

# Early detection of cervical cancer in western Kenya: Determinants of healthcare providers performing a gynaecological examination for abnormal vaginal discharge or bleeding

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## Research

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# Abstract

## Background

In western Kenya, women often present with late-stage cervical cancer despite prior contact with the health care system. The aim of this study was to predict primary health care providers' behaviour in examining women who present with abnormal discharge or bleeding

## Methods

This was a cross-sectional survey using the theory of planned behaviour (TPB). A sample of primary health care practitioners in western Kenya completed a 59-item questionnaire. Structural equation modelling was used to identify the determinants of providers' intention to perform a gynaecological examination. Bivariate analysis was conducted to investigate the relationship between the external variables and intention.

## Results

Direct subjective norms, direct perceived behavioural control (PBC), and indirect measures of attitude predicted the intention to examine patients. Negative attitudes toward examining women had a suppressor effect on the prediction of health workers' intentions. However, the main predictors with the highest coefficients were the external variables being a nurse as opposed to a clinical officer and workload of attending 20–50 patients per day. In bivariate analysis with intention to perform a gynaecological examination, there was no evidence that working experience, being female, having a lower workload, or being a private practitioner were associated with a higher intention to conduct vaginal examinations. Clinical officers and nurses were equally likely to examine women.

## Conclusions

The TPB is a suitable theoretical basis to predict the intention to perform a gynaecological examination. Overall, the model predicted 47% of the variation in health care providers' intention to examine women who present with recurrent vaginal bleeding or discharge. Direct subjective norms (health provider's conformity with what their colleagues do or expect them to do), PBC (providers need to feel competent and confident in performing examinations in women), and negative attitudes toward conducting vaginal examination accounted for the most variance. External variables in this study also contributed to the overall variance. As the model in this study could not explain 53% of the variance, investigating other external variables that influence the intention to examine women should be undertaken.

## Contributions To The Literature

- Path analysis is an effective way to visualize the relationships between constructs and their regression coefficients in behaviour theories, especially for those not directly involved in social sciences.
- We illustrate how a theoretical model including detailed information of a target group of health care professionals can guide development of a questionnaire to examine factors contributing to the intention to perform vaginal examination among women with vaginal bleeding.
- Experiences of health care providers, framed within a psychological theoretical model of behaviour change, can support the evidence regarding factors to address in changing routine gynaecological health care in clinical practice.

## Background

Kenya has a high incidence and mortality from cancer of the cervix. In 2018, GLOBOCAN estimated that 5250 (19.7%) of 26,688 new cases of cancer in women were cervical cancer. Cervical cancer is the leading cause of female cancer mortality, accounting for 17.5% (3286/18,772) of all cancer deaths among women in Kenya [1]. Cervical cancer is preventable through screening and vaccination. However, vaccination programs have not taken off nationwide in Kenya [2]. Screening uptake is low (14%) and is lacking in rural areas, and many women present with cervical cancer at an advanced stage [3–5].

It is estimated that about 95% of women in developing countries have never had a screening test. In addition, 80% of women with newly diagnosed cancer in developing countries already have advanced disease. Research among patients with cancer has shown that even when women present with genital tract symptoms like bleeding or discharge, no examination has been done and many have been treated repeatedly without a concrete diagnosis [6–9].

Numerous factors can influence the implementation of evidence-based guidelines in clinical practice among health care professionals. This includes their knowledge, training, individual motivational predispositions, remuneration, and workplace organizational contexts. It is important to assess the practices of primary health care providers as they are the health professionals that women contact first in rural areas [10–14].

Medical training dictates that when a patient is bleeding, the health practitioner should examine the patient to find from what or where the bleeding is coming. However, women in sub-Saharan Africa who have cervical cancer can bleed for months without undergoing a vaginal examination while being attended by a health provider [15]. Provider delay has been studied less than patient delay. As Unger-Saldana et al. revealed [16], the affected individuals tend to be blamed for their health problems and a lack of medical attention. This begs the questions why this situation exists, how can it be improved, how can the threshold of suspected serious disease be raised when a woman presents with abnormal vaginal bleeding, and how can we promote more frequent gynaecological examinations by health care professionals [17].

To answer these questions, further theoretically based research is needed, to better inform the design of interventions aimed at changing the behaviour of health care professionals. As many clinical practice decisions are individual professional decisions, it would be useful to obtain a better understanding of the individual mechanisms involved in the adoption of new behaviours, using social psychology theories.

The theory of planned behaviour (TPB) [18] was chosen for this study because it is focused on motivation. The TPB proposes that motivation determines behaviour, and therefore, the best predictors of behaviour are factors that predict or determine motivation. The TPB has been used in other clinical domains to explain individuals' behaviour and factors that can be changed; however, to date, there are no studies regarding clinician's behaviour in gynaecological practice [18–24].

Therefore, we conducted the present study, using the TPB to determine those factors that influence primary health care practitioners' intention to examine women with recurrent vaginal bleeding or discharge when they present for medical consultation, and to identify the beliefs associated with this intention.

## Methods

This was a quantitative, cross-sectional, questionnaire-based study conducted in private and public health facilities in western Kenya. The study site, Bungoma East sub-county, is a typical rural area in Kenya as far as the hurdles and challenges in the health system. Most people in this sub-county are farmers.

The study population comprised all nurses and clinical officers working in Bungoma East County in private clinics, dispensaries, health centres, and faith-based hospitals. These health care providers offer antenatal care, maternity care, family planning, and general outpatient care. Nurses and clinical officers are the main staff in these facilities.

Clinical officers undergo a 4-year basic training course in clinical medicine at the diploma level whereas registered nurses complete 3.5 years of training; the enrolled community nurses had completed 2 years of training. All these professional groups have received training in midwifery, which was part of the inclusion criteria if working in the county.

Qualified nurses and clinical officers working within the county in clinical areas (emergency/family planning/trauma) were included in the present study. We excluded those involved solely in administrative work.

## Study sample

The target sample size was based on Green's [25] recommendation. That author proposed the following rule:  $N \geq 50 + 8m$  for multiple correlation and  $N \geq 104 + m$  for partial correlation, where  $m$  refers to the number of predictor variables in the model. This means that, because we were predicting intention (to

perform a gynaecological examination when a woman consults with abnormal vaginal discharge or bleeding ) using the three predictors [attitude (toward performing a gynaecological examination), subjective norms (whether there is social pressure to perform an examination) and perceived behavioural control (whether the provider feels confident in performing a gynaecological examination)] of the TPB, we would need  $50 + 24 = 74$  providers in the sample for a robust multiple R, and  $104 + 3 = 107$  for the significance test relating to individual beta weights for the predictors.

To recruit the study participants, a sampling frame was constructed using the official list of the cadres working in each health facility. Table 1 shows the number of health care providers targeted.

Table 1  
Sampling frame of health care facilities and providers

Health facilities (Bungoma East)	No. of health facilities in this study (Norms & Standards for level of facility)	No. of health care providers to be interviewed	Total
Dispensaries (13/15)	13 (2 registered nurses)	2 each	26
Health centres (5/5)	5 (2 clinical officers, 14 registered nurses)	9 (2 clinical officers, 7 registered nurses) each	45
Hospitals (2)	1 (2 clinical officers, 8 registered nurses)	6 (2 clinical officers, 4 registered nurses)	6
Private medical clinics (9/10)	9 (by owner(s), either clinical officer or registered nurse)	1 (either clinical officer or registered nurse)	9
<b>Total: 29</b> (3 non-operational)			<b>84</b>

Random sampling was used, with the aim of interviewing nurses mainly in the emergency/family planning/trauma areas. There were very few clinical officers and private health care providers (i.e., private clinic owners) and we aimed to interview them all, as they were available. One day prior to visiting each facility, an appointment was booked by phone with the person in charge of the facility. We met with that individual as well as other nurses depending on the duty roster or work schedule, in consideration of the work shifts of providers and staff shortages. We actively sought to interview nurses and clinical officers.

## Study variables

The guidelines in the manual for constructing questionnaires [26], based on the TPB. All three constructs of the TPB (as shown in Fig. 1 below) were used to elicit the salient beliefs of each respondent. A questionnaire was developed to identify the determinants for performing a gynaecological examination. The questionnaire was piloted among health care providers at Moi Teaching and Referral Hospital, to check for clarity and comprehension and Bungoma East county health providers. The final questionnaire was then administered to the study participants.

There is no perfect relationship between intention and the actual performance of a behaviour. Intention, which has measurable variables, is used as the proxy measure of behaviour. The model by Ajzen provides a way to predict behaviour using three variables, even though actual behaviour is not readily measurable. These three variables (attitudes, subjective norms and perceived behavioural control) are psychological constructs. Attitudes indicate beliefs about the consequences of performing a behaviour. Subjective norms are an individual's estimate of the social pressure to perform or not perform the behaviour. Perceived behavioural control is about the individual's confidence in performing the behaviour. In this study, the behaviour of interest is performing a gynaecological examination when a woman presents with abnormal vaginal discharge or bleeding.

Table 2 shows the number of questions for each construct. The questions were rated on a seven-point Likert scale and negatively worded responses were recoded so that higher scores were inclined towards performing the behaviour. Intention simulation questions were ten clinical scenarios that described patients presenting with abnormal vaginal bleeding or discharge. The respondents were to decide whether they would or would not do a gynaecological examination. The responses were summed to create a total score (Table 2 uploaded as separate attachment). The number of questions per construct and the total number of questions are shown in Additional files 1 and 2 (uploaded as separate attachments)

Table 2  
Summary of the developed TPB-derived questions

<b>Behaviour under study: Performing a vaginal examination in a patient with recurrent abnormal discharge or bleeding</b>		
<b>Constructs</b> (number of questions)		Example questions
Behavioural intention (10)	Case scenarios	<p>Mary arrives at the clinic complaining of lower abdominal pain and bleeding from the vagina. Her last normal menses was 3 years ago. She has had pain for many months, and she associates it with her workload. The bleeding is intermittent but the last episode lasted for 2 weeks. She feels much better and came in for her monthly prescription of haematinics and analgesics.</p> <p>Conduct a check-up, including a pelvic exam? Yes/No</p>
<b>Attitudes</b> Direct (4) Bipolar adjectives	Evaluative adjectives with a single stem that defines the behaviour (performing a gynaecological examination).	Performing a vaginal examination is harmful/beneficial.
Indirect (18) likely/unlikely and desirable/undesirable scale.	Strength of behavioural beliefs multiplied by outcome evaluations. The score is the mean of the sum of these.	<p>If I do a vaginal examination, I will identify the source of bleeding.</p> <p>If I do a vaginal examination, I can introduce/spread infection.</p>
<b>Subjective norms</b> Direct (4) should/should not and agree/disagree	The opinions of important people about gynaecological examinations. The mean of the scores give the subjective norms score.	Most people important to me think I should perform vaginal examinations.

Note: See Additional file 2 for a list of variables and number of questions.

<b>Behaviour under study: Performing a vaginal examination in a patient with recurrent abnormal discharge or bleeding</b>		
Indirect (8) approve/disapprove and very much/not at all	Individual/reference groups likely to apply pressure to perform gynaecological examinations.  Social pressure (what others think should be done and what they actually do) is multiplied by strength of the motivation to comply and the products summed to obtain an overall score.	Colleagues think I should perform a vaginal examination when a patient presents with recurrent bleeding.  Other clinical officers and nurses do not conduct gynaecological examinations.
<b>Perceived control</b>  Direct (4) easy/difficult and agree/disagree	Confidence and ability to perform a gynaecological examination. Mean of the total score is the score for perceived control over behaviour.	I am confident that I can perform a vaginal examination if I wish.  The decision to do a gynaecological examination is beyond my control.
Indirect (14) likely/unlikely and less likely/more likely	Beliefs that make it difficult to perform gynaecological examinations. Each control belief is multiplied by the control factors and the products summed to give an overall score.	The unavailability of instruments makes it impossible to examine a patient.  When it is unclear how to manage a patient after the findings of a gynaecological exam, doing this exam becomes less likely.
Note: See Additional file 2 for a list of variables and number of questions.		

## Data collection

During data collection, a trained research assistant distributed the questionnaires to participants and checked for completeness of the returned surveys. Several visits were made to reach as many providers as possible. Despite these efforts, several questionnaires were incomplete, for several reasons: the providers were busy with scheduled clinical duties, on leave, in workshops or conducting outreach; or the questionnaire was too long. No questionnaires were posted or left for the provider to complete on their own in their free time as previous experience has shown that respondents are unlikely to complete the surveys in such cases [28, 29].

## Data management and analysis

To investigate the relationships among the study variables, structural equation modelling (SEM) was applied using the lava package in R. First, a measurement error model was constructed using factor analyses. This allowed construction of the hypothesized latent variables and examination of how the observed variables reliably reflected them. Second, these latent constructs, as well as sex (male vs. female), profession (clinical officer vs. nurse), length of qualification (< 36 months, 36–60 months, > 60 months), cadre of colleagues (nurses only, clinical officers only, both nurses and clinical officers), number of nurses (< 4, 4 or more), number of clinical officers (none, 1–2, > 2), number of patients per day (< 20, 20–50, > 50) and type of facility (health centre, dispensary, private clinic) were used in a structural equation model to explain the variation in the intention to examine women (expressed as a proportion of intention on the basis of the 10 scenarios). Estimates were obtained using maximum likelihood, and all variables were standardized such that estimates of effect sizes were obtained on a comparable scale.

To determine the specific beliefs with the greatest influence on intentions, the intention variable was dichotomized using a median split. The median was 6 and the two groups were either 5 or less (low intention) or 6 and above (high intention). We then analysed bivariate associations (Pearson's chi-square tests) between health care provider characteristics (experience, sex, profession, type of services, workload) and the intention to examine women. To demonstrate whether there was any difference between the proportion of male and female participants in the facilities and whether nurses were seeing more patients than clinical officers, bivariate analysis was also conducted ( $p \leq 0.05$ ).

## Results

We visited 26 of 28 sampled health facilities. There were 18 public facilities and 8 were private. There were 13 dispensaries, 4 health centres and 1 mission hospital. Two additional facilities were non-functional. There was a total of 10 clinical officers and 56 nurses. Nearly 73% of health care providers were female and most had more than 5 years' working experience. Fourteen percent reported working in a facility that attended fewer than 20 patients per day (Table 3).

Table 3  
Baseline characteristics of health care providers

Characteristic	Frequency	%
Cadre		
Clinical officer	10	15.2
Nurse	56	84.8
Sex		
Male	18	27.3
Female	48	72.7
Length of work experience after qualification (mo.)		
< 60	19	28.8
≥ 60	47	71.2
Cadre working in the facility		
Nurses only	29	43.9
Clinical officer only	0	0.0
Both nurses and clinical officers	37	56.1
No. of nurse colleagues*		
≤ 3	26	39.4
4 +	37	56.1
No. of clinical officer colleagues*		
None	29	43.9
1–2	28	42.4
3 +	5	7.6
Nature of health facility		
Public	57	86.4
Private	9	13.6
No. of patients per day*		
< 20	9	13.6
20–50	25	37.9
*Missing cases.		

Characteristic	Frequency	%
> 50	31	47.0
*Missing cases.		

Bivariate analysis (Table 4 below) showed no difference in the proportions as far as experience, sex, profession, type of services offered, or workload and the level of intention; both clinical officers and nurses were equally likely to examine women. There was no statistical evidence demonstrating a difference in the proportion of male participants in public and private facilities (29.8% vs. 11.1%,  $p = 0.425$ ).

Table 4  
Bivariate associations between characteristics of health care providers and intention to conduct a gynaecological examination

	Level of intention			p-value
	Low ( $\leq 6$ )	High ( $> 6$ )	Total	
Variable	N = 33	N = 33	N = 66	
Experience (y)				
< 5	24 (51.1%)	23 (48.9%)	47 (71.2%)	0.786
$\geq 5$	9 (47.4%)	10 (52.6%)	19 (28.8%)	
Sex				
Male	8 (44.4%)	10 (55.6%)	18 (27.3%)	0.580
Female	25 (52.1%)	23 (47.9%)	48 (72.7%)	
Professional				
Clinical officer	5 (50.0%)	5 (50.0%)	10 (15.2%)	> 0.999
Nurse	28 (50.0%)	28 (50.0%)	56 (84.8%)	
Type of services				
Private	2 (22.2%)	7 (77.8%)	9 (13.6%)	0.073
Public	31 (54.4%)	26 (45.6%)	57 (86.4%)	
Workload (number of patients/day)*				
$\leq 50$	20 (58.8%)	14 (41.2%)	34 (52.3%)	0.105
> 50	12 (38.7%)	19 (61.3%)	31 (47.7%)	
*Missing value.				

The results of the structural equation model for the determinants predicting the intention to perform gynaecological examinations can be found in Fig. 2.

Ovals indicate latent constructs; rectangles indicate observed constructs. Error values associated with each are indicated as small circles with the letter “e” inside them. Standard coefficients are shown above the paths between constructs showing positive and negative associations. Factor loadings are indicated between latent constructs and the indicators. The variation explained in the model by the six latent constructs,  $r^2$ , is provided.

Bold arrows show variation in latent variables whereas dashed arrows show variation in the intention to perform a gynaecological examination. Standardized effect sizes and their statistical significance (\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ ) are shown.

DMA, direct measures of attitude; DMSN, direct measures of subjective norm; DMPBC, direct measure of perceived behavioural control; +ATT, positive measures of attitude (indirect); -ATT, negative measures of attitude (indirect); SN, indirect measures of subjective norm; PBC, indirect measures of perceived behavioural control.

As shown in Fig. 2, 47% of the variation in the intention to perform a gynaecological examination was explained by the model. The measurement model on the basis of the factor analyses showed generally high factor loadings. Nevertheless, some items had low loadings in comparison with others (the acceptable loading being 0.3), as below:

- Item 2 in DMSN (I feel social pressure to perform a vaginal examination in a patient who presents with abnormal vaginal bleeding/discharge.)
- Item 4 in direct measures of perceived behavioural control (DMPBC) (Whether I do a vaginal examination or not is entirely up to me.)
- Items 2 and 4 in indirect measures of subjective norms (Patients with recurrent abnormal vaginal bleeding would disapprove or approve of my doing a vaginal examination. Other Clinical Officers and Nurses do not do or do vaginal examinations in patients who consult with vaginal discharge/bleeding.)
- Items 2 and 6 in indirect measures of perceived behavioural control (A lack of skills/knowledge/practice is unlikely/likely to influence whether I perform a vaginal examination. A lack of skills/practice/knowledge makes it much more difficult/much easier to perform a vaginal examination.)

For four of the latent constructs, variation was explained by the other explanatory variables (Fig. 1). The direct measures of attitude (DMA) score was significantly higher in nurses than in clinical officers and higher in female than male health professionals; this score was lower when one or two clinical officers were present as compared with none or more than two clinical officers. These explanatory variables explained 23% of the variation in DMA scores.

Positive attitudes were lower in dispensaries than in health centres and private practices, explaining 12% of the variation. DMSN scores were higher in women than in men and lower in dispensaries than in health centres and private practices, explaining 15% of the variation.

Perceived behavioural control scores were lower in dispensaries than in health centres and private practices, when 1 or 2 clinical officers were present as compared with none or more than 2 clinical officers, and when more than 50 patients were treated per day than a lower number of patients. In addition, perceived behavioural control was higher in women than in men and with length of qualification 36–60 months and > 60 months, explaining 30% of the variation.

The intention to examine women was explained by the following seven variables:

- Higher with 20–50 patients treated per day than < 20 or > 50 patients per day and higher in nurses than in clinical officers
- Positively related to DMSN and DMPBC
- Lower in dispensaries than in health centres and private practices and when both clinical officers and nurses formed the cadre
- Negatively related to negative attitude (a more negative attitude resulted in a lower intention to examine women)

## Discussion

The TPB was the theoretical foundation for the two hypotheses stated in this study. We used the key concepts of Ajzen: attitudes, subjective norms, perceived behavioural control, and intention [18]. In this study, we sought to identify the motivational factors associated with the intention of primary care providers to perform a gynaecological examination when a woman presents with recurrent abnormal vaginal bleeding (i.e., consultation for the same complaint more than once).

Standardized regression weights of the TPB constructs indicated that direct measures of subjective norms were the best predictor of intention, followed by direct measures of perceived behavioural control. We can postulate that if these two are improved and there is a change in the negative attitudes associated with performing a gynaecological examination, then the intention to examine women will improve. However, these are hypotheses and a causal relationship cannot be extrapolated from this path analysis; studies are needed regarding the impact of these variables on actual behaviour. The TPB constructs and other variables in the model explained 47% of the variance in intention; 53% of this variance cannot be explained by this model. Other studies using this theory to examine health provider's intentions in clinical contexts have reported an explained variance of between 19% and 81% (frequency-weighted mean) [30, 31]. In this study, the TPB constructs were not the best predictors of health providers' intentions to conduct vaginal examinations. The intention to examine in this study is associated with external factors, both indirect (female sex, type of facility, type of cadre) and direct (workload, mixed cadre, and being a nurse).

Behavioural intention should result in the behaviour of conducting gynaecological examinations; however, behaviour was not evaluated in this study. As in the study by Godin et al., factors other than the TPB constructs may influence the decisions of health providers. Habit (whether to act out a behaviour) has been shown to influence behaviour performance. In this study, the habit was failure to conduct gynaecological examinations despite symptoms or clinical indications [30, 32].

Indirect measures of subjective norms probably assessed insufficient or inappropriate beliefs as this did not predict intention and had no direct or indirect effects ( $R^2 = 0\%$ ).

The path model also shows several factors with low loadings. These were the opinions of colleagues regarding what they think should be done and what they actually do, as well as social pressure to conduct gynaecological examinations. As suggested in other studies, this may be because health care providers may make decisions without being influenced, even by practice guidelines. Scores for confidence and other factors that determine whether an examination is carried out may have been low because of a lack of resources or a proper environment in which to do a gynaecological examination (a lack of instruments or private rooms) as well as the age/sex of the provider relative to that of the patient [30, 31]. The reason for these low scores could also be owing to the way these questions were scored, although standard scoring procedures were followed [26].

Bleeding may be a symptom of reproductive tract pathology, including cervical cancer. It is recommended that before a diagnosis of abnormal uterine bleeding is made using the PALM-COEIN classification (classifies causes of abnormal bleeding into structural and functional: Polyps, Adenomyosis, Leiomyoma, Malignancy and hyperplasia, Coagulopathy, Ovulatory dysfunction, Endometrial, Iatrogenic, and Not yet classified), lesions of the cervix must be ruled out. The PALM-COEIN classification helps in investigations and selecting treatment modalities. Therefore, even examining patients under age 25 years (recommended age of screening initiation) also helps to establish the diagnosis [33, 34]. By the time a woman is diagnosed with stage 3B cervical cancer, there is spread from the cervix to the vaginal walls. If a health provider had performed a vaginal examination much earlier, an earlier diagnosis could likely have been made.

In rural areas, most women initially visit dispensaries and health centres manned by nurses and clinical officers [15, 35, 36]. We hypothesized that sex, the number of years of work experience, profession, workload (number of patients seen per day), and type of facility are factors that predict health care professionals' intention to examine women. These are factors external to the TPB, and we predicted the value of these factors [31].

According to the study findings, being a nurse and a workload of 20–50 patients per day was associated with more frequent gynaecological examinations conducted in women (the recommended workload, according to the norms and standards of health service delivery of the Ministry of Health Kenya, is 17 patients per day) [37]. There is a shortage of health care providers, especially in rural facilities. Most health centres and dispensaries are run by female workers. In our study, there were more female than

male providers, but we can postulate that positive attitudes and the motivation to examine women would be stronger in female providers who attend a woman that is bleeding. Reluctance to be seen by male providers, either by the woman herself or her partner, has been reported in other studies [38–40].

Negative attitudes toward vaginal examination, as seen in the indirect measures of attitude, were associated with being a dispensary as opposed to health centre and having a mixed cadre of both nurses and clinical officers. These negative attitudes had a suppressor effect on the predicted variance, i.e., these contributed negatively to the intention to perform examinations in women. Factors such as patient preference and resource constraints also influence prediction in the TPB [20, 30].

There were direct effects on perceived behavioural control from the external variables that were hypothesized to predict intention. Having worked for more than 5 years and being female had a positive influence on the performance of vaginal examinations. However, being a dispensary and seeing more than 50 patients per day suppressed the variance in perceived control and confidence in performing examinations [41, 42]. More than 36 countries in sub-Saharan Africa have been classified by the World Health Organization as having a critical shortage of health workers. This includes Kenya, which is a constraint in implementing public health interventions, especially in primary care.

How can we improve gynaecological examination of women and detection of abnormalities, to refer women with cervical cancer earlier? The first problem to address is the staff shortages in rural areas. Increasing the staff would reduce the workload, thereby creating more time for thorough history taking and examination of women.

Women will still need screening and early detection, even once a human papillomavirus vaccination program is in place. However, establishing such a program will take time and those who are sexually active now must be examined if they present with recurrent bleeding and discharge. Therefore, health providers should be encouraged to do away with any negative attitudes and to develop the motivation, competence, and confidence to perform gynaecological examinations when necessary [39, 40].

Working in a dispensary was found to be associated with negative attitudes toward examining patients. Motivation to do what other colleagues expect, and even the capability and confidence to examine patients, is reduced in the presence of negative attitudes. This may not be owing to the provider's attitudes alone but may also be influenced by the lack of supplies and equipment. Availability of the proper environment may prompt health workers to make the effort to examine patients. Therefore, another area to address is improving the supply/reserves of dispensaries, which are relatively smaller than health centres but are easier for the population to reach [42].

Indirect measures of attitude included questions on the negative outcomes of performing a vaginal examination. This must be addressed via knowledge provided to health care professionals. For example, fear of spreading infection or causing further bleeding is not a valid reason to avoid conducting a vaginal examination. This is also clinically related behaviour, whose performance may depend on several factors, such as those highlighted by Godin et al [30, 31]. Past behaviour was not a variable in those studies,

which would have indicated whether a habit is common among practitioners and whether providers have actually been examining patients during a longer period.

## **Study strengths and limitations**

One main strength of this study is that we created our questionnaire using a guide developed based on the well-established theory of planned behaviour (TPB). For the first time, we developed and used case scenarios in this study; additional studies are needed to clarify whether these can be considered adequate as a proxy to measure intention.

Path analysis examines the contribution of specific variables within a specific model, without testing for causality (a single regression will not test the contribution of that path to the model. One model cannot be compared with another based on the  $R^2$ ). However, path analysis fits with the findings of other studies using the TPB to predict health providers' intentions.

This was a cross-sectional study and therefore has limitations inherent to this study design. Although we used the TPB to guide and support the correlations and associations found in our study, we could not provide evidence regarding the cause of health care providers not performing a gynaecological examination.

Some questions had low factor loadings and may not have measured the latent variables they were intended to measure.

Participants completed the questionnaires during regular working hours and their answers may be unreliable or may have been different if given more time. Providers who had busy schedules or were unavailable were not included in the analyses. These limitations, together with the small sample size, may have impacted the results.

Although limited by these factors, this study demonstrates the potential of the TPB to identify the predictors of health providers' intention to perform gynaecological examinations in women. This study provides direction for further research, which should be carried out using an adequate random sample, to better understand the behaviours of primary health care providers regarding gynaecological examinations.

## **Importance of the findings for public health**

The behaviour of primary health care workers in performing gynaecological examination among patients with symptoms of abnormal bleeding or discharge may lead to earlier diagnosis in cervical cancer and other genital tract diseases. Our study findings will inform policy makers of interventions to improve clinical effectiveness through identifying modifiable factors like knowledge, attitudes, self-efficacy, and a lack of resources, which can be used to eventually improve the intention-to-action of performing gynaecological examinations.

In this study, subjective norms were associated with intention, which suggests that providers felt that examining patients is expected and colleagues also perform gynaecological examinations of patients. Perceived control also predicted intention; however, several barriers were found. Eliminating these barriers and supporting feelings of confidence in conducting vaginal examinations should be included in the interventions. Initially, this will be based on guidelines, but eventually such behaviours should become habitual.

## Conclusions

In predicting the intention to examine women who present with abnormal vaginal bleeding or discharge, the TPB appears to be a suitable theoretical basis for investigating this behaviour. Our study findings indicated that DMSN, DMPBC, and indirect measures of attitude could only explain 47% of the variance in the intention to perform a gynaecological examination when a woman consults for recurrent abnormal vaginal bleeding. This variance was also explained by several external variables: the number of patients attended per day, being a nurse, being a dispensary facility, and cadres with both nurses and clinical officers working together. Resource constraints (as evidenced by workload and type of facility, i.e., dispensary) within the health facilities had a negative association with intention.

No other studies have explicitly used the TPB to investigate health providers' behaviours regarding gynaecological examination of women. Therefore, our study serves as an important baseline for other research involving clinical procedures in reproductive health. Our findings also provide research-based evidence in how TPB constructs can be exploited to best improve patient care.

## Abbreviations

WHO	World Health Organization
PALM-COEIN	Polyps, Adenomyosis, Leiomyoma, Malignancy and hyperplasia, Coagulopathy, Ovulatory dysfunction, Endometrial, Iatrogenic, and Not classified yet.
TPB	Theory of Planned Behaviour
DMA	Direct measures of attitude
DMSN	Direct measures of subjective norms
DMPBC	Direct measures of perceived behavioural control
IMA	Indirect measures of attitude
IMSN	

Indirect measures of subjective norms

IMPBC

Indirect measures of perceived behavioural control

RN

Registered nurse

CO

Clinical officer

## Declarations

**Ethics approval and consent to participate:** Approval for the study was granted by 1) Moi University School of Medicine Institutional Research and Ethics Committee (IREC) -FAN: IREC 1071. 2) Ghent University, Commissie voor Medische Ethiek, ONS KENMERK, PA 2011/019.

**Consent for publication:** Not applicable.

**Availability of data and material:** The datasets used and/or analysed during the study are available from the corresponding author on reasonable request.

**Competing interests:** The authors declare that they have no competing interests.

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**Authors' contributions:** EM: conception and design, development of methodology, acquisition of data, analysis and interpretation of data, and writing of article. MT, HB, VN: concept design and review proposal writing. EM, BO: data collection. EM, GVH, SV: Data analysis and interpretation. MT, PG, GVH, BO, HB, VN, and EM: read and approved the final manuscript.

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## References

1. GLOBOCAN. International agency for research on cancer estimated cancer incidence and mortality worldwide in 2018. <http://globocan.iarc.fr/Default.aspx>. Accessed 22 Aug 2019.
2. Kenya National Bureau of Statistics. Kenya demographic and health survey 2014. Nairobi, Kenya: Kenya National Bureau of Statistics; 2015.
3. Were EO, Buziba NG. Presentation and health care seeking behaviour of patients with cervical cancer seen at Moi Teaching and Referral Hospital, Eldoret, Kenya. *East Afr Med J.* 2001;72:55-9.

4. Gakidou E, Nordhagen S, Obermeyer Z. Coverage of cervical cancer screening in 57 countries: low average levels and large inequalities. *PLoS Med.* 2008;5:e132.
5. Gichangi P, Estambale B, Bwayo J, Rogo K, Ojwang S, Opiyo A, et al. Knowledge and practice about cervical cancer and pap smear testing among patients at Kenyatta National Hospital, Nairobi Kenya. *Int J Gynecol Cancer.* 2003;13:827-33.
6. Mwaka AD, Okello ES, Wabinga H, Walter FM. Symptomatic presentation with cervical cancer in Uganda: a qualitative study assessing the pathways to diagnosis in a low-income country. *BMC Women's Health.* 2015;15:15.
7. van Schalkwyk SL, Maree JE, Wright SC. Cervical cancer: the route from signs and symptoms to treatment in South Africa. *Reprod Health Matters.* 2008;16:9-17.
8. Issah F, Maree JE, Mwinituo PP. Expressions of cervical cancer-related signs and symptoms. *Eur J Oncol Nurs.* 2011;15:67-72.
9. Martinez RG. "What's wrong with me?": Cervical cancer in Venezuela—living in the borderlands of health, disease and illness. *Soc Sci Med.* 2005;61:797-808.
10. de Weerd S, Westenend PJ, Kooi SG. Cervical cancer in 2 women with a Mirena(R)-pitfalls in the assessment of irregular bleeding: a case series. *Cases J.* 2008;1:62.
11. Lumsden MA, Gebbie A, Holland C. Managing unscheduled bleeding in non-pregnant premenopausal women. *BMJ.* 2013;346:f3251.
12. Were E, Nyaberi Z, Buziba N. Integrating cervical cancer and genital tract infection screening into mother, child health and family planning clinics in Eldoret, Kenya. *Afr Health Sci.* 2010;10:58-65.
13. de Nooijer J, Lechner L, de Vries H. A qualitative study on detecting cancer symptoms and seeking medical help; an application of Andersen's model of total patient delay. *Patient Educ Couns.* 2001;42:145-57.
14. Robinson KM, Christensen KB, Ottesen B, Krasnik A. Socio-demographic factors, comorbidity and diagnostic delay among women diagnosed with cervical, endometrial or ovarian cancer. *Eur J Cancer Care (Engl).* 2011;20:653-61.
15. Anorlu RI. Cervical cancer: the sub-Saharan African perspective. *Reprod Health Matters.* 2008;16:41-9.
16. Unger-Saldana K, Infante-Castaneda C. Delay of medical care for symptomatic breast cancer: a literature review. *Salud Publica Mex.* 2009;51:s270-s85.
17. Hjertholm P, Moth G, Ingeman ML, Vedsted P. Predictive values of GPs' suspicion of serious disease: a population-based follow-up study. *Br J Gen Pract.* 2014;64:e346-e53.
18. Rimer B, Glanz K. *Theory at a glance. A guide for health promotion practice.* Washington, D.C: U.S. Department of Health and Human Services, National Institutes of Health; 2005.
19. Grimshaw JM, Eccles MP, Steen N, Johnston M, Pitts NB, Glidewell L, et al. Applying psychological theories to evidence-based clinical practice: identifying factors predictive of lumbar spine x-ray for low back pain in UK primary care practice. *Implement Sci.* 2011;6:55.

20. Perkins MB, Jensen PS, Jaccard J, Gollwitzer P, Oettingen G, Pappadopulos E, et al. Applying theory-driven approaches to understanding and modifying clinicians' behaviour: what do we know? *Psychiatr Serv.* 2007;58:342-8.
21. Sable MR, Schwartz LR, Kelly PJ, Lisbon E, Hall MA. Using the theory of reasoned action to explain physician intention to prescribe emergency contraception. *Perspect Sex Reprod Health.* 2006;38:20-7.
22. Walker AE, Grimshaw JM, Armstrong EM. Salient beliefs and intentions to prescribe antibiotics for patients with a sore throat. *Br J Health Psychol.* 2001;6:347-60.
23. Koyio LN, Kikwilu E, Mulder J, Frencken JE. Attitudes, subjective norms, and intention to perform routine oral examination for oropharyngeal candidiasis as perceived by primary health-care providers in Nairobi Province. *J Public Health Dent.* 2013;73:127-34.
24. Ponnet K, Wouters E, Walrave M, Heirman W, Van Hal G. Predicting students' intention to use stimulants for academic performance enhancement. *Subst Use Misuse.* 2015;50:275-82.
25. Green SB. How many subjects does it take to do a regression analysis? *Multivariate Behav Res.* 1991;26:499-510.
26. Francis J, Eccles MP, Johnston M, Walker AE, Grimshaw JM, Foy R, et al. Constructing questionnaires based on the theory of planned behaviour: a manual for health services researchers. Newcastle upon Tyne, UK: Centre for Health Services Research, University of Newcastle upon Tyne; 2004.
27. Icek Ajzen. The Theory of Planned Behaviour. *Organ Behav Hum Decis Process.* 1991;50:179-211.
28. Nigel Lindemann. What's the average survey response rate? [2019 benchmark]. <https://surveyanyplace.com/author/nigel-lindemann/>. Accessed 23 Nov 2019.
29. Draugalis RJ, Coons SJ, Plaza CM. Best Practices for Survey Research Reports: A Synopsis for Authors and Reviewers. *Am J Pharm Educ.* 2008;72:11.
30. Godin G, Belanger-Gravel A, Eccles M, Grimshaw J. Healthcare professionals' intentions and behaviours: a systematic review of studies based on social cognitive theories. *Implement Sci.* 2008;3:36.
31. Eccles MP, Grimshaw JM, MacLennan G, Bonetti D, Glidewell L, Pitts NB, et al. Explaining clinical behaviours using multiple theoretical models. *Implement Sci.* 2012;7:99.
32. Nilsen P, Roback K, Brostrom A, Ellstrom PE. Creatures of habit: accounting for the role of habit in implementation research on clinical behaviour change. *Implement Sci.* 2012;7:53.
33. Munro MG, Critchley HO, Broder MS, Fraser IS. FIGO classification system (PALM-COEIN) for causes of abnormal uterine bleeding in nonpregnant women of reproductive age. *Int J Gynaecol Obstet.* 2011;113:3-13.
34. Landy R, Birke H, Castanon A, Sasieni P. Benefits and harms of cervical screening from age 20 years compared with screening from age 25 years. *Br J Cancer.* 2014;110:1841-6.
35. Denny L. Control of cancer of the cervix in low- and middle-income countries. *Ann Surg Oncol.* 2015;22:728-33.

36. Randall TC, Ghebre R. Challenges in prevention and care delivery for women with cervical cancer in Sub-Saharan Africa. *Front Oncol.* 2016;6:160.
37. Crouch M. Reversing the trends: the second national health sector strategic plan of Kenya – NHSSP II 2005–2010. Nairobi, Kenya: Ministry of Health, Health Sector Reform Secretariat Afya House; 2006.
38. Lim JN, Ojo AA. Barriers to utilisation of cervical cancer screening in Sub Sahara Africa: a systematic review. *Eur J Cancer Care (Engl).* 2017; doi:10.1111/ecc.12444.
39. Modibbo FI, Dareng E, Bamisaye P, Jedy-Agba E, Adewole A, Oyeneyin L, et al. Qualitative study of barriers to cervical cancer screening among Nigerian women. *BMJ Open.* 2016;6:e008533.
40. Williams M, Kuffour G, Ekuadzi E, Yeboah M, EIDuah M, Tuffour P. Assessment of psychological barriers to cervical cancer screening among women in Kumasi, Ghana using a mixed methods approach. *Afr Health Sci.* 2013;13:1054-61.
41. McQuide PA, Kolehmainen-Aitken RL, Forster N. Applying the workload indicators of staffing need (WISN) method in Namibia: challenges and implications for human resources for health policy. *Hum Resour Health.* 2013;11:64.
42. Willcox ML, Peersman W, Daou P, Diakite C, Bajunirwe F, Mubangizi V, et al. Human resources for primary health care in sub-Saharan Africa: progress or stagnation? *Hum Resour Health.* 2015;13:76.

## Figures

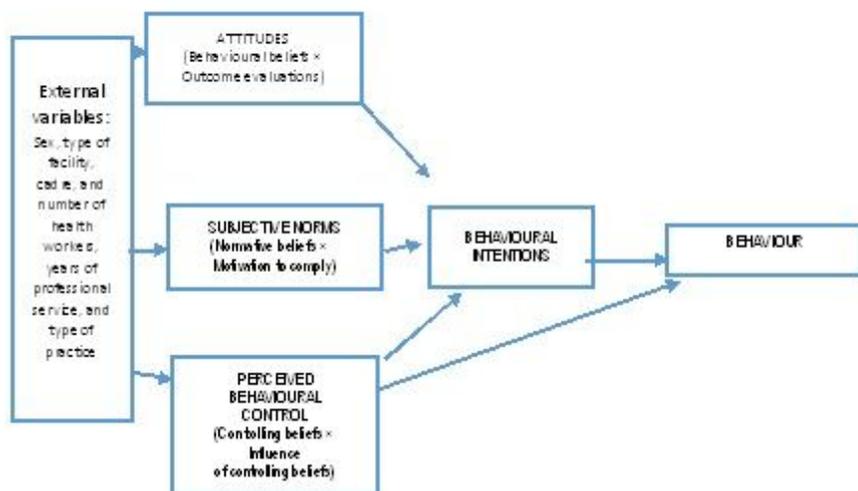


Figure 1

Theory of planned behaviour (TPB) [27]

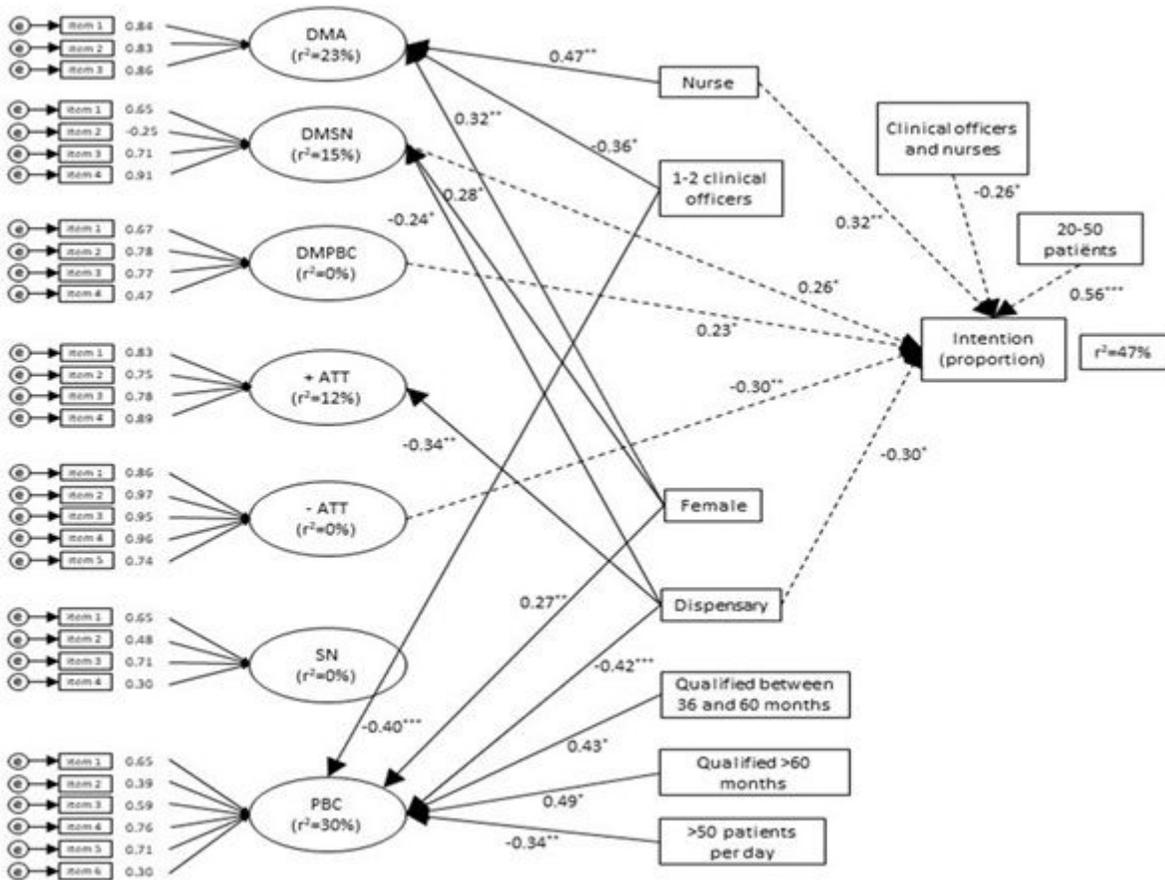


Figure 2

Graphic representation of the SEM exploring the relationships among the predictor variables of the TPB and intention to do a gynaecological examination.

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