, Edwards & Marks, 2010: 997 [JP2010.1]; Harinarain & Haupt, 2014: 291).

Businesses that depend largely on casual and migrant labour are likely to be seriously affected by HIV/AIDS (Whiteside & Sunter, 2000: 140), as HIV prevalence is considerably higher among workers who travel for employment (Interagency Coalition on AIDS and Development (ICAD), 2004: 2; Bowen, Dorrington, Distiller, Lake & Besesar, 2008: 828 [JP2008.1]). Other aspects driving risky lifestyles and hence disease vulnerability for such workers include substandard living environments, absence from stable family environments for long periods, high rates of alcohol abuse, and promiscuous sexual activity (ICAD, 2004: 3). The construction industry is vulnerable to all these factors; research was thus needed in order to better understand its situation and improve its HIV/AIDS intervention management practices.

The research journey described in this article commenced with a policy-positioning paper (Meintjes *et al.*, 2007: 255 [JP2007.1]), following the official reports of poor industry response, despite evidence of increasing prevalence of HIV/AIDS infection. By 2009, the disease was regarded as pandemic, and the question arose: Had the construction industry's awareness of, and responses to HIV/AIDS improved? This stimulated the commencement of a small research project at the University of Cape Town in 2009 to investigate the construction industry's awareness and management of HIV/AIDS. For logistical and financial reasons, the initial research was confined to the Western Cape. The scope of the project has since expanded, but this development has brought with it a recognition of the need to adopt different methods to service the data-collection needs of such expansion. The 'umbrella' approach to this need falls with the methodology known as Sequential Mixed Methods Research (SMMR).

While reporting some of the more important findings, the main purpose of this paper is to demonstrate the use of SMMR in the HIV/AIDS intervention management research project, by presenting it as a staged, and as yet unfinished, journey.

2. Research method and design

The research journey set out by asking:

- How aware are construction firms about the long-term threat of HIV/AIDS to the workforce?
- What HIV/AIDS intervention management activities are construction firms engaged in?
- Do construction firms regard management interventions as financially viable?

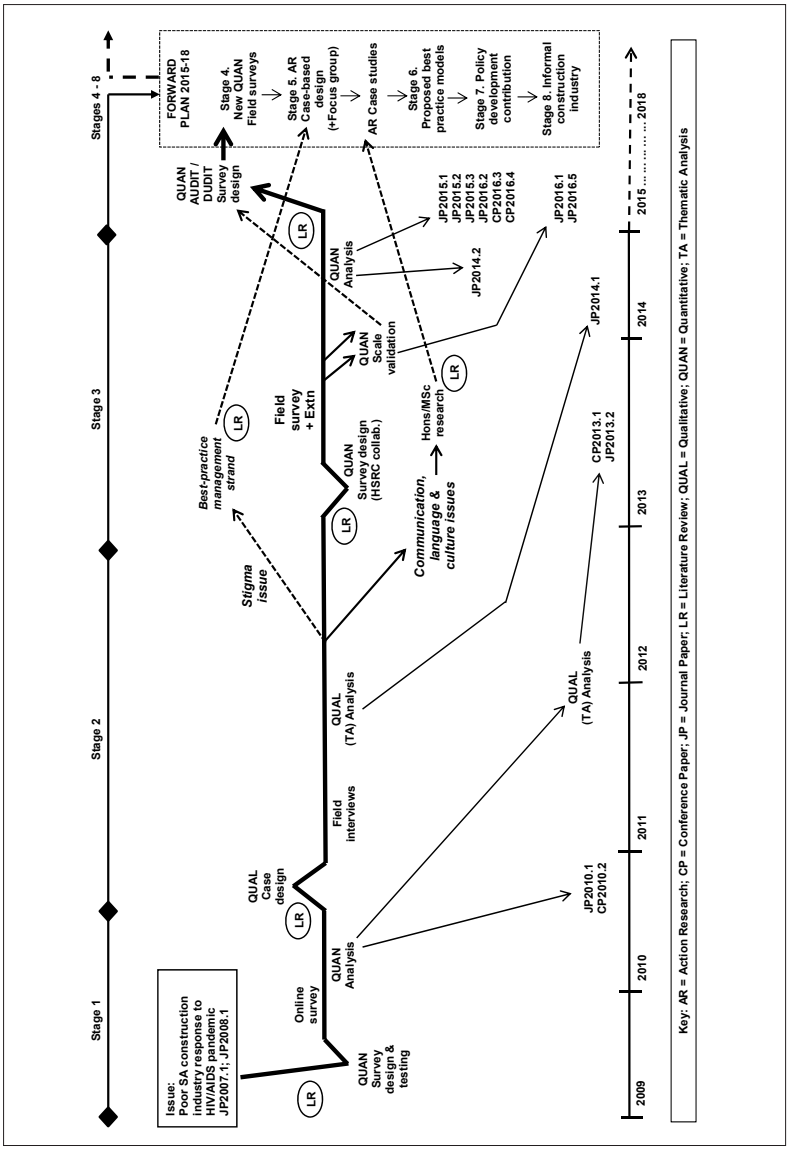

Figure 1: HIV/AIDS intervention management in the South African construction industry: SMMR Research Journey 2009-2018

The staged journey to date is shown in Figure 1. Institutional ethical clearance was obtained for each stage of the research. Journal and conference papers emanating from the research are labelled in the diagram by type, year and sequence in the year (e.g., CP2010.2; JP2016.2). They are also identified in the narrative text and endlist of this article in square parentheses following the conventional references. Timelines are not to scale in the diagram, and the later, as yet un-travelled parts of the journey are condensed in a panel on the right-hand side. The stages of the research are discussed in the article in terms of their design and outcomes, with conclusions offered for both aspects as well as for the research process.

2.1 Mixed methods research

Since construction is as much a social as a technical process, it is inappropriate to attempt to force-fit construction management research into a unitary, purely quantitative paradigm in terms of investigative methods. The variability and uncertainties associated with human perceptions, attitudes and behaviours in the management of construction processes are not best dealt with by a purely quantitative approach.

On the other hand, wholly qualitative approaches may suffer from other deficiencies. The outcomes from either approach, if undertaken in isolation, may be a lack of completeness in the research (Tashakkori & Teddlie, 1998: 39).

If unitary approaches to construction management research are inappropriate or inadequate (or both), then alternative hybrid or multiple methods may be needed. The latter approach is better known as 'mixed methods' research (MMR), with a productive history now spanning several decades (Cresswell, 2013: 61).

Integral to the use of MMR is the collection of both qualitative and quantitative data, where data is collected either sequentially or concurrently (Tashakkori & Teddlie, 1998: 18). Used sequentially (SMMR), the analysis of quantitative or qualitative data collected in the first phase then informs the nature of quantitative or qualitative data collection in the second phase, and so on (Myers & Oetzel, 2003: 436). By contrast, concurrent (or parallel) MMR encompasses a holistic view of the research field through the different perspectives whereby both types of data are collected simultaneously (Bak, 2011: 77), and is perhaps more akin to a hybrid research model where similar data can be collected through both qualitative and quantitative means (or a combination thereof). As SMMR allows the research process to reflect the practical and contemporary

theoretical circumstances of each stage, it also allows the researcher to adopt variable, but appropriate world views. This approach is predominantly pragmatic, but, as Morrow (2007: 209) argues, the research needs to focus on the outcome and should not be constrained by one single perspective. From a methodological viewpoint, the adoption of MMR brings characteristics thought to be advantageous over research conducted using a single method of data collection and analysis.

Arguably, the most valuable benefit is the ability to maintain a focus on the research problem and outcome (Creswell & Plano Clark, 2011: 17) rather than being distracted by explaining and attempting to avoid the limitations of adopting a single method (Canales, 2013: 7). However, the multiple methods must be integrated; the 'flow' of the research should be encompassed within an over-arching aim. A further benefit of MMR is that it can be adapted to suit the research problem being investigated. Where the research is exploratory, this flexibility facilitates the adoption of an appropriate method as more becomes known about both the context and the preliminary findings (Hanson, Creswell, Plano Clark, Petska & Creswell, 2005: 229). Combining qualitative and quantitative data is recognised as providing a more complete and 'richer' picture than a single method used alone (Tashakkori & Teddlie, 1998: 40; Johnson & Onwuegbuzie, 2004: 21; Mertens, 2012: 810). The same arguments apply to research that is more explanatory than exploratory in intent.

In addition to combining methodological rigour with flexibility, indirect benefits are realised. Mertens (2013: 215) finds MMR to be a better approach in research where it is difficult to reach the population, both geographically and psychologically. Chilisa (2005: 680) gives an example of a shortcoming of single-stage data collection in a culturally sensitive environment, describing particular HIV/AIDS research in Botswana as inaccurate because of the culturally insensitive survey used. Had the cultural context first been ascertained, the survey design could have been more appropriate. Quantitative data-collection tools used alone may not give sufficient regard to the cultural context or beliefs (Creswell & Plano Clark, 2011: 8), as, for example, in surveys about alcohol use where convenient standardised instruments exist (e.g., Saunders, Aasland & Babor, 1993: 791; Bloomfield, Hope & Kraus, 2013: 18). In this instance, adopting a qualitative data collection as part of a mixed methods approach would allow the relationship between researcher and participant to become closer than typical forms of quantitative data collection usually allow. Sequential MMR satisfactorily addresses the frequently encountered situations where the findings from an

investigation designed to answer particular research questions inevitably raise further questions of interest.

As a flexible research strategy, MMR has enjoyed a growth in popularity over the past ten years, as evidenced by an informal scan of the number of books published on the topic (15 in 2009, compared to five between 2003 and 2007) and the appearance of a journal dedicated to MMR since 2007 (see, for example, Alatinga & Williams, 2016). Given the exploratory nature of the HIV/AIDS research and the context of the South African construction industry, mixed methods research using a sequential staged design was adopted.

3. Stage 1 research design

The benchmark South African research into HIV is the South African National HIV Prevalence, Incidence and Behaviour Survey, conducted jointly by the Human Sciences Research Council (HSRC) and the Medical Research Council (MRC) (see Shisana, Simbayi, Rehle, Onoya, Jooste, Zungu, Labadarios & Zuma, 2014). Using survey data to investigate HIV attitudes and behaviour issues in South Africa is much more established and widespread than qualitative research methods, arguably because the sampling design permitted by surveys enables proper estimates of incidence and prevalence, a critical consideration in a country with rates of current and new infections among the highest in the world. The research questions presented earlier derive from the results of the survey referred to above. The opening stage of this research journey thus employed a questionnaire survey to establish base-line information specific to the construction industry.

Using literature relating to HIV/AIDS intervention management in other industries, a sectioned questionnaire was designed with a mixture of closed, dichotomous, declarative and multiple-choice questions. Rating type questions used 5-point frequency scales for indicators of importance. Open response options were made available for some questions. The seven-part survey questionnaire sought demographic information from respondents (e.g., category and size of firm, and number of permanent employees); explored company perceptions regarding HIV/AIDS as a long-term threat; ascertained the presence of an HIV/AIDS policy within the company; determined the existence and nature of HIV/AIDS awareness, prevention, and treatment campaigns or programmes; explored the relationship between HIV/AIDS and employees (e.g., disclosure of status, participation in treatment programmes); investigated any additional involvement in addressing HIV/AIDS issues within the organisation (e.g., support

provided to HIV+ employees, presence of medical aid benefits); sought perceptions of what constitutes success for a management intervention programme, and solicited opinions regarding the financial viability of management intervention action.

The sampling process for Stage 1 identified contracting firms of sufficient size to support the likelihood that they would have given serious consideration to the issues. Onwuegbuzie & Collins (2007: 286) recognise this adoption of purposive sampling as one option for SMMR. The Construction Industry Development Board's (CIDB) (Western Cape) database and the Western Cape Master Builders' Association (WCMBA) membership list were used to identify potential respondents. Since contractors may belong to both organisations, a genuine and commercially active total population for this region is difficult to determine, but is likely to be approximately 5 000. Contractors registered in Grades 6 to 9 inclusive on the CIDB list (an indicator of capacity to undertake project work within a given monetary value range: Grade 6 = >ZAR6.5 million project cost) were randomly telephoned and asked to participate. This sub-population totals about 300. Twenty-one firms agreed (over four different grades). Similarly, 21 members of the WCMBA agreed to participate after being randomly telephoned. Once contact with an individual had been established, that person was emailed, given a URL where the questionnaire could be accessed online, and formally asked to participate. A stratified purposive sampling approach was thus adopted. Data collection took place from May to November 2009, with participation from 42 construction firms (a 14% response rate representative of the sub-population).

Survey response data were subjected to quantitative analysis. Descriptive statistics formed the main analytical tool, with some use of inferential analysis.

3.1 Stage 1 outcomes

The survey findings (Bowen *et al.*, 2010: 997 [JP2010.1]; Bowen, Edwards, Cattell & Marks, 2010: 9 [CP2010.2]) revealed that respondents held no universal view about the long-term threat posed by HIV/AIDS to the construction industry. The majority of the organisations had developed HIV/AIDS 'policies', but few went beyond promoting worker awareness and providing preventative information and condoms. Widespread doubt was expressed about the financial viability of more extensive involvement. The size of firms (in terms of employee numbers) did not influence the adoption of awareness and prevention campaigns, but was moderately associated with

the running of voluntary counselling and testing (VCT) programmes, and significantly related to the provision of *treatment* programme interventions. Larger firms tended to deliver more services. 'Worker sensitivity', confidentiality risks, and fear of further stigmatising HIV+ persons were cited as barriers to involvement.

The open response data elicited by the survey were subjected to further thematic analysis during 2011 as a means of validating the approach for the second stage of the research. From this analysis, five themes were identified: understanding the problem of HIV/AIDS in relation to the firm; interventions by the firm; barriers to interventions; success of interventions, and future intentions (Bowen, Edwards & Cattell, 2013: 7 [CP2013.1]; Bowen, Edwards, Simbayi & Cattell, 2013: 17 [JP2013.2]). Deeper investigation into these issues was planned for the next stage.

4. Stage 2 research design

A case-study approach, employing qualitative semi-structured interviews, emerged as the method best suited to conduct more detailed investigation. The strategy adopted was a collective (multiple) case-study approach (Creswell, 2013: 101), whereby individual construction firms comprised the cases, and the units of analysis were the processes and procedures adopted by firms for HIV/AIDS intervention management (Yin, 2014: 31). Purposive and convenience sampling of construction firms was adopted; purposive in the sense of selecting cases to meet differentiation criteria, and convenient in that several firms from the earlier survey had expressed their willingness to participate further.

The conceptual design proposed eight case organisations, comprising two construction firms in each of the micro, small, medium and large employment and turnover categories used to categorise economic data in South Africa (Stats SA, 2008: 18). Twelve Western Cape construction firms participated, comprising ten respondents from the earlier online survey and two firms identified from personal contacts. The sample was thus purposive and comprised 4% of the original sub-sample. Resource constraints associated with the field interview logistic requirements for data collection precluded the use of a larger sample, and generalisation of results to a total population was not essential, since the focus was on the type and effectiveness of HIV/AIDS management intervention activities undertaken by individual construction firms.

Compliance with the proposed size categories proved difficult to achieve, since employment and turnover sizes did not necessarily correspond. Given that different firms use different employment strategies, it was also difficult to make consistent comparisons between employment categories; the findings of the case-based Stage 2 research largely relate to the *permanent* workforces of the interviewed firms. Where available, documentary evidence (organograms, policies, procedures, posters, reports) was gathered from the participating organisations. Interviews provided the primary data.

A semi-structured interview protocol was designed to guide the interview process, following replication logic for each case (Yin, 2014: 146). The issues identified in the earlier survey findings informed the topics covered by the protocol. While sub-questions were proposed under each topic, the protocol was intended purely as an '*aide memoire*' for the interviewers, and all questions were regarded as 'open' for interviewees. Organisational information was also collected. Ethical considerations included informed consent to the interview and the recording thereof; the absence of deception; privacy and confidentiality safeguards, as well as accuracy confirmation (Christians, 2011: 65).

An interview was also conducted with a private company offering HIV/AIDS-related management and clinical services to the construction industry. Since the purpose was to explore HIV/AIDS intervention management practices from the 'employer-to-employee' perspective, interviews were not planned for construction workers at this stage. However, one large firm indicated that an HIV+ employee had volunteered to 'tell his story' and this opportunity was taken up.

Interviews were conducted during February 2011 at the head office (or regional head office) locations of the participating firms, generally in the Cape Town metropolitan area. At least two interviewers were present on each occasion; one being a postgraduate student focusing only on treatment programmes. Interviewees comprised directors or senior (HR) managers from each of the twelve construction companies; a director of the service provider company, and the HIV+ construction worker. The majority of the interviews lasted approximately one hour and all were digitally recorded and subsequently transcribed. The interviewers also made handwritten notes. Interviews were conducted in English, with the exception of the interview with the HIV+ employee, where an interpreter was present. In this instance, the interviewers posed questions in English. Where the

interviewee did not fully understand a question (obvious by his body language in turning to look towards the interpreter), the interpreter translated it into *isiXhosa* (an indigenous African language). A mixture of English and *isiXhosa* answers ensued. The English responses (and the English translation of the worker's responses) were transcribed from the digital recordings. The edited interview transcripts were returned to the participants (or the interpreter) for confirmation of content and accuracy ('member checking': Lincoln & Guba, 1985: 373; Poland, 2001: 643).

A post-interview debriefing session was conducted between the researchers and the interviewers. The debriefing included comparisons of interviewers' notes as well as recalling any strong emphases detected in the conduct or views of interviewees.

Thematic data analysis examined the qualitative interview data (using the unedited transcripts: Poland, 2001: 630) and the documentary evidence to identify emergent themes (Stake, 1995: 49; Ritchie, Spencer & O'Connor, 2003: 219), thereby confirming and extending those found in the Stage 1 research.

4.1 Stage 2 outcomes

The following major concerns emerged from the Stage 2 research findings: fears about employees' stigmatisation and their reluctance to disclose with respect to HIV+ status (thus making it almost impossible for employers to reach them with treatment programme help) and communication issues associated with these concerns. The findings from the thematic analysis of the case-based data were reported as a journal paper (Bowen, Allen, Edwards, Cattell & Simbayi, 2014: 377 [JP2014.1]), in which guidelines were proposed (in the form of an 'A-Z' checklist of questions) for construction organisations to consider when developing and implementing HIV/AIDS intervention management policies. The guidelines address many of the concerns about lack of knowledge, on the part of construction organisations, about HIV/AIDS intervention management.

Stage 3 of the journey was planned to address employee concerns about stigmatisation and communication in greater detail. Two other issues identified through the interviews included the lack of reach into the informal sector of the South African construction industry, and the difficulties arising from the employment structures of the formal sector. However, resource and budgetary constraints placed these outside the remit of Stage 3.

5. Stage 3 research design

Given the sensitivity of the proposed focus upon stigma (prejudice and discrimination), disclosure and communication for the Stage 3 research, and better generalizability of findings were considered an important strategic objective. Furthermore, the focus, in this instance, would be on construction workers themselves. This meant accessing a larger sample frame and reverting to quantitative methods of data analysis. The first two issues (stigma and disclosure) would involve direct participation by construction workers, since their views would be important. The communication aspect would be explored from both worker and organisation perspectives, and was subsequently established as a separate strand, commencing in mid-2012, conducted initially by Honours-level students to establish a literature-based context of theory and practice, and followed by postgraduate Masters research (ongoing).

HIV/AIDS stigma and disclosure issues intrinsically relate to the ways in which people respond to the testing processes for the disease (i.e., their testing behaviour). The nature of worker participation required, and the socio-economic status of the majority of workers precluded the use of online data-collection methods. Instead, a field-administered quantitative survey of construction workers was proposed, consistent with procedures adopted by the HSRC (Kalichman & Simbayi, 2003: 443).

Design of the data-collection instrument was finalised by mid-2013. The item catalogue for the questionnaire included demographic details, lifestyle risk information (relating to condom use, information about alcohol consumption and drug use), and questions designed to determine the participants' knowledge about HIV/AIDS, their feelings towards HIV+ persons, and whether or not they fear HIV/AIDS testing (attitudinal fear of testing). Additional questions, directed specifically at HIV+ persons, sought information relating to internal and external stigma and discrimination, social support systems, and disclosure. The questions, mostly with dichotomous or multiple-choice answer options, were drawn from the measures of Kalichman & Simbayi (2003: 443; 2004: 574); Kalichman, Simbayi, Jooste, Toefy, Cain, Cherry & Kagee (2005:137), and Simbayi, Kalichman, Strebel, Cloete, Henda & Mqeketo, (2007: 1825). The survey questionnaire was made available in three of the eleven official languages of South Africa, namely Afrikaans, English and *isiXhosa*, since these are the most commonly spoken languages in the Western Cape region.

From June to September 2013, the survey was administered to site-based construction employees, comprising unskilled and skilled

workers, and site office-based supervisory staff. Participants were drawn from 18 construction sites in the Western Cape, involving the willing co-operation of six construction firms from the Stage 2 research (again, a purposive sample frame). Resource constraints, particularly those associated with the need to collect data in field settings, limited the number of sites that could be visited within the available time frame. The questionnaires were administered in supervised settings, generally in on-site container offices, each equipped with chairs and a large table. The nature of the study was explained and participants were assured about the voluntary, anonymous, and confidential nature of the survey. Care was taken to ensure that workers had sufficient individual privacy to complete their questionnaires. For each site visit, at least three researchers were present to cope with relay batches of participants, to ensure proficiency in all three languages, and to provide assistance where requested. The completed questionnaires totalled 512. In terms of minimum sample sizes required in research to achieve a satisfactory level of generalisability, above a population of more than N=5000 a sample size of 400 is adequate (Lucko & Rojas, 2010: 130). Preliminary data analysis yielded descriptive statistics. Bivariate analysis was then used to explore relationships within the data. Subsequently, regression analysis and Structural Equation Modelling (SEM) were used to test conceptual predictive models of the HIV/AIDS testing regime behaviour of construction workers, as well as feelings of prejudice towards, and discrimination against HIV+ persons.

5.1 Stage 3 outcomes

The findings of the Stage 3 research to date, along with psychometric scale validation assessment, are reported in Bowen, Govender, Edwards & Cattell (2014: 1106 [JP2014.2]); Bowen, Govender, Edwards & Cattell (2015a: 04015040-1); Bowen, Govender, Edwards & Cattell (2015b: 1150) [JP2015.1, JP2015.2]; Bowen, Govender, Edwards, Cattell & Street (2015: 04015014-1 [JP2015.3]), and Bowen, Govender, Edwards & Cattell (2016a: 92; 2016b: 1; 2016c: 1 [JP2016.2, CP2016.3, CP2016.4]). The survey results highlight the complex interrelationship between HIV/AIDS knowledge, prejudice, discrimination, and attitudinal fear of testing. They suggest that more carefully nuanced training for peer educators (a component of existing HIV/AIDS workplace intervention management) is important, along with more finely tuned and culturally sensitive awareness campaign targeting and media (e.g., site posters). The communication strand of the Stage 3 research confirms this (Akita, Baloyi & Gumede, 2012: 86).

The SEM analyses (see, for example, Bowen *et al.*, 2016a: 92 [JP2016.2]) have revealed pathways between the factor variables that should provide more strategic targeting for management interventions; these will inform the Stage 4 research. Techniques involving Classical Test Theory (exploratory and confirmatory factor analyses) and Item Response Theory (Embretson & Reise, 2000: 65) were used to validate survey catalogue items and measures, with the aim of ensuring robust and culturally appropriate survey instruments (Bowen, Govender & Edwards, 2016: 1 [JP2016: 1]; Govender, Bowen & Edwards, 2016: 12 [JP2016.5]).

Additional data analysis, relating to condom use among construction workers, has led to two further journal papers, each currently in the process of publication. All this work has led to a new quantitative survey design (Figure 1: Stage 4).

6. Stage 4 research design and beyond

The next stage of the HIV/AIDS research will include the administration of a new quantitative survey field administered on more construction sites. The extensive data-collection process is planned to take place in mid-2017 and will explore alcohol and drug use among construction workers in greater detail, using standardised quantitative screening surveys such as AUDIT (see Babor, Higgins-Biddle, Saunders & Monteiro, 2001) and DUDIT (see Berman, Bergmann, Palmstierna & Schyler, 2002), for alcohol and drug usage, respectively, augmented with Likert-type HIV/AIDS-related questions. Substance use is known to affect the efficacy of anti-retroviral (ARV) treatment medication, and may influence workers' decisions to remain compliant with treatment programmes (Tetrault, Fiellin & Sullivan, 2010: 1; Braithwaite & Bryant, 2010: 280). Much of the AIDS pandemic in South Africa occurs in the context of substance use (Parry, Myers, Morojele, Flisher, Bhana, Donson & Pludemann, 2004: 437). Alcohol abuse has also been linked to inconsistent condom use (Shisana *et al.*, 2014: xxvii). The findings of this research will inform the development and testing of appropriate management intervention tools, and higher level policy development work (Figure 1: Stages 5, 6 & 7). These tools will initially focus on techniques to improve construction workers' HIV/AIDS testing behaviour by improving workers' knowledge, minimising stigma, and encouraging testing and disclosure. This represents a shift in the research strategy, from "What is ...?" to "What should be ...?" Beyond that, the question becomes "how can that be addressed and implemented ...?", and eventually to "how effective is that ...?". Thus the forward strategy will move from

investigating the current situation to exploring the effectiveness of management interventions, proposing guidelines, influencing policy development, and encouraging industry best practice. Action research – undertaken at the construction organisation level – appears to be an appropriate method to explore the practicality of employing such tools and assessing their effectiveness (Reason & Bradbury, 2009: 1). In action research, the researcher plays an active role in the investigation, as distinct from the more usual detached observer position. The purpose of action research is to effect change in specific contexts. With the willing consent of the stakeholders, the researcher introduces a change in practice in an organisation, prior to examining its effects. The technique is commonly associated with practice-based research. It is participative and collaborative, following an iterative cycle of plan, act and observe, reflect and refine. Workplace drama (or 'theatre for development') may be one action research medium for management tool development and application, thus embracing the communication and stigma strands of the research (Durden & Nduhura, 2011: 91). The adoption of action research methods within a SMMR umbrella approach is not explicated in the SMMR literature, so this approach could potentially make a valuable contribution to the general methodological discussion. Appropriate focus groups will advise this research design as it progresses. Stage 7 should then draw much of the entire research journey together in a contribution towards HIV/AIDS policy development for the construction industry at a national level.

Further ahead (Figure 1: Stage 8), an attempt is envisaged to engage with the informal construction sector in South Africa; ascertain its special HIV/AIDS management needs, and explore ways to deliver appropriate help. This will not be easy. The formal sector will first have to provide an effective response model for the entire industry, and then promote mentoring opportunities between formal and informal builders. On another front, government, industry groups (contractor representative associations and unions) will have to address issues relating to industry employment structures and their impacts on effective HIV/AIDS intervention management.

7. Discussion of research findings to date

The staged MMR approach to HIV/AIDS intervention management in the South African construction industry has delivered several important findings, and opened up further areas for investigation. The Stage 1 quantitative survey findings showed that knowledge about HIV/AIDS and the long-term threat that it poses is patchy

across the industry. While organisational policy development was found to be fairly common, more often than not it was very limited in both scope and implementation. Realistic understanding of the cost implications of intervention was rare, as was involvement beyond passive prevention counselling. Firms were cautious about the risks in terms of confidentiality and stigmatisation. The latter concerns were re-confirmed in the qualitative case study interviews in Stage 2, but, on a more positive note, the intervention practices of some organisations could be regarded as world-leading in terms of the nature and extent of their involvement in treatment programmes and family support. However, the reach of these interventions was limited mainly to full-time permanent employees in each organisation, thus missing the large number of workers who are casually employed or engaged on limited short-term contracts. By extension, the substantial informal sector of the South African construction industry is unlikely to have been reached at all.

In Stage 3, a reversion to quantitative surveys, aimed specifically at construction employees, showed that reluctance to disclose their HIV zero status is a major concern for construction workers. Fears of discrimination and stigmatisation fuel this anxiety. The relationships between these factors, knowledge about HIV/AIDS, level of education, and life-style risk behaviours (alcohol and drug use, sexual practices) are complex, especially in the context of different ethnic cultures. This complexity has many implications for HIV/AIDS intervention management, particularly with regard to management/worker communication and organisational policy development. Since the research is management-oriented, as distinct from HIV/AIDS clinical practice, the ongoing and future research must embrace behavioural and communication objectives with a normative intent to improve management effectiveness.

8. Discussion of the SMMR approach

At the outset of the HIV/AIDS intervention management research journey, the end destination was not clear, other than a general desire to invigorate the construction industry with respect to its response to the pandemic. The research project thus demanded flexibility in terms of how it would proceed (*i.e.*, the exploratory/explanatory design sequence). The adoption of each subsequent method of investigation has been decided by the outcomes from the preceding stage, their implications for the nature of the issues to be explored in the following stage, and thus the type of data to be collected. This follows the *caveat* for an integrated perspective (Canales, 2013: 18).

The HIV/AIDS research journey continues to yield more complete pictures of the research problem (Mertens, 2012: 810). The overall multi-stage design is clearly evident, but transformational design (in the sense of exploring, implementing and assessing change) has yet to become a major feature.

Literature review was an essential prerequisite for primary data collection. It was particularly important to know the relevant terminology; the nature and extent of the extant research; its findings and contribution to knowledge; its applicability to the construction industry, and how the research had been carried out. This informed the justification for the research; guided the methodological decision-making, and assisted the subsequent research design and development of primary data-collection instruments. As Figure 1 shows, the literature review was not confined to the start of the journey, but has continued to be re-visited and extended as deeper issues have emerged in later stages.

Importantly, a suitable 'reach' and sample frame for survey participants was required, and online administration in Stage 1 solved issues of administration costs normally associated with questionnaire surveys. Sufficiency of response is considered later in this section. For the Stage 1 HIV/AIDS intervention management survey, the regional construction organisation associations provided the sample frame, and the researchers adopted sampling techniques documented by authors such as Kemper, Stringfield & Teddlie (2003: 273) and Onwuegbuzie & Collins (2007: 286). Stage 1 provided a supplemented nesting sample whereby Stage 2 used the same sample with the addition of two more organisations known to the researchers. The transition from Stage 2 to Stage 3 used a parallel sample, in which the sample is drawn from the same "population of interest" (Onwuegbuzie & Collins 2007: 281), in this instance the workers on various sites administered by six of the organisations involved in Stage 2. The investigators were careful to avoid generalising the results beyond the capacity of the data. In fact, the nature of construction management is sufficiently universal to render many of the findings credible in the majority of contexts.

The research journey has progressively adopted more complex data-analysis techniques. It commenced with descriptive statistics (Stage 1). Inferential statistics then explored factor relationships between category groups, followed by bivariate analysis and, eventually, multiple regression analysis and structural equation modelling to examine predictive pathways among contributory variables (Stages 3 & 4). In Stage 3, item response theory was used to

examine the robustness of scale measures at the level of individual items within scales (for the quantitative survey questionnaires). Thematic analysis of open responses to survey questions (Stage 1) and interview transcripts (Stage 2) has added qualitative richness and depth to the research journey.

While the research journey began with an organisational focus (effective HIV/AIDS intervention management by construction firms), it has subsequently paid attention to individual construction workers. Future research plans to revert to firms when it is then likely to engage at a higher level with industry and government, while also engaging at the worker level again through action research. This research used SMMR to facilitate such deliberate shifts in perspective, while the proposal to adopt action research methods may well be novel for the methodology.

Survey response rates are a continuing aggravation for a great deal of construction management research, a field that has not yet settled on what constitutes response adequacy. While sample insufficiency manifests in a clear inability to state *any* findings conclusively, unconsidered insistence upon the adoption of target frames and response rates deemed essential to other areas of research (e.g., medicine) may be counterproductive. More important than response rates for this research is the capacity of the data to service the desired nature and levels of analysis. Surveys are a useful means of identifying relevant issues, ascertaining the strength of their importance, and examining the significance of differences between category groups. However, simply one instance of a construction organisation failing to provide an acceptable duty of care towards its employees, from the perspective of HIV/AIDS intervention management, would suffice to warrant investigation at a case-study level.

Managing multiple strands of a SMMR research project (together with other projects not reported in this article), each with additional student involvement, has been remarkably free of major difficulties. Keeping abreast of developments in the research area (substantially large when considered beyond a construction industry context) initially proved difficult, but has been substantially resolved through access to relevant publication-alerting services. A great deal of the contemporary literature is now brought to the researchers' desktops.

The research journey began with a general desire to improve industry practices, but (with the exception of the guidelines produced for HIV/AIDS intervention management) that aim is not yet fully achieved. Developing and testing effective human resources management

tools for the construction industry is a worthwhile, but certainly not a 'quick fix' endeavour.

This article has demonstrated the use of SMMR in a multiphase longitudinal project in the human resources area of the construction management domain. The main focus of the article is the methodological debate, and it is acknowledged that this inevitably limits detailed presentation and discussion of the research findings. However, these findings are disseminated elsewhere.

9. Conclusions

A research project journey to explore HIV/AIDS intervention management among construction firms was used to demonstrate the use and appropriateness of sequential mixed methods within a multiphase design. The journey demonstrated the importance of an informed sequence for the research design, a natural 'building-blocks' approach to knowledge generation that becomes almost self-selecting as the research journey unfolds. So far, SMMR provided sufficient flexibility for the research: first targeting organisations and individuals, and then potentially rising to industry level and beyond that to government.

The driver for adopting SMMR is shown to be 'data demand' flowing from the research questions: What data are needed at each stage? How can they be sourced? The collected data must be appropriate and adequate for spanning the relevant issues and for permitting suitable analysis. SMMR is ideally suited to longer term staged research, especially where end outcomes are not sufficiently clear at the outset. The approach may be less suitable for the typically constrained shorter term nature of postgraduate research, unless that is based on a clear topic 'slice' carved from a larger (institutional) research project. Concurrent (parallel) MMR might be better for students working independently. For academics with competing work priorities and commitments, SMMR offers a measured and satisfying approach to undertaking research. It is also helpful in deciding the nature, direction and extent of research that is often vulnerable to precarious funding. It can yield meaningful, but not necessarily complete outcomes at each stage. However, SMMR is unlikely to be attractive to competitively funded research grant-approving bodies if they lack a full understanding and appreciation of its benefits or if they cannot engage with its longer term implications. Grant applicants proposing the use of SMMR must be prepared to argue their case strenuously and craft their research proposals carefully. In addition, SMMR exposes researchers to a variety of techniques,

some quite complex, thus broadening and extending their research and research management skills. It also delivers good answers to research questions.

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