



**LUND UNIVERSITY**  
Faculty of Medicine

Master's Programme in Public Health

**SYSTEMATIC REVIEW AND META-ANALYSIS OF HIV/AIDS PROGRAMS TARGETING  
TRUCK-DRIVERS WITHIN EAST AFRICA**

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**AUTHOR**

**BONIFACE GACHARA NDEGWA**

**SUPERVISOR**

**BENEDICT OPPONG' ASAMOAH**

**SENIOR LECTURER, SOCIAL MEDICINE, AND GLOBAL HEALTH**

**LUND UNIVERSITY**

**CO-SUPERVISOR**

**MALACHI OCHIENG ARUNDA**

**DOCTORAL STUDENT, SOCIAL MEDICINE, AND GLOBAL HEALTH**

**LUND UNIVERSITY**

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**STUDENT: BONIFACE GACHARA NDEGWA**

**SUPERVISOR: BENEDICT OPPONG' ASAMOAH**



## **ABSTRACT**

**Background:** In the growing body of knowledge on how human environment impacts population health, the transport sector is observed to occupy strategic position. However, the transport corridors equally serve as sources of socio-economic challenges. Such is the case of the transport sector's contribution to the HIV/AIDS epidemic. In this respect, truckers are observed to carry a disproportionate burden of both the disease and the risks. Similarly, the host communities exhibit their vulnerability as a result of poverty hence falling prey to temptations of sex-trade. Despite these realities, the gaps in the knowledge base on transport sector as a determinant of health remain extensive. To contribute to the discourse on linking evidence to policy, we sought to interrogate HIV/AIDS programming targeted at truckers within East Africa.

**Methods:** To identify articles for inclusion into the study, a dual search strategy was assumed. The initial search was conducted through LUBsearch and electronic resources, a library database that plays host to academic and bibliographic databases while a complementary search was completed independently through PubMed. The search terms used were **HIV or AIDS or Programs or Programming and Truckdrivers or Rwanda or Kenya or Uganda or South Sudan or Tanzania or Burundi or East Africa**. In the initial search, the inclusion criteria were peer-reviewed research articles published in English between 2015 – 2020 on HIV subject and accessible at Lund University while in the complementary search, HIV subject was substituted with AIDS. Subsequently, a quality assessment was conducted along various aspects of trustworthiness. Finally, a narrative account of the findings was conducted while meta-analysis was conducted using the weighted average method.

**Results:** From the search, six articles were included in the narrative synthesis while four articles qualified for inclusion in the meta-analysis. The included studies were all conducted in Kenya within a roadside wellness clinic intervention. From the narrative synthesis, the emerging themes were: risky sexual behaviors; access to HIV testing and counselling services (HTC); use of approaches grounded on strong theoretical basis in HIV/AIDS programming; innovative approaches to scale up HTC services; barriers to access of HTC services and the economic impact of HIV/AIDS. In the meta-analysis, a resultant odds ratio of 2.5 was obtained.

**Conclusion:** HIV testing serves both as a preventive measure and as the entry point into care and treatment. In this respect, the use of technology in communicating health messages is observed as an innovative approach to leverage on for increased HIV testing. In addition, self-testing has equally been observed to significantly influence the testing rates. The preference on oral HIV testing and home-based testing demonstrate readiness for transition into these convenient options of HIV testing. Similarly, the observed correlation between drug abuse and uptake of HIV testing demonstrate opportunities that could be exploited for joint programming.

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## List of Abbreviations

AIDS:	Acquired Immunodeficiency Syndrome.....	5
BG:	First Reviewer [Initials].....	7
CI:	Confidence Intervals.....	13
CRD:	Center for Reviews and Dissemination.....	8
EAC:	East African Community.....	6
HIV:	Human Immunodeficiency Virus.....	5
HTC:	HIV Testing and Counselling.....	2
MO:	Second Reviewer[Initials].....	7
OR:	Odds Ratios.....	13
P:	P-value[alpha].....	13
PRISMA:	Preferred Reporting Items for Systematic Reviews and Meta-Analyses.....	7
UNAIDS:	Joint United Nations Programme on HIV/AIDS.....	5
WHO:	World Health Organization.....	20

# INTRODUCTION

## Background and Rationale

According to the Joint United Nations Programme on HIV/AIDS (UNAIDS), as at 2014, approximately 39 million people had died of HIV/AIDS while 35 million were living with HIV (Nasir et al., 2015, UNAIDS, 2014). Accounting for 70.6%, Sub-Saharan Africa reported a higher burden of the disease (Nasir et al., 2015). Within East Africa, the prevalence was reported at about 4.9 million cases while 333,400 new infections had been recorded in 2012 (Secretariat, 2015). This scenario has been explained by amongst other reasons, risky sexual behaviors, ignorance and other determinants of health such as migration (Nasir et al., 2015, Skolnik, 2017). Notably, specific groups within the society have been identified to harbor an elevated risk of HIV infection and transmission (Conserve et al., 2016, UNAIDS, 2014). These include commercial sex workers, men who have sex with men, injectable drug users and long-distance truckers whose vulnerability arise from the nature of their occupation (UNAIDS, 2014, Malta et al., 2006, Lippman et al., 2018). Such groups present untold challenges in regard to responses instituted to check the epidemic and warrant targeted approaches on their pockets of concentrated epidemics within the general population (UNAIDS, 2010, UNAIDS, 2014).

In the wake of renewed interests to expand regional integration, the transport sector is observed to attract unparalleled attention in respect of how it influences the flow of commerce and allied sectors (Kunaka et al., 2018, Secretariat, 2015). In this respect, there is established knowledge on migration as a social determinant of health and the disproportionate burden of HIV/AIDS amongst migrant populations (Botao et al., 2016, Skolnik, 2017, Organization, 2005). These include long distance truckers who comprise drivers and their assistants (Organization, 2005, Botao et al., 2016). Exposure to HIV infection and transmission amongst truckers is considered structural owing to the nature of their occupation that include extended periods of travel and stay away from home (Botao et al., 2016). In addition, these groups traverse through zones of high HIV prevalence which elevates their risk of infection when coupled with risky sexual behaviors and substance abuse associated with occupational resilience (Botao et al., 2016, Malta et al., 2006). Despite these hazards, knowledge on and about HIV amongst these groups remain low (Valway et al., 2009). Similarly, their risk perception on HIV infection is observed to be equally low (DiCarlo et al., 2014, Evangeli et al., 2016). This has been explained by among other arguments, the lack of targeted interventions focused on these groups (Malta et al., 2006, Nasir et al., 2015, Kelvin et al., 2019). On this understanding, there is evidence of efforts focused on reshaping the narrative on HIV epidemic. Such include the 90-90-90 strategy that seek to identify 90% of the infected persons, place 90% of the positively identified cases on treatment and attain viral suppression in 90% of the people on treatment (UNAIDS, 2014, Kelvin et al., 2016, Lippman et al., 2018). This agenda re-emphasizes the

importance of HIV testing as a preventive measure and as the entry point into care and treatment (Mantell et al., 2014, Lippman et al., 2018, Napierala Mavedzenge et al., 2013, Fleming et al., 2016, Evangeli et al., 2016).

On the foregoing, the East African Community (EAC), a regional economic block comprising six partner states namely Burundi, Kenya, South Sudan, Rwanda, Uganda and Tanzania, caused for the establishment of EAC HIV/AIDS unit as part of its regional agenda in prevention and control of communicable diseases (Community, 1999 ). Guided by a joint strategic plan, this is observed as an effective way to leverage on the regional resource pool in addressing a shared HIV/AIDS burden (Secretariat, 2015). The current strategic plan covers the period between 2015 to 2020 (Secretariat, 2015). Under key result area number two, the strategic plan proposes regional programming that target vulnerable, mobile and key populations with specific intentions of increasing coverage to this demographic by 30% by 2020 (Secretariat, 2015). This is planned to be achieved through health systems' cooperation and development in policy and research (Secretariat, 2015). Notably, as a key driver on HIV/AIDS, the agenda has a clear outlook on human rights and gender as proscribed by various global commitments (UNAIDS, 2010, Regondi et al., 2013, DiCarlo et al., 2014, Sheri et al., 2006, Organization, 2005).

As observed in other settings, the prevalence of HIV/AIDS amongst women is reported as higher than men although the risk of mortality is higher in men (Fleming et al., 2016, UNAIDS, 2014, Secretariat, 2015). This scenario presents an interesting gender dimension to trucking as a male dominated occupation owing to poor health seeking behaviors reported amongst men (Fleming et al., 2016, DiCarlo et al., 2014, Shattuck et al., 2013, Romo et al., 2018, Morris and Ferguson, 2007). In this regard, to increase the uptake of HTC services, there is need to contextualize interventions so as to accommodate the exceptional needs of various groups (Musheke et al., 2013). However, this is frustrated by the fact that HIV/AIDS programming within Sub-Saharan Africa remain heavily donor dependent hence integration of allied services into various health systems is challenged by accountability demands of the donors (UNAIDS, 2010, Organization, 2005, Sheri et al., 2006, UNDP, 2009). In addition, the lack of evidence that would enable contextualization of policies and allow for regional harmonization is observed as another barrier towards regional integration (Community, 1999 , Secretariat, 2015, Conserve et al., 2016, Regondi et al., 2013). Towards this, we sought to systematically evaluate HIV/AIDS programming with an outlook on risk factors, preferences and predictors of uptake of HTC services amongst truckers within East Africa with an overall goal of assessing areas of harmonization and joint improvement in the regional HIV/AIDS programming; this is intimated to be conducted with an outlook on the health systems framework as proposed by the World Health Organization (WHO, 2007). Further, we project to contribute to the discourse on linking evidence to policy through systematic reviews as recommended by



various policy instruments and as projected in the EAC HIV/AIDS strategic plans (Regondi et al., 2013, Conserve et al., 2016, Secretariat, 2015).

## **Research Question**

What are the key risk factors, preferences and predictors of uptake on HTC services amongst truck-drivers within East Africa and under what categories of the health systems building blocks do HIV/AIDS programs targeting the truck-drivers fall?

## **Rationale**

Migration is widely acknowledged as a determinant of health. However, there is a limited body of knowledge on how evidence associated with migration has influenced decision making at various levels. To contribute to the discourse on linking evidence to policy through systematic reviews, this study sought to interrogate HIV/AIDS programming targeted at truck-drivers within East Africa.

## METHODOLOGY

### Sources of Information

The initial search was actualized through LUBsearch and electronic resources; an aggregate of databases administered by Lund University and plays host to multiple databases based on social sciences, biomedical research and other multi-disciplinary subjects (Industries, 2020). These include SocIndex, Scopus®, Complementary Index, CINAHL Complete, Social Sciences Citation Index and Science Citation Index which are all recommended for the conduct of a systematic review (Boland et al., 2014). Complementary search was completed independently through PubMed (Information, 2020). Initial search was completed on 21<sup>st</sup> February 2020 while the complementary search was completed on 27<sup>th</sup> February 2020.

### Identification of Studies

On the study population and intervention, a specific search criterion was adopted while for the other search phrases, a broad criterion was assumed as evidenced by the usage of Boolean operators and as illustrated in *Table 1*. The combination of search terms used were HIV **or** AIDS **or** Programs **or** Programming **and** Truckdrivers **or** Rwanda **or** Kenya **or** Uganda **or** South Sudan **or** Tanzania **or** Burundi **or** East Africa while the search limiters applied were peer-reviewed research articles published in English between 2015 – 2020 on HIV subject and accessible at Lund University (Industries, 2020). In the complementary search, AIDS, being the only proximate term was substituted for HIV (Information, 2020) as illustrated in *figure 1*.

### Data Collection

This was done in accordance to the PRISMA guidelines as illustrated in *figure 1*. Data collection began with a scoping search where articles on the tentative topic were retrieved and reviewed to refine the research question. Based on the scoping review, an inclusion criterion was established as illustrated in *Table 1*.

The study review articles were then identified by the first reviewer (BG) and screened for duplicates. Level one screening was completed by the first reviewer (BG) through screening of titles while screening of titles and abstracts at level two was completed by the first (BG) and a second reviewer (MO) independently. *An assumption made at this stage was that the engagement and sharing of articles with the co-supervisor after level one screening was equivalent to a level two screening where two people are expected to review the articles' titles and abstracts and that the co-supervisor's silence implied consent.* The full texts of eligible articles were then retrieved and reviewed independently by reviewer one (BG) and the exclusions made and reported with reasons. From the studies suited for inclusion in qualitative analysis, the variables and reported outcomes were assessed for heterogeneity to isolate studies suited for inclusion in the quantitative analysis/meta-analysis.

## Quality Assessment

Quality assessment of the selected articles was conducted in accordance to the recommendations of an assessment tool originated by Center for Reviews and Dissemination (CRD) (Boland et al., 2014). The dimensions assessed were based on reported outcomes, external and internal validity of selected studies as shown in *Table III*. Choice of the tool was informed by the study design of selected articles while the process assessment was presumed to be synonymous with evaluation of the study's procedure.

## Analysis

To extract data from the selected articles, a narrative analysis was conducted while table grids adopted from (Boland et al., 2014) were prepared as shown in *Table II and IV*. A summary of the quantitative study results was also prepared as shown in *Table V*.

From the study characteristics, elements that were extracted are as follows: specific studies arranged in a chronological order, year when the studies were conducted, country, trial setting, commercial disclosures and conflict of interests. Under the qualitative information matrix, the information extracted was in respect to reviewed interventions and these comprised the specific study, setting, study design, key intervention, subsidiary intervention, health system building block most relevant to the intervention, comparison groups, predictors of uptake and the preferred option within the intervention. The qualitative information is presented in *Table IV*. In respect to the quantitative information, data extracted comprised the specific study, study design, sample size, reported outcomes, measure of effects, and a summary of the reported findings as shown in *Table V*. A critical interpretative analysis of the qualitative information was conducted along emerging themes as demonstrated in *figure 2* while meta-analysis of the quantitative information was conducted using the weighted average method with the various sample sizes employed to compute applicable weights.

## RESULTS

### Search Results:

9626 citations were identified through combined search of the databases. After elimination of duplicates, 7364 potential citations were identified. At level one screening, 7333 citations were excluded after review of titles for relevance to the research question. 31 articles qualified for level 2 screening from which 21 articles were excluded after review of titles and abstracts leaving 10 citations that were eligible for the full-text examination. Subsequently, this resulted into elimination of four articles based on appropriateness of intervention, relevance of the study population, type of evidence reported, and one article was excluded based on the acceptability criterion. Six citations were retained for qualitative analysis (Kelvin et al., 2019) (Strauss et al., 2018a) (Kelvin et al., 2018a) (Kelvin et al., 2018b) (Romo et al., 2018) (Strauss et al., 2018b). Subsequently, two citations were assessed to be heterogenous in respect to the reported findings leaving four citations for quantitative analysis.

### Summary of the Study Characteristics:

One study was a randomized controlled trial on the use of text messaging to communicate accessibility of oral HIV testing to truckers (Kelvin et al., 2019), two citations were discrete choice experiments on testing preferences amongst truckers (Strauss et al., 2018a, Strauss et al., 2018b), one study was a randomized controlled trial on oral HIV self-testing (Kelvin et al., 2018a), one study utilized data from a randomized controlled trial to investigate the predictors of uptake of oral HIV testing amongst truckers (Kelvin et al., 2018b) while one study utilized data from a randomized controlled trial to interrogate psychosocial characteristics as drivers on health seeking behaviors and uptake of HIV testing (Romo et al., 2018). Notably, all the studies were conducted along the transport corridors in Kenya within roadside wellness clinics run as an intervention by North Star Alliance as illustrated in the study characteristics in *Table II (Alliance, 2012)*.

### Summary of the Quality Assessment:

Using a quality assessment tool originated by Center for Reviews and Dissemination (CRD), three dimensions to the included studies namely reported outcomes, external and internal validity were assessed as shown in *Table III (Boland et al., 2014)*. The quality assessment dimensions were based upon 16 aspects modelled around randomization, blinding, baseline comparability of the studies and the level of participation. From the six studies included in the review, 61.46% of these aspects were appraised as complete, 11.46% as partially fulfilled while 27.08% were absent. Overall, although there were no defined cutoffs to merit the quality assessment, this can be termed as a satisfactory appraisal.

## Summary of Results:

### Narrative Account of the Findings.

In the randomized controlled trial evaluating the use of text messages to communicate availability of oral HIV testing to truckers, there were 2262 participants with a mean age of 35.3 years (Kelvin et al., 2019). 84.9% were drivers while their assistants accounted for a proportion of 15.1%. 76.3% of the participants reported having a partner while 73.1% detailed having tested for HIV within the past 12 months with the mean testing time being 5.9 months. From the participants randomized between standard of care (HIV blood test through finger prick and a single regular text message) and the intervention groups (text messages sent on three instances with a modified message), those in the intervention group demonstrated a higher likelihood of testing after the messaging intervention (OR = 2.7, 1.3 – 5.5: 95% CI and  $p = 0.009$ ). After accounting for self-reported HIV self-testing, there was a reported increase in the association (OR = 3.2, 1.6 – 6.5: 95% CI and  $p = 0.002$ ). The clinic contact between participants in the enhanced standard of care group (participants from the standard of care group to whom the regular text message on availability of HIV testing services was sent on three instances) and those in the intervention group did not yield a statistically significant association even after inclusion of those who reported to have self-tested. Similarly, the association between participants in the standard of care and the enhanced standard of care groups did not yield a statistically significant association which may be indicative of effectiveness of the modified message communicating availability of HIV testing services in the intervention group. From the intervention group, 64.5% of the participants chose the HIV self-test with 70.0% of them preferring providers' supervised testing, 25.0% electing home-based self-testing while 5.0% exhibited indifference between provider supervised self-test and the home-based testing.

The discrete choice experiment that comprised four distinct categories investigating preferences on HIV testing among truckers had 305 participants with an equipose mean and median age of 37 years (Strauss et al., 2018a). Reported median time on transit was 22 days and only 2 participants reported having previously self-tested. Four aspects namely telephonic counselling, a three-hour test, a service fee above \$3.0 and onsite testing at the company office were all demonstrated to decrease the likelihood of preferring a testing option with the strongest association being registered with the user fee as illustrated in the measures of effects respectively: [ OR = 0.881, 0.809 – 0.959: 95% CI and  $p=0.003$ ; OR = 0.776, 0.671 – 0.898: 95% CI and  $p= 0.001$ ; OR = 0.351, 0.297 – 0.415: 95% CI and  $p=0.001$ ; OR = 0.826, 0.714 – 0.955: 95% CI and  $p=0.010$  ]. When testing time was reduced to 20 minutes, there was a reported increase in the likelihood of testing [OR = 1.172, 1.012 – 1.357: 95% CI and  $p= 0.034$ ]. Home based testing and offering incentives to test did not yield statistically significant results. The aspects around which there was demonstrated interaction amongst the models were history of testing versus never having tested and regular testing versus irregular testing; with the overall effect from the interaction

models being multiplicative. History of not having tested bore an increased likelihood of preferring oral testing [OR = 1.598, 1.1 – 2.4: 95% CI and p= 0.009] while a history of testing demonstrated indifference on the choice between finger prick and oral tests. Regarding testing, history of not having tested positively influenced telephonic counselling [OR= 2.033, 1.4 – 3.4: 95% CI and p= 0.001] while a history of testing negatively influenced telephonic counselling [OR= 0.833, 0.3 – 0.8: 95% CI and p= 0.001]. On the attributes of service delivery, regular testers were influenced by time/duration of the test and user fee while they demonstrated indifference on type of test, mode of counselling, location and mode of administration of the test. Conversely, non-regular testers demonstrated preference on finger prick blood test, in-person counselling, on-site testing at roadside clinics and a free of charge service which were among the baseline elements within the study that were suggestive of self-efficacy as a critical component in the choice of a test. Risk factors that exhibited interaction with uptake of HIV testing were procurement of the services of sex workers, multiple sexual partners and inconsistent condom usage. Finally, testing at a roadside clinic demonstrated similarities in preference of testing with other testing sites.

In the secondary study utilizing data from a randomized controlled trial to investigate levels of self-efficacy and predictors of uptake on the choice of HIV testing amongst truck drivers, 149 participants were enrolled (Kelvin et al., 2018b). The mean age of the study group was 37.07 years of whom 38.26% reported to have obtained a secondary school education. Approximately 75% of the truckers were average earners [\$240 - \$550] while 82.99% reported to be married. 48.3% were accounted to have a partner on the trucking route despite being married, 52.86% had procured sex within 6 months and 15.26% were reported to be regular condom users within the past six months. Participants who had never tested for HIV were 10.07% while the average testing time was 4.74 years. On the psychosocial characteristics, there was a low score on anticipated stigma, gender equity, fatalism and sensation seeking. Preference on self-testing was markedly high at 56.38% as compared to provider administered blood test that was reported at 23.49% with the results being comparable across all the demographic variables. From the risk factors, only alcohol consumption was associated with HIV testing with half of the participants, 51.68%, reportedly having consumed alcohol in the past one year. Non-consumption of alcohol was associated with refusal to test at 25% and preference on provider-initiated testing at 29.17% which may be indicative of overconfidence and high optimism amongst the teetotalers while alcohol consumption was associated with preference on self-testing at 66.23% [ OR= 2.32, 1.04 – 5.19: 95% CI]. Apart from gender equity and fatalism, none of the other attitudinal attributes had remarkable association with the choice of HIV testing. The choice of provider administered test and self-test were based on fatalism and gender equity respectively. Notably, increased sense of fatalism lowered the likelihood of opting for a HIV self-test. From the participants who chose HIV self-test, in respect to self-efficacy, based on the criterion of complete performance, need for guidance and need for corrective measures, the reported distributions were 52.38%, 47.61% and

13.10% respectively. The corrective measures were attributed to impatience and interpretation of results. Notably, 97.4% of the participants sought the presence of providers while conducting the self-test which was explained by anticipated stigma [OR= 1.64, 1.03 – 2.61; 95% CI] and fatalism [OR= 1.06, 1.03 – 1.08; 95% CI]. However, gender equity was associated with high efficacy in the conduct of a self-test.

In the randomized controlled trial on HIV self-testing amongst truck drivers, 305 participants were randomized to the standard of care option that comprised provider administered blood test or the choice option that comprised provider administered blood test, supervised oral self-test and self-administered oral test (Kelvin et al., 2018a). The mean age of the participants was 37.0 years. On education and income, 66.7% of the participants had lower than secondary school education while 27.8% earned less than \$235. The average time on transit per month was reported as 22 days while average years of working was detailed as 8.7 years. Sexual activity in the last six months was reported by 98% of the participants. On (extra-)marital status, 83.1% reported being married while 46.6% detailed as having intimate partners along the trucking route. Of the 55.9% who had procured sex, only 14.1% were reported to have used condoms in the past 6 months. Majority of the participants, 91.8%, had a history of HIV testing with the mean testing duration being 1.1 years. Home based testing was associated with 2.8 times increased likelihood of testing [OR= 2.8, 1.5 – 5.4; 95% CI and p= 0.002] while the proportion that preferred supervised self-testing was 54.5%. The choice of provider administered test could be explained by low self-efficacy on participants and high trust on providers in administering the test correctly while choice of supervised oral test was mainly driven by curiosity of a new product. Preference on home-based testing was explained by self-efficacy, access to moral support/ social capital, confidentiality and convenience availed by the HIV self-test.

The fifth study utilized data from a randomized controlled trial to probe psychosocial attributes associated with health seeking behaviors and HIV testing amongst truck drivers (Romo et al., 2018). 305 male participants were recruited into the study with 66.9% being below the age of 40 years. 64.3% had not obtained a secondary school education while 72.2% reported an average monthly income of \$240. On the number of working years, 64.3% reported less than 10 years. Testing for HIV within the past six months was reported by 48.2% while 91.8% reported having a history of HIV testing. At baseline, 80% of the participants agreed to a HIV test while 56% were tested during follow up. On psychosocial attributes, anticipated stigma was high among those who had never tested while self-efficacy was greater amongst participants with more than the average income and more than 10 years of working. Fatalism was associated with lack of a religious identity, low income, being married and less than 10 years of trucking. Gender equity was linked to higher levels of education, high income, being married and admission into follow-up testing. Sensation seeking was reportedly high amongst low earners and amongst truckers who reported less than 10 years of working. Remarkably, only self-esteem was associated

with a history of HIV testing. Within the psychosocial variables, interaction was reported between sensation seeking and self-efficacy and between gender equity and fatalism. On testing behaviors, anticipated stigma and self-esteem were associated with a history of testing as shown in the measures of association respectively; [OR= 0.73, 0.60 – 0.89: 95% CI and p= 0.002; OR= 1.11, 1.01 – 1.23: 95% CI and p= 0.029]. Baseline testing was high amongst truckers with high scores on sensation seeking while it was negatively associated with gender equity as shown in the measures of association respectively [ OR= 1.14, 1.00 – 1.30: 95% CI and p= 0.049; OR= 0.96, 0.93 – 1.00: 95% CI and p= 0.032]. Testing into the follow-up was only associated with self-esteem [ OR= 1.06, 1.00 – 1.12: 95% CI and p= 0.038].

Finally, the last study was a discrete choice experiment that investigated the congruence between reported choice on HIV testing and the actual pick during testing (Strauss et al., 2018b). Amongst the 150 participants, 96.6% reported being sexually active with 48% reportedly having sexual partners along the transport corridors despite being married. Condom usage within the past six months was reported amongst 11.3% participants out of the 50% who admitted to procuring sex from sex workers. On testing, 90% of the participants had a history of testing for HIV with the mean testing time being 1.1 years. Overall, testing during follow-up was lower than baseline testing with the provider administered testing recording higher popularity amongst the participants at both steps, which may be indicative on the necessity for self-efficacy in self-testing. In terms of counselling and location, participants preferred in-person counselling as opposed to telephonic counselling while access to services at the roadside clinic was preferred over company's office. However, there was indifference on homebased testing over the other options. Waiting time and cost were negatively associated with the uptake of HIV testing. Notably, incentives were not predictors on the uptake of HIV testing. On the type of test, oral test was preferred as a self-test over finger prick blood test while in the case of provider administered test, a finger prick blood test was preferred to an oral test. After accounting for interactions, the findings demonstrated indifference on the preferences for self-administered and provider administered tests. The stratification was along preferred type of test at baseline. These findings demonstrate consistency with results from the other studies.

From the narrative account of the findings, the emerging themes were: risky sexual behaviors; access to HTC services; use of approaches grounded on strong theoretical basis in HIV/AIDS programming; innovative approaches to the scale up HTC services that comprise use of technology in health messaging and HIV self-testing that consist of home-based testing and oral HIV testing; barriers to access of HTC services that consist individual, structural, societal and institutional barriers; and the economic impact of HIV/AIDS.



## Meta-Analysis.

From the analysis of study results, findings from four citations (Kelvin et al., 2019, Kelvin et al., 2018a, Strauss et al., 2018a, Strauss et al., 2018b) demonstrated homogeneity in respect to the reported outcomes for inclusion in the meta-analysis as illustrated in the overlap of all confidence intervals in *figure 3*. Profiled studies had a component that compared the preference of oral HIV testing over standard of care finger-prick HIV blood tests. The combined analysis was appraised as viable in explaining the potential of oral tests in enhancing uptake of HIV testing amongst truckers.

Meta-analysis was conducted through the weighted average method as demonstrated below.

An assumption made at this stage was that the population sizes would serve as respective weights for the various studies. That is, 2262, 305, 305 and 150 respectively. Accompanying measures of effects were: OR = 2.7, 1.3 - 5.5: 95% CI and p= 0.009; OR = 1.5, 1.1 - 2.4: 95% CI and p= 0.009; OR = 2.8, 1.5 - 5.4: 95% CI and p= 0.002; OR = 1.26, 1.1 - 1.5: 95% CI and p= 0.005 as summarized in *Table V*.

Formulae: Weighted Average =  $\sum [ \text{Estimate} \times \text{Weight of Individual Study} ] / \text{Sum of Weights}$

Weighted Average Odds Ratios =  $\sum [ 2.7 \times 2262 + 1.5 \times 305 + 2.8 \times 305 + 1.26 \times 150 ] / 3022 = 2.5$

The resultant odds ratio implies an overall likelihood of 2.5 times increase in HIV testing amongst the truckers with access to oral HIV tests. The observation does not distinguish whether the test is self, or provider administered which can be interpreted to denote preference on the features of an oral HIV test that makes it convenient and user-friendly.

## Ethical Considerations:

The study utilized secondary information from published and gray literature; therefore, no formal ethical approval was required to conduct the review (Boland et al., 2014). However, the conduct of the review was in strict compliance to the recommendations on conduct of a systematic review as advanced by the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) statement (Boland et al., 2014, Tacconelli, 2010). In addition, the study can be argued to be in strict observance of select general ethical principles as recommended by the International Ethical Guidelines for Epidemiological Studies (1991). These comprise the principle of beneficence that proscribes the conduct of research for human benefit (1991). The review study is intimated to cause for a regional transition in HIV/AIDS programming targeted at truckers within East Africa with an overall goal of reducing HIV burden within this group. Another inherent principle is distributive justice that recommend an outlook on equity in the conduct of research (1991). The current study is targeted at truckers within a low-resource setting of East Africa. Trucking as an occupation has also been established to bear a disproportionate burden of HIV/AIDS besides being male dominated and hence the demographic fits the description of an underserved key population in HIV/AIDS response; that demand tailor-

made and targeted response, the goal of our study. Finally, the conduct of the study was preceded by preparation of a protocol detailing key steps in the conduct of the review which was submitted for approval by the supervisor.

## DISCUSSION

Globally, transport is appreciated as an integral component to economic development (Regondi et al., 2013). However, the trucking industry has also demonstrated a strong association with the spread of HIV and sexually transmitted infections (Pandey et al., 2011). This vulnerability is further correlated to the distance travelled and length of stay away from home which is consistent with established knowledge on migration as a social determinant of health (Pandey et al., 2011, Skolnik, 2017, Organization, 2005). In addition, the scenario presents an exceptional challenge in what has been tagged as the 90-90-90 agenda that seek to cause for the identification of 90% of all HIV infected persons, place 90% of the positively identified under treatment and attain viral suppression in 90% of the people on treatment (UNAIDS, 2010, UNAIDS, 2014). This presenting challenge has partly been explained by the formation of pockets of concentrated epidemics attributed to the trucking occupation as observed with the patient turnout in a roadside wellness clinic intervention where 40% of 220,000 patients were detailed as truckers and sex workers (Lippman et al., 2018, Alliance, 2012) (UNAIDS, 2010, Muhammad Ahmed and Babar Tasneem, 2015); the evidence base upon which this study sought to build on.

Utilizing the inclusion criteria to sift through citations identified from the search process (Boland et al., 2014), six articles were considered for inclusion in the qualitative analysis while four articles were accommodated in the meta-analysis after accounting for heterogeneity; an indication on the limited body of knowledge on truckers as a key population within our study setting (Malta et al., 2006). In addition, most studies on occupations associated with elevated risk of HIV infection and transmission are reported as a-first (Ijeoma et al., 2018, Botao et al., 2016) yet their knowledge on and about HIV/AIDS remain poor (Botao et al., 2016). This low level of knowledge base has been accredited to barriers reported at individual, institutional and societal levels which makes truckers a key target-population on HIV/AIDS response (Pandey et al., 2011). Moreover, most HIV/AIDS programs targeted at key populations have overly concentrated on sex workers and injectable drug users hence truckers, reported major clients of the sex workers, experience low exposure to HIV/AIDS interventions and where contact has been reported, it is detailed as not tailor-made to meet their exceptional needs as exhibited by the great variations in effectiveness of deployed HTC strategies beyond the explanations that would be offered by the background prevalence (Pandey et al., 2011, Grabbe et al., 2010). For instance, in India, one of the countries with many truckers, six million truckers are reportedly not exposed to a HIV/AIDS intervention program (Pandey et al., 2011). Such a scenario warrants interrogation of HIV/AIDS programming targeted at truckers. Within our study setting, the limited knowledge base is demonstrated by confinement of included studies to one country under the review period (Kelvin et al., 2019, Kelvin et al., 2018a, Kelvin et al., 2018b, Romo et al., 2018, Strauss et al., 2018a, Strauss et al., 2018b).

As exemplified by the study findings, trucking is observed as a male dominated occupation which compounds the low uptake of HIV/AIDS services owing to documented poor health seeking behaviors amongst men (Kelvin et al., 2019, Kelvin et al., 2018a, Kelvin et al., 2018b, Romo et al., 2018, Strauss et al., 2018a, Strauss et al., 2018b). Notably, despite the global HIV testing rates falling far below the necessary levels to impact an epidemic, men are reported to test half as-frequent-as women (Lippman et al., 2018). Further, only 40% of HIV positive men are reported to have knowledge of their status with one third of men aged between 15 – 49 years, the age bracket of our study participants, reported to have never tested for HIV (Lippman et al., 2018). This scenario presents an interesting conversation on gender dynamics and health as accounted by (Shattuck et al., 2013, Fleming et al., 2016, DiCarlo et al., 2014). Evidently, there are multiple dimensions to the arguments of our discourse and this presents the need for multiple approaches to existing HTC strategies to meet the requirements of various groups and achieve the HIV prevention, care and treatment goals as conceived in various global commitments (Grabbe et al., 2010, UNAIDS, 2010, UNAIDS, 2014). Towards this, the study findings shall be considered along emerging themes to establish areas of harmonization and joint improvement on HIV/AIDS programming within East Africa. Under the broad categories of intervention areas, predictors of uptake and preferred type of service, the emerging themes are: Innovative approaches to HTC services that comprise use of technology in communication and HIV self-testing as sub-themes; access to HTC services although anchored on WHO's framework of health access (Evans et al., 2013, Lars Dahlgren, 2018), was considered exceptional since it concerns truckers as a special group; economic impact of HIV amongst truckers although rather an off the cuff inclusion, resonates with the age demographic of most truckers and offers direction on the age bracket to focus HIV interventions targeted at truckers; barriers to HIV testing were abstracted along individual, institutional, societal and structural levels; reported risky behaviors and use of approaches grounded on strong theoretical basis in HIV testing and counselling.

### Reported Risky Behaviors Amongst Truckers

From the study findings, it is evident that truckers experience a higher rate of HIV infection and transmission than the general population. This is largely accredited to select risky sexual behaviors within this demographic. Some of the reported risky sexual behaviors that occasion the high incidence of HIV amongst truckers within the East African transport corridors are procurement of the services of sex workers, inconsistent condom use and multiple sexual partners that comprise having intimate partners along the trucking route (Strauss et al., 2018a, Kelvin et al., 2018b). For instance, amongst participants in the included studies, condom usage over a duration of 6 months was reported as between 11% to 16% by truckers who acknowledged to procuring sex (Kelvin et al., 2018a, Kelvin et al., 2018b, Strauss et al., 2018b). In addition, alcohol consumption was isolated as a behavior that contribute to increased risk of HIV infection owing to its inhibitive attributes (Kelvin et al., 2018b). These findings demonstrate consistency with established knowledge on risk of HIV infection and

transmission amongst migrant populations (Organization, 2005). Notably, the exposure arises from high-risk areas along the transport corridors that are referred to as hot spots (Organization, 2005). Similarly, the sexual patterning of the truckers along these areas demonstrate an elevated risk than within the general population (Morris and Ferguson, 2007, Pandey et al., 2011). Despite the fact that risky sexual behaviors are demonstrated to be associated with higher levels of testing, exposure to HIV prevention programs is documented to be lower than the critical levels required to impact an epidemic (Pandey et al., 2011). Conversely, in one of the studies investigating levels of self-efficacy as a predictor of uptake of HTC services, 25% of the participants who were reported to have not consumed alcohol were also associated with a low uptake of HTC services which introduces an interesting dimension on the role of optimism and over-confidence in the uptake of HTC services (Kelvin et al., 2018b, Botao et al., 2016). In addition, the risky sexual behaviors are also observed to be associated with low levels of risk perception which confers a tragic scenario to the actual risk of HIV infection (Valway et al., 2009, Shattuck et al., 2013, Napierala Mavedzenge et al., 2013).

### Access to HTC Services

According to the World Health Organization, there are three dimensions to access of healthcare namely physical accessibility, acceptability and financial affordability (Evans et al., 2013). This is envisioned in the universal health coverage agenda that seek to guarantee health services to all without inviting financial burden from out-of-pocket payments (Evans et al., 2013). Owing to the nature of trucking occupation, truckers experience challenges on access to HTC services and subsequent linkage to care and treatment in almost all the dimensions of access as exemplified by our study findings. On physical accessibility, the aspect of reasonable reach is compromised for truckers due to location of health facilities within the transport corridor (Evans et al., 2013, Kelvin et al., 2019, Kelvin et al., 2018a, Kelvin et al., 2018b, Romo et al., 2018, Strauss et al., 2018a, Strauss et al., 2018b). On the financial dimension to health access, affordability, which has been suggested as a component of household income and the health-financing systems accounts for incurred direct and indirect costs to estimate ability of people to pay without inviting financial burdens (Evans et al., 2013). In respect to our review, a cost above \$3 demonstrated a negative association with uptake of HTC services (Strauss et al., 2018a, Strauss et al., 2018b). This demonstrates willingness to pay up to a certain threshold after which any additional cost becomes an opportunity cost to the various aspects of the truckers' livelihoods. In addition, the low levels of disposable income that truckers would be willing to devote for procurement of health services is explained by their low levels of income which averages at about \$240 (Kelvin et al., 2018a, Strauss et al., 2018a, Strauss et al., 2018b). Finally, the other component comprises acceptability which denote the level to which services resonate with desires and preferences of the clients (Evans et al., 2013). Acceptability can further be interrogated along individual attributes that predict uptake of HTC services. These include attitudinal attributes such as fatalism, anticipated stigma, sensation seeking and self-esteem (Kelvin et al., 2018a, Kelvin et al.,

2018b, Romo et al., 2018). Other attributes that augment acceptability include confidentiality, convenience, waiting time and social support besides societal constructs such as gender equity (Kelvin et al., 2018a, Kelvin et al., 2018b, Romo et al., 2018). Notably, the attributes that define acceptability appear to be highly influenced by social determinants of health such as education, income and social capital as illustrated in the study findings (Kelvin et al., 2018a, Kelvin et al., 2018b, Romo et al., 2018, Skolnik, 2017) and create the need for other support services such as counselling and psychosocial therapies (Kelvin et al., 2018a, Kelvin et al., 2018b, Romo et al., 2018). The WHO editorial also points to cultural and social accessibility which require consumers of health services to be attended with respect and dignity (Evans et al., 2013).

### Use of Approaches Grounded on Strong Theoretical Basis in HTC Services

In respect to the study findings, several observations resonate with established theoretical approaches as derived from reported associations. These include self-efficacy as observed from studies evaluating the choice of tests and HIV self-testing. As a theoretical approach, self-efficacy applies where the intention is to obtain changes in the levels of knowledge (Nutbeam et al., 2010). Similarly, it is also associated with the outcomes in behavior change interventions (Nutbeam et al., 2010). From the study findings, the preference to have presence of a provider while conducting a HIV self-test resonates with low levels of self-efficacy (Kelvin et al., 2019, Kelvin et al., 2018a, Kelvin et al., 2018b, Strauss et al., 2018b). Self-efficacy is also demonstrated to be associated with the psychosocial attributes where anticipated stigma and fatalism are reported to have a 1.64 and 1.06 likelihood of increasing the uptake of HIV self-test respectively (Kelvin et al., 2018b). In addition, the conduct of research using data from randomized controlled trials in the discrete choice experiments argues for market based approaches that are grounded on the principle of utilitarianism in building up evidence on HIV/AIDS related services where health services are considered as products (Kelvin et al., 2018a, Kelvin et al., 2018b, Romo et al., 2018, Strauss et al., 2018a, Strauss et al., 2018b). The use of text messaging to announce availability of HTC services can equally be argued to be grounded on conjectures revolving around communication in health (Kelvin et al., 2019, Nutbeam et al., 2010). Finally, stigma is arguably founded on a strong social concept while the other individual attributes equally oscillate around social constructs (Kelvin et al., 2019, Kelvin et al., 2018a, Kelvin et al., 2018b, Romo et al., 2018, Strauss et al., 2018a, Strauss et al., 2018b, Lars Dahlgren, 2018).

### Innovative Approaches to HTC Services

#### Use of Technology such as Short Messaging Services (SMSs) to Communicate Availability of HTC Services

According to (Nutbeam et al., 2010), this strategy has been defined as social marketing and involves deployment of market strategies to influence choices. Based on communication for behavior change model, the impact of messaging intervention was evident from the study results (Kelvin et al., 2019, Nutbeam et al., 2010).

In the messaging intervention, the reported findings indicated a 2.7 times increase in the likelihood on uptake of clinic based HTC services and a 3.2 times increase in the likelihood on uptake of HTC services after accounting for the self-reported cases (Kelvin et al., 2019). One of the predictors of uptake of HTC services being indirect costs incurred to access the service, this demonstrates potential of the opportunities that lie behind taking advantage of the high mobile phones penetration in developing countries to navigate the complex barriers to access (Kelvin et al., 2019). Other studies have demonstrated consistency with these findings (de Tolly et al., 2012, Conserve et al., 2016).

### [HIV Self-Testing: \[Oral HIV Testing and Home-Based Testing\]](#)

HIV self-testing has been defined as any form of testing where an individual collects a sample by themselves, performs a rapid diagnostic test and becomes the first to learn of their results (Napierala Mavedzenge et al., 2013). The test can take the form of an oral HIV test or a self-administered finger prick blood test (Krause et al., 2013). This is considered as a revolutionary approach aimed at scaling up the uptake of HTC services and offers solution to various aspects that have been regarded as a challenge in the traditional HTC arrangement; namely, convenience, cost and confidentiality (Napierala Mavedzenge et al., 2013). From the study findings, the potential of HIV self-testing in enhancing uptake of HTC services amongst truckers is evident from the reported popularity. For instance, in the intervention evaluating impact of text messaging on uptake of HIV services, 64.5% of truckers opted for self-testing which is consistent with other findings that have equally demonstrated a high preference on this option as influenced by attributes such as alcohol consumption, gender equity and self-efficacy (Kelvin et al., 2018b). Notably, convenience and confidentiality were observed as pertinent attributes on the preference for HIV self-testing amongst truckers owing to affiliated risk factors such as unbecoming sexual behaviors and alcohol consumption that elevate their uncertainties regarding HIV status and destabilize their other psychosocial traits (Kelvin et al., 2019, Kelvin et al., 2018a, Kelvin et al., 2018b, Romo et al., 2018, Strauss et al., 2018a, Strauss et al., 2018b). When carefully considered to account for inherent shortcomings associated with self-testing, this option is touted as a formidable solution to the inadequate levels of HTC services in low-resource settings and among high risk populations such as truckers (Napierala Mavedzenge et al., 2013).

#### *Oral HIV Testing*

Oral HIV testing has been described as a rapid diagnostic test that involves collection of a sample from the mouth using an oral swab (Napierala Mavedzenge et al., 2013). It is also referred to as an oral fluid test (Napierala Mavedzenge et al., 2013). Technically, this form of testing is more user friendly than the blood test and does not pose a challenge in medical waste disposal that comprise biohazardous material and sharps involved in the finger prick HIV blood test (Napierala Mavedzenge et al., 2013). In addition, it is touted to

achieve high accuracy although reported to have lower sensitivity as compared to the blood test (Napierala Mavedzenge et al., 2013). With the knowledge base on HIV status reported to be lower than the expected level to impact an epidemic; more so, amongst high risk populations such as the truckers, oral HIV testing is observed as an innovative alternative towards the 90-90-90 HIV/AIDS goal (Botao et al., 2016, UNAIDS, 2014). From the review findings, the discrete choice experiment investigating preference on HIV testing reported a 1.598 times increased likelihood of testing using the oral HIV test amongst truckers who reported to have no history of testing (Strauss et al., 2018a). In this respect, oral HIV test is observed as a suited entry point to care and treatment for truckers who may have no history of testing. These observations resonate with the findings of the meta-analysis where results from four studies demonstrated a combined effect of a 2.5 times increased likelihood in uptake of HIV testing with access to oral HIV tests (Kelvin et al., 2019, Kelvin et al., 2018a, Strauss et al., 2018a, Strauss et al., 2018b).

### *Home-Based Testing*

In respect to self-testing, home-based testing accounts for the location where the test is performed without discriminating whether it is an oral or self-administered finger prick blood test (UNAIDS, 2014, UNAIDS, 2010, Napierala Mavedzenge et al., 2013). This is observed to harness confidentiality, convenience and social support as exemplified by the study findings that reported an absolute preference of 25% amongst participants who were offered an option on HIV self-testing (Kelvin et al., 2019). In the randomized controlled trial on HIV self-testing, home-based tests were observed to increase the likelihood of testing amongst truckers by 2.8 times (Kelvin et al., 2018a). However, in one of the discrete choice experiments, there was a reported indifference on the preference and actual pick in the type of tests when participants were offered choices on HIV testing (Strauss et al., 2018b) while in another study, testing at a roadside wellness clinic was observed to bear the same preference with other testing sites (Strauss et al., 2018a). This raises the need for further interrogation of the specific features of a testing site that would make it desirable for the target population to realize increased uptake of HTC services.

### *Barriers to HIV Testing and Counselling Services*

Owing to their disproportionate vulnerability and risk, truckers warrant a targeted approach to subdue the bottlenecks that hinder effective response (UNAIDS, 2014, Pandey et al., 2011). In this respect, limited access to HTC services has been isolated as one of the barriers increasing the vulnerability of truckers to HIV/AIDS (Regondi et al., 2013). For instance, in one of the surveys conducted along Mombasa – Kampala highway, HTC services were established to be available in one third of the centers within the hotspots with the hours of operation being equally limited (Regondi et al., 2013). Other barriers that have been isolated by UNAIDS include stigma, homophobia, policy barriers and legislative barriers among others (UNAIDS, 2010). These present an exceptional challenge in the roll-out of HTC services; more so, within high risk populations that are



disaggregated such as the truckers. Majorly grounded on the dimensions of access to healthcare, these obstacles can be grouped into individual, institutional, societal and structural barriers as perceived and explained within environmental and social contexts by the socio-ecological model (Kelvin et al., 2016) (Evans et al., 2013). Further, these barriers may be related to the general uptake of HTC services or they may be associated with a specific modality within HTC testing as illustrated by the review findings (Kelvin et al., 2018a, Kelvin et al., 2018b, Romo et al., 2018, Strauss et al., 2018a, Strauss et al., 2018b).

## Individual Barriers

These account for personal attributes that inhibit the uptake of HTC services and are mainly cognitive and affective in nature (Kelvin et al., 2016, Evangeli et al., 2016). From our review findings, these barriers majorly revolve around psychosocial, behavioral and attitudinal characteristics that include anticipated stigma, fatalism, sensation seeking and alcohol consumption besides self-efficacy which would be associated with other factors such as the level of education (Kelvin et al., 2018b, Romo et al., 2018). Notably, their level of influence on uptake of HTC services is observed as relative since this largely depends on the scale of an individual attribute where low level of anticipated stigma for instance would be associated with increased uptake of HTC services while high levels of the same attribute would be inhibitive on the uptake of HTC services. From the study findings, consumption of alcohol was associated with uptake of HTC services amongst 51.68% of the truckers with a 2.32 increased likelihood of preferring a self-test while non-consumption of alcohol was associated with uptake of HTC services amongst 25% of the truckers (Kelvin et al., 2018b). Similarly, anticipated stigma was associated with 1.64 increased likelihood of preferring the presence of a provider while conducting a self-test while fatalism was associated with 1.06 increased likelihood of preferring the presence of a provider (Kelvin et al., 2018b). In respect to the dynamic nature in which the psychosocial attributes are observed to influence the uptake of HTC services, these findings are consistent with other studies. Stigma was observed to influence a reduction in uptake of HTC services by 27% while self-esteem had a 1.11 increased likelihood of enhancing the uptake of HTC services and a 1.06 increased likelihood of influencing the uptake of testing into the follow-up whereas sensation seeking was associated with a 1.14 increased likelihood of uptake of HTC services at baseline (Romo et al., 2018). These observations demonstrate the need to contextualize the design of HIV/AIDS related services since the level to which the attributes influence uptake of HTC services is quite dynamic and a deep understanding of an intervention group to decipher how each attribute influences them is paramount. In this respect, it is not unusual to observe sharp contrasts in findings on individual barriers. Trucking as a male dominated occupation would also augment the need to interrogate intrapersonal dynamics associated with health seeking behaviors amongst men (Kelvin et al., 2016).

## Institutional Barriers

Institutional barriers are largely a component of the health systems' arrangement within a context and account for factors affiliated to healthcare access and efficiency of a system that makes the services appealing to the target market (Conserve et al., 2016). From our review findings, affiliated barriers include service charge where a fee above \$3 was demonstrated to be associated with a reduction in uptake of HTC services by 64.9%, being the strongest association reported on institutional barriers (Strauss et al., 2018a). Other factors include waiting time where a reduction in waiting time to 20 minutes demonstrated increased likelihood of testing by 1.172 times (Strauss et al., 2018a). Notably, user fee and waiting time are the only components that were associated with truckers who reported to test regularly (Strauss et al., 2018a). In regard to location, onsite testing in a company office was less preferred which would make an argument in the trade-off between confidentiality and convenience to demonstrate the high premium placed on confidentiality in HIV testing (Strauss et al., 2018a). Notably, telephonic counselling was also observed to be negatively associated with uptake of HTC services which is consistent with an international policy that recognized in-depth-pretest counselling as a barrier in HTC scale-up (Napierala Mavedzenge et al., 2013). Similarly, in the study investigating self-efficacy as a predictor of HIV self-tests, among the 13.10% who were reportedly in need of corrective measures as an indicator of their low level of self-efficacy, this was largely attributed to impatience which demonstrates the significance of waiting time in the administration of a HIV test (Kelvin et al., 2018b). This resonates with the three dimensions to health access where location would argue for physical accessibility, user fee for financial affordability, waiting time and type of counselling for what is acceptable amongst the truckers as a target population (Evans et al., 2013). In addition, there is the perception of healthcare arrangements and the design of services in most poor-resource settings as gendered; with the health systems policies touted to confer preference on women over men (Fleming et al., 2016). This is exemplified in the durations of contact with the healthcare systems which avail more opportunities for women to access HTC services during antenatal care and while attending to their children's healthcare needs (DiCarlo et al., 2014). However, in the randomized controlled trial evaluating the impact of text messaging on uptake of HTC services, clinic contact was established to have no significant association with uptake of HTC services which confers an interesting dimension to the conversation on how men in the trucking occupation can be incentivized to scale up their uptake of HTC services bearing in mind that one of the studies established financial incentives to have no significant association with the uptake of HTC services (Kelvin et al., 2019, Strauss et al., 2018a).

## Societal Barriers

At the population level, there are established cultures and norms that would make it challenging for truckers to seek or access HTC services. More so, in relation to trucking as a male dominated occupation (Regondi et al.,

2013). For instance, hegemonic masculinity diminishes the constructive roles of men in sexual and reproductive health and poses a challenge in the uptake of HTC services amongst this group (Regondi et al., 2013). This is consistent with published studies that have reported men as less likely to seek healthcare and HTC services (Fleming et al., 2016). Notably, in as much as masculinity would be argued to be a societal construct, this norm is observed to cross-cut across individual, structural and societal dimensions and causes for suppression of perceived vulnerability therefore reducing the willingness to seek HTC services (Fleming et al., 2016). On the same breadth, in a study investigating self-efficacy as a predictor of uptake on choice of HIV testing, gender equity was demonstrated to influence self-efficacy which similarly positively influenced HIV testing (Kelvin et al., 2018b). Although other studies have demonstrated masculinity to bear mixed findings on how it influences the uptake of HTC services, the aforementioned observations ratifies the argument on the role that gender-transformative programming can play in enhancing uptake of HTC services amongst men (Fleming et al., 2016). Further, these recommendations are exemplified by the positive correlation between gender equity and the social determinants of health namely education and income as observed in the study investigating influence of psychosocial attributes on health seeking behaviors (Romo et al., 2018).

## **Structural Barriers**

Like other social constructs, occupational norms are socially constructed amongst the players in an industry or occupation while the structuring exist as a function of organizational arrangements and the environment. This has been described as the interplay within a society where perception of the society becomes a social construct (Lars Dahlgren, 2018). Such include perception of trucking as a male dominated occupation owing to its masculinization that subsequently breeds gendered recruitments. These are intertwined with gender realities within a society, institution and at the intrapersonal level. From the review findings, some of the aspects that revolve around structural barriers to HTC uptake amongst truckers include time on transit (Strauss et al., 2018a). In one of the studies investigating preferences on HIV testing amongst truckers, the median time on transit was reported as 22 days in a month (Strauss et al., 2018a). On the same, within the study population of 305 truckers, only two truckers reported to have previously tested for HIV which is consistent with established knowledge on migration as a social determinant of health with the distance travelled and length of stay away from home being correlated to the level of vulnerability (Pandey et al., 2011, Skolnik, 2017, Organization, 2005). The extended time on transit exist as a function of the hauling distance hence structural in respect to the trucking occupation. Another aspect is the long working hours which is associated to the reasoning on lengthy time on transit and inefficiencies at border points (Organization, 2005, DiCarlo et al., 2014, Kelvin et al., 2018a). Other barriers include lack of legislative provisions on workplace HIV/AIDS response (Organization, 2005). This is more pronounced with lack of uniformity in regional laws hence hindering access to health

services amongst workers travelling through other countries (Organization, 2005). In addition, fragmentation of the trucking industry presents challenges in the roll-out of targeted interventions owing to feasibility concerns (Botao et al., 2016). As such, integrated models of interventions that extend to the communities along the transport corridors have been proposed (Botao et al., 2016).

### Economic Impact of HIV/AIDS amongst Truckers

Transport is widely acknowledged as an integral component to economic development (Regondi et al., 2013). Within East Africa, road transport as the major form of transport allows access to the regional markets (Kunaka et al., 2018). However, this facilitation is hampered by inefficiencies, poor infrastructure and diseases among other barriers (Kunaka et al., 2018). From the review findings, the mean age of truckers in the included studies is reported as between 35 to 40 years while proportion of those that were reportedly married was between 75% to 85% (Kelvin et al., 2019, Kelvin et al., 2018a, Kelvin et al., 2018b, Romo et al., 2018, Strauss et al., 2018a). This demographic represents an economically productive age-group to whom HIV/AIDS is not only a threat to the regional productivity but also to their dependents as demonstrated by the proportion who reported to be married. On the same line of argument, according to the UNAIDS report on HIV/AIDS epidemic, HIV prevention accounts for 22% of the HIV/AIDS investments in low and medium-income countries (UNAIDS, 2010). Notably, only 11% of these investments are focused on populations at an elevated risk of HIV infection (UNAIDS, 2010). With the inherent threat to regional productivity, the epidemic is likely to cause a decrease in investments to HIV/AIDS interventions as noted with the decline in 2009 (UNAIDS, 2010). On the same breadth, owing to resultant challenges in access arising from limited facilities and opportunities, this reality acts as a barrier to uptake of HTC services amongst high risk populations such as truckers even where investments in HIV/AIDS prevention have been demonstrated to harbor a twofold return on investment when averted orphan-care, healthcare costs and foregone labor productivity are considered (UNAIDS, 2014). In addition, bearing in mind that economic reasons have been advanced to occasion the entry of most women into sex trade while mobile populations such as truckers have been isolated as key consumers of the services of sex workers, the scenario presents a tragic vicious cycle (Regondi et al., 2013). In this respect, economic empowerment at all levels is observed as a strategic modality to increase opportunities for roll-out and uptake of HTC services (Regondi et al., 2013) and augments the argument on the need to rethink the structuring of HIV/AIDS interventions to accommodate initiatives such as income generating activities targeted at the host communities as a sustainable way of averting vulnerability by enhancing their economic resilience (Regondi et al., 2013, Musheke et al., 2013).

### Strengths

Conduct of the study ensured strict adherence to the procedures on systematic reviews in accordance to the PRISMA guidelines (Tacconelli, 2010). The other merit of this study is high scientific rigor derived from

randomized controlled trials, the study design upon which included studies or data were based upon. In addition, the review process could be presumed to have been participatory having involved reviewer one (BG) and reviewer two (MO) during screening and the supervisor; to whom submission of the preliminary report was deemed as a peer review step. On the references used to conduct background review, these were obtained from the scooping search and from bibliographies of included citations which offered a diverse perspective on the review topic.

### Limitations

On the inclusion of studies, selection of citations was limited to peer-reviewed articles published in English between 2015 – 2020. Application of such a stringent criterion could have omitted potential citations for inclusion into the review. In addition, although the quality of included studies was appraised as satisfactory, an in-depth overview of the reported outcomes established some inconsistencies with accompanying narrations (Strauss et al., 2018a, Kelvin et al., 2018b, Romo et al., 2018, Strauss et al., 2018b).

The use of weighted average method in conducting meta-analysis fails to preserve the benefits deduced from randomization (Boland et al., 2014). In addition, the use of Microsoft Excel 2010.Ink in creating the forest plot used to estimate heterogeneity does not compute the confidence intervals of resultant odds ratio hence interpretation of the association at the population level is inconceivable (Aschengrau and Seage, 2013). However, since all the summary results were towards the same direction, and all studies employed a design consistent with experimental studies, the degree to which benefits of randomization may have been missed are presumed to be minimal. Another limitation of the review findings arises from limited number of articles included in the study. This is partly due to low number of publications on HIV/AIDS programming targeted at truckers within East Africa and hence the findings from the meta-analysis are observed to be biased towards the measure of effects with the larger weight. However, since the largest weight account for 74.9% of all the sample sizes, the extent to which meta-analysis results may fall far from the true measure of association is presumed to be immaterial and the statistical procedure argued to preserve the benefits of being a suited alternative to performing large number of trials (Aschengrau and Seage, 2019).

In addition, despite the earlier intimation on conduct of the review within East Africa, resulting studies from the search process were all conducted in Kenya within North Star Alliance roadside clinics; a homogenous setting that may fail to account for all external influences hence limiting inclusion of insights from diverse settings (Kalichman et al., 2008). However, an assumption that study participants (drivers and their assistants) plying the regional transport corridors represent multiple nationalities could mitigate uncertainties arising from this limitation. This assumption is further explained by the seaports of Mombasa and Dar salaam being the

transshipment points and the origin of the transport corridors serving other landlocked countries which makes it appropriate to assume that the study participants would report multiple nationalities.

Although an assumption was made that the engagement and sharing of selected articles with the co-supervisor was equivalent to a level two screening by a second reviewer (MO), this could still serve as a limitation to the study since there was no active response and consent was only presumed through silence. Finally, from the included studies, the measure of effects was mainly reported through odds ratios at 95% confidence intervals and p-values; however, there was a reported discrepancy between the two measures in some of the studies. In that respect, the odds ratios reported at 95% confidence intervals were utilized to make the inference since this measure does not only explain the existence of an association, but also provides the range within which the association is valid as an estimate of the effect within the source population (Aschengrau and Seage, 2013).

## CONCLUSION

Globally, formation of economic blocks through integration is recognized as a feasible way to harness economies of scale by leveraging on capacities of the individual countries. Considering the expanding regional integration, road transport is observed as a critical sector; being the most common form of transport within the East African region. However, long distance hauling is also acknowledged to harbor immense social challenges that manifest within the various sectors either as disease burdens or economic losses. These challenges become even more apparent within the growing body of knowledge on social determinants of health. In this respect, the transport sector is categorized under migration where exposure to truckers (drivers and their assistants) arise from various social ills along the transport corridors namely sex trade and substance abuse as evidenced by the review findings. This burden is compounded by gender dynamics within the transport sector where the occupation is observed to be male dominated hence the inherent attributes associated with poor health seeking behaviors amongst men that make them more likely to remain undiagnosed of HIV infection, suffer the chronic forms of the disease and report higher mortality than women. In this respect, there is an urgent need to contextualize HIV/AIDS programming to serve the exceptional needs of various groups and ensure that the pathways to the flow of commerce remain patent. However, the fact that HIV/AIDS programming remain highly dependent on donors makes this intention a mirage, more so, where the evidence to inform policy is unavailable. From the review findings, it is evident that multiple factors play host to the HIV/AIDS burden amongst truckers at various levels of influence. However, the opportunities that exist to counter these obstacles are equally pronounced. For instance, innovative use of technology was observed to significantly influence the uptake of HTC services through messaging on availability of services. This opportunity can harness the high levels of mobile phones penetration within developing countries to increase the levels of HIV testing. As a preventive measure and the entry point into care and treatment, HIV testing occupies a strategic position in line with the objects of the 90-90-90 agenda. In addition, self-testing is observed to attract a high preference amongst the groups that place high premiums on confidentiality and convenience which serves as a great opportunity for first-time testers. Notably, psychosocial attributes were also observed to influence the uptake of HTC services which is observed as an opportunity and another entry point for strategies targeted at behavior change and the use of social marketing to influence uptake of HTC services. In respect to the barriers, these are aligned along the various aspects of access to healthcare. The structural barriers are observed to reflect the dynamics within the trucking occupation where transit time and efficiency at border points play a significant role in the exposure levels. Towards this, in line with the recommendations on capacity development, alignment of the border efficiencies through one stop border points is observed to serve as a timely solution to the structural obstacles. Finally, though extensive, the review findings cannot be claimed to be exhaustive, and we recommend further research on how migration influences HIV/AIDS programming.

## Policy Implications

As evidenced by observations on trucking as a male dominated occupation with a disproportionate risk of HIV infection, the included studies resonate with World Health Organization's commitment on human rights and gender (WHO, 2007, Regondi et al., 2013, Organization, 2005). Further, from the review findings, the interplay between select components of a health system as conceived in the WHO's health systems framework is evident while the organic nature in which various studies are grounded on existing policies is equally pronounced (WHO, 2007). On this intent, contemplating policy as an iterative process, there is the need to continually build on the evidence base to inform decisions. (WHO, 2007, Regondi et al., 2013).

Conversely, an in-depth examination of the included studies revealed a leaning towards service delivery in the reviewed interventions as shown in *Table IV* (Kelvin et al., 2019, Kelvin et al., 2018a, Kelvin et al., 2018b, Romo et al., 2018, Strauss et al., 2018a, Strauss et al., 2018b). By failing to encompass all the fundamental components, this strategy alienates the systems-thinking approach which was the primary intention of the WHO framework as illustrated in *figure 4* (WHO, 2007, Muhammad Ahmed and Babar Tasneem, 2015). With an outlook on probable policy implications, we re-interrogated the study findings along the critical interpretations from our discussion to develop a conceptual framework that would inform future HIV/AIDS programming targeted at truckers within East Africa. Currently, the most preferred practice has been the ratification of international guidelines and legal instruments to serve as policies (Regondi et al., 2013). However, it is evident from the review findings that there is the need to contextualize these global commitments to serve the exceptional needs of a setting and equally pronounces the role of research, more so qualitative research in informing policy as part of the widely advocated practice of linking evidence to policy; a key contribution of systematic reviews (Regondi et al., 2013, Kelvin et al., 2016, Conserve et al., 2016, Secretariat, 2015). These aspirations are equally consistent with the organic principles of capacity development on scanning globally for local re-invention (Theisohn, 2003, Press, 2014). Taking the inputs of our review findings into consideration, we proposed the stepwise model to serve as a conceptual framework in addressing some of the programmatic challenges associated with HIV/AIDS programming amongst truckers within East Africa.



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## TABLES

**Table 1:** PICO Table on Systematic Review of HIV/AIDS Programs Targeting Truckers within East Africa

<b>Review Question</b>	What are the key risk factors, preferences and predictors of uptake on HTC services amongst truck-drivers and under what categories of the health systems building blocks do HIV/AIDS programs targeting truck-drivers within the East African Community fall?
<b>Population</b>	Truck-drivers plying the East African transport corridor
<b>Intervention</b>	Any form of HIV/AIDS program that addresses risk factors to HIV infection, preferences and predictors of uptake on HTC services amongst truckers
<b>Comparator</b>	The stated interventions compared with each other
<b>Outcomes</b>	Any objective outcome that is based on sound epidemiological research
<b>Setting</b>	All the six countries within the East African Community
<b>Study Design</b>	Interventions

Table format was adopted from: Boland, A., Cherry, M. G. & Dickson, R. 2014. *Doing A Systematic Review: A Student's Guide*, Sage Publications Ltd.

Table II: Table of Study Characteristics

Study	When Trial or Study Conducted	Country	Trial Setting	Commercial Research Support	Conflict of Interest Declared
(Kelvin et al., 2019)	2018	Kenya	North Star Alliance Roadside wellness clinics	Grant from the International Initiative for Impact Evaluation	None
(Strauss et al., 2018)	2017	Kenya	North Star Alliance Roadside Wellness Clinics	Grant from the International Initiative for Impact Evaluation	None
(Kelvin et al., 2018)	2017	Kenya	North Star Alliance Roadside Wellness Clinics	Grant from the International Initiative for Impact Evaluation	None
(Kelvin et al., 2018a)	2016	Kenya	North Star Alliance Roadside Wellness Clinics	Grant from the International Initiative for Impact Evaluation	None
(Romo et al., 2018)	2018	Kenya	North Star Alliance Roadside Wellness Clinics	Grant from the International Initiative for Impact Evaluation	Not Stated
(Strauss et al., 2018b)	2018	Kenya	North Star Alliance Roadside Wellness Clinics	Grant from the International Initiative for Impact Evaluation	None

*Table format was adopted from: Boland, A., Cherry, M. G. & Dickson, R. 2014. Doing A Systematic Review: A Student's Guide, Sage Publications Ltd.*

**Notes:**

- North Star Alliance is associated with 36 roadside wellness clinics throughout Africa with 8 of the clinics being in Kenya.

**Table III:** Table of Quality Assessment on the Randomized Controlled Trials Included in the Effectiveness Study

TRIAL	RANDOMIZATION			BASELINE.COMPARABILITY			BLINDING				WITHDRAWALS					
	Truly Random	Allocation Concealment	Number Stated	Presented	Achieved	Measure of Effect	Inclusion Criteria Specified	Co- Interventions Identified	Assessors	Administration	Participants	Procedure Assessed	>80% in Final Analysis	Reasons Stated	Intention to Treat	Other Outcomes
(Kelvin et al., 2019)	√	√	√	√	√	OR, p	√	√	NS	NS	√	√	√	√ <sup>x</sup>	√	×
(Strauss et al., 2018)	√	NS	√	√	√ <sup>x</sup>	OR, p	√	NS	NS	NS	√	√	√	×	√	×
(Kelvin et al., 2018)	√ <sup>x</sup>	NS	√	√	√	OR, p	√	√	NS	NS	√ <sup>x</sup>	√	√	√	√ <sup>x</sup>	×
(Kelvin et al., 2018a)	√ <sup>x</sup>	√	√	√	√	OR, p	√	√	NS	NS	√ <sup>x</sup>	√	√	√ <sup>x</sup>	√	×
(Romo et al., 2018)	√ <sup>x</sup>	NS	√	√	√	OR, p	√	√	NS	NS	√ <sup>x</sup>	√	√ <sup>ç</sup>	×	×	SR
(Strauss et al., 2018b)	√	NS	√	√	√	OR, p	√	√	NS	NS	×	√	√	√ <sup>x</sup>	√	×

*Table format was adopted from: Boland, A., Cherry, M. G. & Dickson, R. 2014. Doing A Systematic Review: A Student's Guide, Sage Publications Ltd.*

<b>Key:</b>	<b>√</b>	Yes	<b>P</b>	P.value	<b>SR</b>	Self-reporting on HIV testing behavior(s)	<b>NS</b>	Not stated
	<b>√<sup>x</sup></b>	Partially	<b>×</b>	No	<b>√<sup>ç</sup></b>	Yes, computed from the tables	<b>OR</b>	OddsRatios



**Table IV: Matrix of Qualitative Information Synthesis [Summary of the Findings]**

Study	Setting	Type of Study and Design	Key Intervention Area (s)	Subsidiary Intervention Component	Main Health Systems Building Block(s)	Comparison Group(s)	Predictors of Uptake	Preferred Type of Service
Kelvin, E. A., George, G., Kinyanjui, S., Mwai, E., Romo, M. L., Oruko, F., . . . Govender, K. (2019). Announcing the availability of oral HIV self-test kits via text message to increase HIV testing among hard-to-reach truckers in Kenya: a randomized controlled trial. <i>BMC Public Health</i> , 19(Par), 7. doi:10.1186/s12889-018-6345-1	Kenya	RCT  [n=2262]	Communication via text message on product availability at roadside wellness centers.	Health Products and technologies	Service delivery.	Current program of general text messaging.	-Text message alerts  -Messaging language  -Frequency of messaging	Enhanced standard of care that comprise standard of care messaging on availability of oral HIV self-test kits sent thrice alternated in two languages (English and Kiswahili)
Strauss, M., George, G., Lansdell, E., Mantell, J. E., Govender, K., Romo, M., . . . Kelvin, E. A. (2018). HIV testing preferences among long distance truck drivers in Kenya: a discrete choice experiment. <i>AIDS care</i> , 30(Par), 72-80. doi:10.1080/09540121.2017.1367086	Kenya  Roadside Wellness Clinics.	DCE  [n=305]	HIV testing service delivery models.	-	Service delivery.	Trade-offs on availed choices.	-Counselling  -Testing site  -Waiting time  -Service fee  -Incentives	Oral HIV testing
√* Kelvin, E. A., George, G., Mwai, E., Nyaga, E. N., Mantell, J. E., Romo, M. L., . . . Govender, K. (2018). Offering Self-administered Oral HIV Testing as a Choice to Truck Drivers in Kenya: Predictors of Uptake and Need for	Kenya	√* RCT  [n=149]	Supervised oral HIV testing at the clinic.	-	Service delivery.	Standard provider administered blood test.	-Choices on HIV testing  -Psychosocial attributes	Self-administered oral HIV testing

Guidance While Self-testing. <i>AIDS Behav</i> , 22(2009), 580-592. doi:10.1007/s10461-017-1783-9								-Behavioral attributes (alcohol consumption)	
Kelvin, E. A., George, G., Mwai, E., Nyaga, E., Mantell, J. E., Romo, M. L., . . . Govender, K. (2018). Offering self-administered oral HIV testing to truck drivers in Kenya to increase testing: a randomized controlled trial. <i>AIDS care</i> , 30(Par), 47-55. doi:10.1080/09540121.2017.1360997	Kenya	RCT  [n=305]	Choice on HIV testing method.	Health products and technologies	Service delivery.	Standard testing that comprise provider administered rapid HIV blood test.	-Choice on HIV testing method -Self-efficacy -Behavioral attributes (curiosity of a new test) -Individual preferences	Provider supervised Self-administered oral HIV testing	
Strauss, M., George, G., Mantell, J. E., Romo, M. L., Mwai, E., Nyaga, E. N., . . . Kelvin, E. A. (2018). Stated and revealed preferences for HIV testing: can oral self-testing help to increase uptake amongst truck drivers in Kenya? <i>BMC Public Health</i> , 18(Par), 1231-1231. doi:10.1186/s12889-018-6122-1	Kenya	DCE  [n=150]	Actual choice of HIV testing amongst truck drivers.	-	Service delivery.	Stated HIV testing preference.	-Counselling -Choice on HIV testing method -Location -Cost -Waiting time	Oral HIV testing	
ROMO, M. L., GEORGE, G., MANTELL, J. E., MWAI, E., NYAGA, E., ODHIAMBO, J. O., GOVENDER, K. & KELVIN, E. A. 2018. Psychosocial characteristics of primary care-seeking long-distance truck drivers in Kenya and associations with HIV testing. <i>African journal of AIDS research: AJAR</i> , 17, 119-128.	Kenya	✓ RCT  [n=305]	Choice on HIV testing amongst truck drivers.	-	Information and research  -Service delivery.	Standard of care HIV testing.	-Anticipated HIV stigma -Self-efficacy -Fatalism/ attitude -Gender equity and norms	-	

-Self-esteem

-Sensation seeking

**Key:**

$v^*$  - Study based on a secondary research question that utilized information from a randomized control trial.

**RCT** – Randomized control trial.

**DCE** – Discrete choice experiments.

**Notes:**

- *The discrete choice experiments were located within randomized controlled trials and are based on the principle of utilitarianism.*

**Table V: Summary of the Study Results**

Study	Type of Study	Labels	N	Outcome(s)	Measure of Effect(s)	Summary of Findings
(Kelvin et al., 2019)	RCT	Study 1	2262	Uptake of oral HIV testing with enhanced communication through text messaging.	OR, p	<b>OR = 2.7, 1.3 - 5.5: 95% CI P = 0.009</b>
(Strauss et al., 2018a)	DCE	Study 2	305	Tradeoffs on HIV testing choices: Preference of oral HIV test over the blood test.	OR, p	<b>OR = 1.5, 1.1 - 2.4: 95% CI P = 0.009</b>
(Kelvin et al., 2018b)	sRCT	Study 3	149	Preference on HIV testing method (s) based on preferences and various predictors of uptake.	OR, p	Multiple
(Kelvin et al., 2018a)	RCT	Study 4	305	Uptake of oral HIV testing when offered choices.	OR, p	<b>OR = 2.8, 1.5 - 5.4: 95% CI P = 0.002</b> ***
(Romo et al., 2018)	sRCT	Study 5	305	Predictors of uptake of HIV testing.	OR, p	Multiple
(Strauss et al., 2018b)	DCE	Study 6	150	Actual choice of HIV testing based on stated preference; oral HIV self-test.	OR, p	<b>OR = 1.26, 1.1 - 1.5: 95% CI P = 0.005</b>

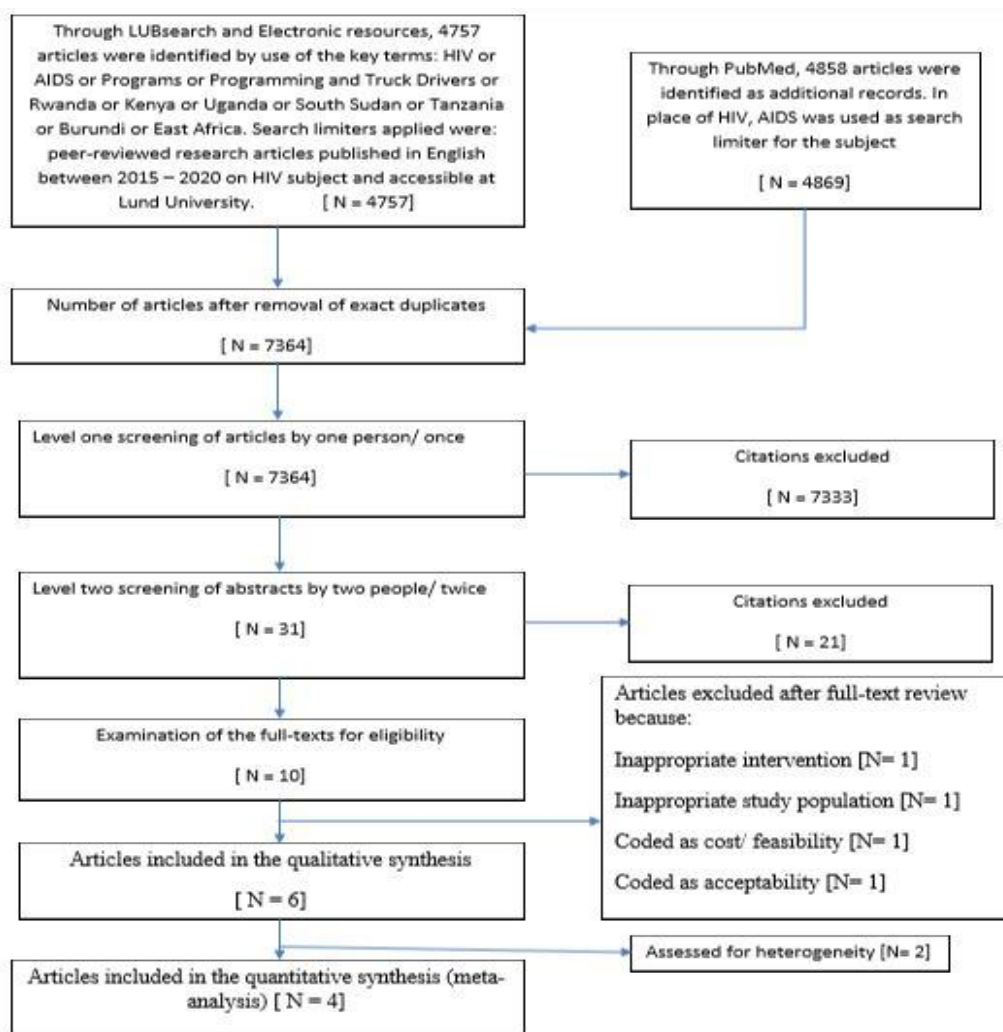
*Table format was adopted from: Boland, A., Cherry, M. G. & Dickson, R. 2014. Doing A Systematic Review: A Student's Guide, Sage Publications Ltd.*

**Notes:** RCT – Randomized control trial. DCE – Discrete choice experiments. sRCT – A secondary research question based on a Randomized Control Trial.

OR – Odds ratios P – P-value N – Study population Multiple – Study findings investigating multiple effects \*\*\* Significance of findings dependent on site

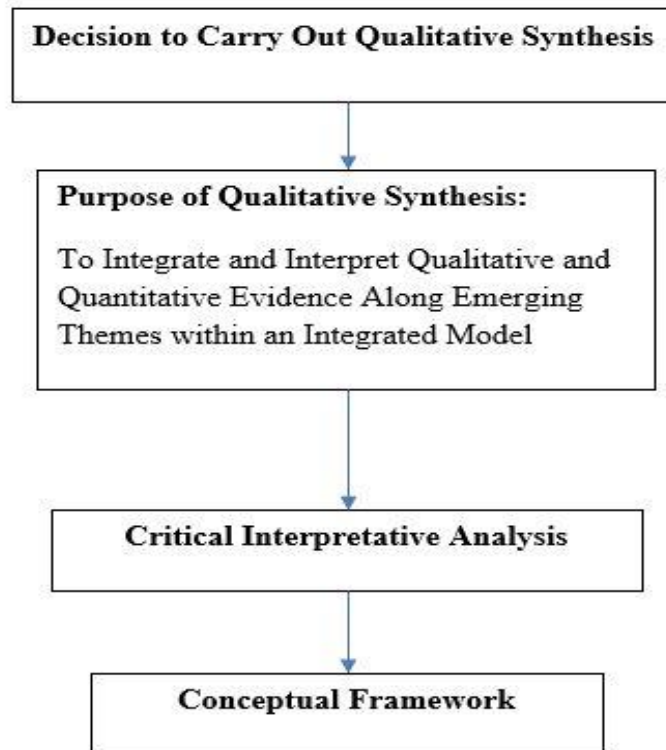
*From analysis of the study results, findings from four articles shaded in bold appear homogenous for inclusion in a meta-analysis to explain viability of oral HIV testing in enhancing uptake of HIV testing amongst truck-drivers. Profiled studies compared the preference of oral HIV testing over the standard of care HIV blood test.*

## FIGURES

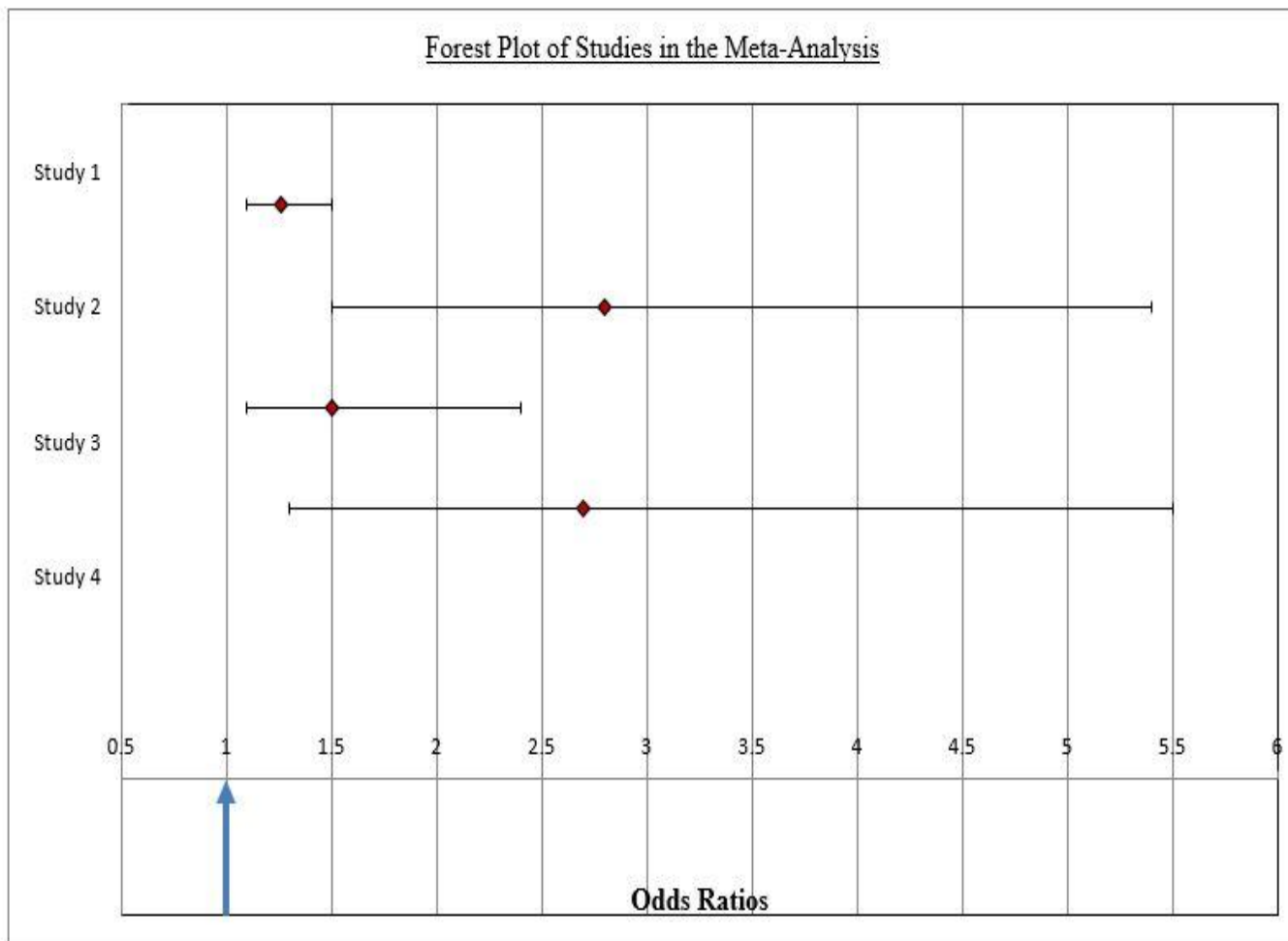


**Figure 1:** Flow diagram of the information cascade in a systematic review  
 The PRISMA flow diagram was adopted from: Boland, A., Cherry, M. G. & Dickson, R. 2014.  
*Doing A Systematic Review: A Student's Guide, Sage Publications Ltd.*

**Notes:** Heterogeneity was assessed in respect of how the reported outcomes were observed to be similar for combination to estimate the overall effect.



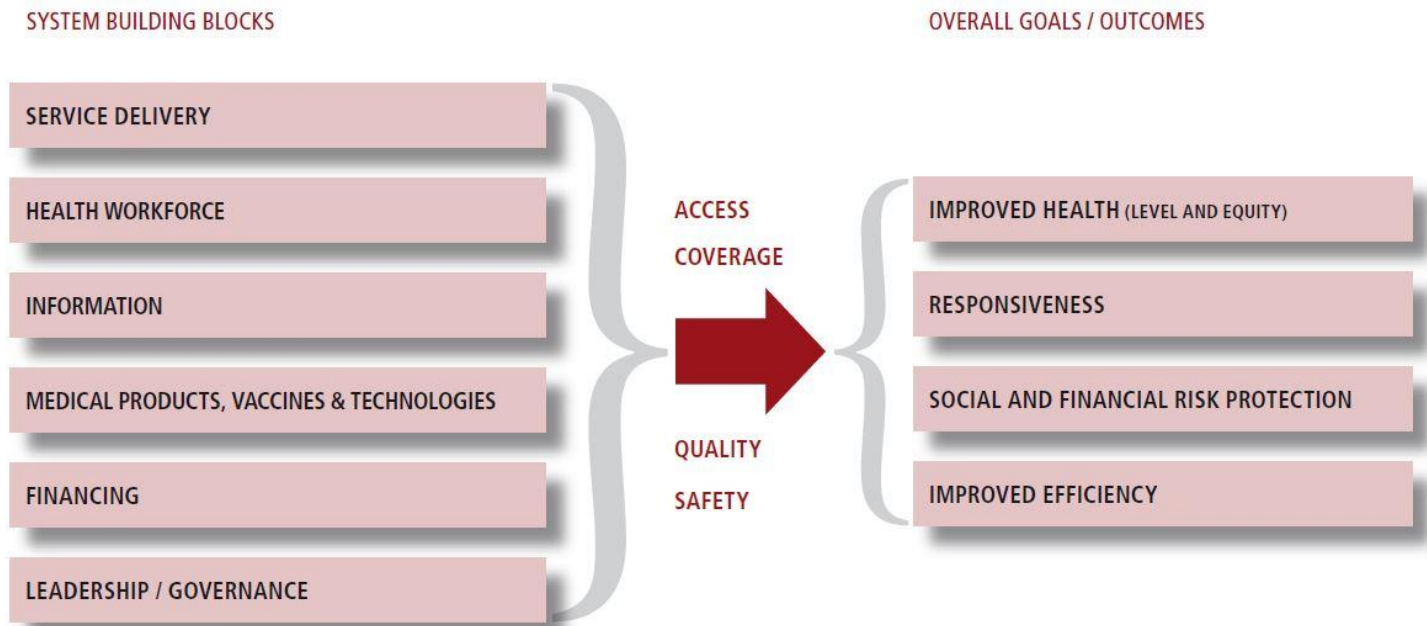
**Figure 2:** Flow diagram to illustrate the cascade of qualitative information synthesis  
*Flow chart segment was adopted from Cochrane Collaboration Qualitative Methods Group  
(Boland et al., 2014, Noyes and Noyes, 2012)*



**Figure 3:** A forest plot to estimate homogeneity and show appropriateness for inclusion in the meta-analysis

**Figure 3:** A forest plot to estimate homogeneity and show appropriateness for inclusion in the meta-analysis

*The forest plot was developed using Microsoft Excel 2010.Ink*



**Figure 4:** The World Health Organization’s health systems framework  
*The framework was adopted from WHO’s framework for action tagged everybody’s business: strengthening health systems to improve health outcomes (WHO, 2007).*



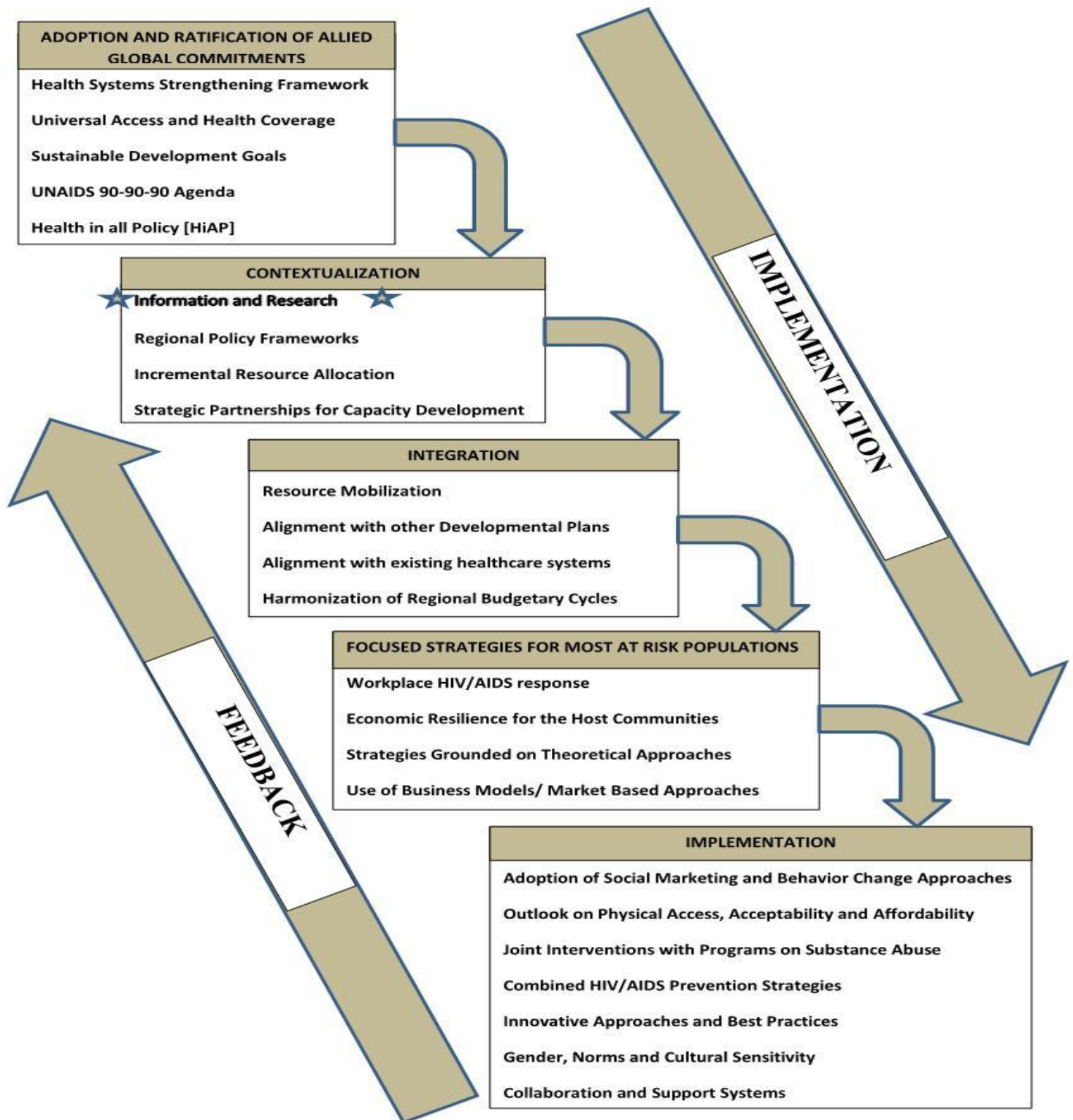


Figure 5: Stepwise Model: A Conceptual Framework on HIV/AIDS Programming Targeting Truckers within East Africa.

## POPULAR SCIENCE SUMMARY: English Version

Acquired Human Immunodeficiency Syndrome (AIDS), a disease caused by Human Immunodeficiency Virus (HIV), is acknowledged as a public health challenge. Its impact is far-reaching as traced within various sectors. However, there is limited knowledge on how the disease relates to other sectors beyond healthcare. On this understanding, there is a growing body of knowledge on how various aspects of human environment influences population health; otherwise known as social determinants of health. The transport sector is such one aspect. In respect to truck-drivers, the nature of their job consists prolonged separation from families. This makes them vulnerable to social-ills such as drug-abuse and prostitution. Similarly, communities along the transport corridors demonstrate vulnerability due to poverty. These include sex workers while truckers become their victims. The zones of sex-trade form breeding grounds for HIV infection and transmission with the impact of this burden being reflected in the economy and other sectors. Despite this knowledge, evidence from the transport sector has not been fully exploited in decision making on population health. In the current study, we scrutinized HIV/AIDS programming targeted at truckers within East Africa. From our findings, technology is demonstrated to have great potential in communicating health messages. Another key observation is on how choices in healthcare services influence their uptake. In this respect, HIV self-testing is shown to increase the rates of testing. This demonstrates the potential that lie behind home-based testing and oral HIV tests. In addition, influence of drug abuse on HIV testing demonstrates how HIV/AIDS programming can be organized jointly with programs on substance abuse. At the individual level, attitudes and behaviors that influence uptake of HIV testing act as opportunities for behavior-change in HIV/AIDS programming. Finally, targeting vulnerable members within the community through income generating initiatives is observed as an area of economic empowerment to reduce sex-trade through enhanced economic resilience.

## POPULÄR VETENSKAPSRESUMÉ: Swedish Version

Förvärvat humant immunbristsyndrom (AIDS), en sjukdom som orsakas av humant immunbristvirus (HIV), erkänns som en folkhälsoutmaning. Dess inverkan är långtgående spårad inom olika sektorer. Det finns dock begränsad kunskap om hur sjukdomen relaterar till andra sektorer utanför vården. På denna förståelse finns det en växande mängd kunskap om hur olika aspekter av mänsklig miljö påverkar befolkningens hälsa; annars känd som sociala hälsosfaktorer. Transportsektorn är en sådan aspekt. När det gäller lastbilsförare består deras jobb i långvarig åtskillnad från familjer. Detta gör dem utsatta för sociala sjukdomar som drogmissbruk och prostitution. På samma sätt visar samhällen längs transportkorridorerna sårbarhet på grund av fattigdom. Dessa inkluderar sexarbetare medan lastbilsförare blir deras offer. Zonerna för könshandel utgör grogrund för hiv-infektion och överföring med effekten av denna börda återspeglas i ekonomin och andra sektorer. Trots denna kunskap har bevis från transportsektorn inte utnyttjats fullt ut i beslutsfattandet om befolkningshuden. I den aktuella studien granskade vi HIV / AIDS-programmering riktad till lastbilsförare inom Östafrika. Från våra resultat visar det sig att teknik har stor potential för att kommunicera hälsobudskap. En annan viktig observation är hur val inom sjukvården påverkar deras intag. I detta avseende visar sig HIV-självtestning öka testhastigheterna. Detta visar potentialen som ligger bakom hembaserade tester och orala HIV-tester. Dessutom visar påverkan av drogmissbruk på hiv-testning hur hiv / aids-programmering kan organiseras tillsammans med program om drogmissbruk. På individnivå fungerar attityder och beteenden som påverkar upptagandet av HIV-testning som möjligheter till beteendeförändring i hiv / aids-programmeringen. Slutligen kan man inrikta sig på utsatta medlemmar i samhället genom inkomstgenererande initiativ som ett område med ekonomisk bemyndigande för att minska sexhandel genom ökad motståndskraft.