

Narrative Comparison Analysis of Colorectal Cancer Knowledge, Attitudes, and Practices of Health Care Workers in South Africa and Brazil

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Abstract

Aim: To conduct a narrative comparison of knowledge, attitudes, practices (KAP) and associated factors related to colorectal cancer (CRC) screening among health care workers (HCWs) working in South Africa (SA) and Brazil (BR).

Method: We conducted a KAP in South Africa in 2021 (not yet published) and compared the results to a similar study conducted in Brazil which was identified through literature search of using multiple search engines and met the inclusion criteria (similar objectives, both used cross-sectional study designs, conducted the survey in public health settings, conducted in prior to implementation of CRC national screening programmes, conducted in country that is part of BRICS partnership, focused on KAP of health care workers, focused on CRC, similar questions included in their data collection tools.). The comparative study was published in 2015. The South African (SA) study was conducted in 21 public health primary health care facilities in the city of Durban located in KwaZulu-Natal province (one of 9 provinces) in South Africa. Whereas the study from Brazil, randomly selected Health units (n = 1 600) across 26 states and the Federal District. There were 109 health care workers that responded to the survey in South Africa and a total of 1 251 that responded to the survey in Brazil. The study data was analysed using SPSS version 28 and SAS v.9.3 for South Africa and Brazil respectively. The narrative comparison used the STROBE checklist and captured data using Microsoft Excel to highlight the comparisons between the two studies.

Results: There were similarities in terms of study design, setting, target population, subject matter, question used for data collection and data analysis. Differences were observed in terms of year of data collection, the data collection methods, study sampling methods, study size and geographic coverage, study. In South Africa, self-administered survey was used while in Brazil, telephonic interviews were conducted. All participants in the facilities were invited to participate in the South African study, whereas, in Brazil, only those that were randomly selected were invited to participate. Random sampling used in BR compared to purposive sampling in SA, with the sample size much smaller than in Brazil. None of participants mentioned outreach CRC screening in SA, and only eleven of the participants reported to have ever conducted CRC screening. Whereas, in BR, four hundred (25%) units conducted outreach CRC screening. Eighty-three (47%) of doctors and 244 (65%) of nurses reported not conducting CRC screening. The South African study setting only included one city (11% coverage), whereas the Brazilian study was conducted in all states and Federation districts (100% coverage).

The results reported from both studies showed that there were differences in knowledge, attitudes and practices of medical doctors and nurses in both countries. The South African study showed that HCWs were less knowledgeable about CRC screening, types of screening tests, and had perceived these tests as less effective than the HCWs in the Brazilian study. The results of both

shown statistically significant associations between perceived influence of guidelines and outreach screening services provision. There was also a significant association between perceived influence of guidelines and the screening tests. The CRC screening practice, in SA study, was associated with previous training; working at least 40 hour a week, familiarity with different types of screening tests and perceived influence of NCCF and test to be effective. Whereas, in the Brazilian study screening was associated with gender, age, number of patients seen, clinical experience, start age of routine screening, familiarity of and perceived effectiveness of CRC screening tests. CRC screening in SA study only had significant association with a 40 hour working week, while in the BR study CRC screening has significant association with younger age, more than 5 years clinical experience, working 40 hours per week, solid familiarity with gFBOT and perception of gFBOT as very effective.

Conclusion: The narrative comparison review of the two studies from both countries highlights poor knowledge, attitudes and practices related to CRC screening. This is the first study to compare the KAP study results among HCWs from the two developing countries. It also highlights the importance of raising awareness of CRC burden, policy development, training and health systems preparedness is critical to enable access, uptake and shift health care worker attitudes and practice towards CRC screening.

Keywords: Colorectal Cancer; Cancer Screening; South Africa; Knowledge; Attitude; Practices; Brazil

Introduction

Globally, colorectal cancer (CRC) is one of the top three most common cancers affecting both men and women [1]. Another report projected that by 2035, the CRC new cases will increase across countries based on the geography, risks factors and population types [2]. South Africa (SA) reported new colorectal cancer cases of 5 570 and 4 600 deaths in 2019 [3]. According to the WHO Global Cancer Country Sheet 2020, there are 7 354 (6.8%) new cases of CRC in 2020. South Africa (SA) age-standardised mortality rate for 2020 was estimated to be 7.5 per 100 000 population [4].

The recent review of disease burden reported an increase in the number of deaths including age-standardised death rates between 2010 and 2019 in Africa [5].

The Brazilian new cases between period 2015 to 2016 were recorded as 1 322, made up of 40% males and 60% females Aracaju, Sergipe State, Brazil [6]. In 2020, the CRC estimated age-standardized (World) incidence rates (ASIR) to be at 19.4 per 100 000 population and the CRC mortality rate was 9.5 per 100,000 populations for Brazil (BR) [3]. It is projected that by 2030, CRC new cases will increase by 39% in Brazil. Brazil have higher CRC age standardised (world) incidence rate (ASIR) estimates when compared to their regional ASR estimates at 19.6 versus 18. 6 per 100,000 for the South American region [1,7,8].

Noting the above , prevention and control to mitigate the rise of incidence rates require early screening. There is various type of

screening tests currently used including , guaiac faecal blood tests (gFBOT), colonoscopy and flexible sigmoidoscopy. These have been found to be both highly sensitive and specific to detect CRC for those 50 years and older [9]. However, the Markov model showed that reducing the start age by 5 years and increasing CRC screening using colonoscopy test is highly cost effective in terms number of averted CRCs, number of deaths and increased quality-adjusted life-year (QALY) [10].

Justification of the review

In most developed countries, national CRC screening programmes are implemented, while in developing countries only targeted screening programmes for high-risk groups were recommended as cost effective due to low CRC burden [11]. However, as the incidence and prevalence of CRC increases over the years, The Brazilian National Cancer Institute (INCA) recommendations for CRC screening and the Ministry of Health approved national population-based CRC screening programme (including surveillance) in Brazil, however, many hospitals started to implement screening in 2015, like Barreto's cancer hospital [8,9,13].

The introduction of the programme and surveillance systems enabled Brazil to train service providers to use different screening tests and also assisted the country to correctly monitor the CRC trends by geographical area [9,13].

Although South Africa has The National Cancer Control Framework (NCCF), that mentioned CRC as the fifth leading cause of cancer deaths in South Africa, however, the first 4 cancers are prioritised for prevention and control. Nonetheless, noting there are high-risks groups that still need to be screened, the South African CRC Society had developed the screening guidelines for use by clinicians located in both public and private sector facilities. Hence it is important to compare KAP of health care workers before to establish a baseline for future comparison after the introduction of the screening guidelines in South Africa.

Research questions

- **Primary:** What are differences and similarities of KAP related to CRC screening in South Africa compared to Brazil at a time when no national CRC screening programme is implemented in both countries?
- **Secondary:** What are differences and similarities of associated variables and factors affecting KAP related to CRC screening in both countries?

The primary aim of this paper is to present a narrative comparison review of two studies conducted on knowledge, attitudes, and practices of HCWs related to CRC screening in South Africa and. The secondary objective is to compare findings and factors identified by both studies to be associated with screening in South Africa and Brazil. The authors outline a narrative comparison starting from study design, sample strategy, study participants, questionnaire design, data collection methods as well as results from both studies.

Why the comparison of South Africa and Brazil?

- Both countries are ranked by the World Bank as upper middle-income countries, both have similar disease patterns and are members of the BRICS partnership [14,15].
- This comparison is conducted at the point when the CRC burden is gradually increasing in both countries, as reported by the GLOBOCAN reports, however, when the national CRC screening policy or programme did not exist in both countries.
- It is critical to identify any similarities and differences in the KAP responses based on this context for South Africa to apply lessons and actions learned from Brazil since the introduction of the national screening programme through south-south partnership. Both countries are perceived to be emerging leaders and influencers in the global health space [15].

- These are the very first KAP studies ever conducted in both countries.

Structure of the paper

This paper presents a narrative comparative review, conducted in May and July 2022 using two studies on KAP related to CRC in South Africa and Brazil. The comparison is reported using the STROBE checklist.

The SA based KAP study findings were analysed in 2021 by authors in South Africa (are yet to be published) [16].

Approach used to select a study for comparison

To identify the Brazilian KAP study comparison, the authors searched PubMed/Medline, Google Search, Academia, Research gate, Web of Science and Cochrane database focusing on peer reviewed journals from January 2000 to June 2022 [17]. The search was limited to articles published in English or with abstracts translated in English. The research terms used were "Colorectal, colon cancer; colon neoplasm, knowledge, attitudes, practices, health care workers, nurses, doctors, Brazil". A further search of each article was done to learn more about the study design, sampling size and study findings.

Selection criteria of the study to be used for comparison included:

- Had to be a cross-sectional study
- Had to be published from Brazil
- Assessed knowledge, attitudes, and practice of health care workers
- Conducted in the public health sector system
- Published between January 2000 and June 2022
- Published before the CRC population-based registry or national CRC screening programme implementation.

Of the ten studies were identified published, only one addressed knowledge, attitude and practice; was published within the time period and published before the implementation of the CRC population-based registry in Brazil. The study had used a cross sectional study design. This national study was published in 2015 [17].

Comparison of Data Collection methods reported in each study

In South Africa: the primary study data was collected between May and December 2021 using a self-administered questionnaire written in English and interviews lasted 10 minutes on average.

The HCWs that submitted a completed copy of the questionnaire to the facility coordinator were classified as fully consented and participated in the study. The submissions were obtained after two weeks after distribution. Due to covid 19 lock down regulations some questionnaires were submitted via email.

In Brazil: the comparison study data was collected in 2011. A telephone survey was conducted as part of the Guide for Useful Interventions for Physical Activity in Brazil and Latin America (GUIA) project. The questionnaire was drafted in English and translated to Portuguese by native speakers. Interviews lasted 40 minutes on average [17].

Comparison of Study setting, sampling strategy and size reported in each study

Purposive sampling technique was used to select facilities in South Africa and random sampling technique was used in Brazil.

- **In South Africa:** There were 21 of 48 public primary health care facilities managed by the province (excluding the municipality) were selected to participate including (4 community health centres (CHCs), 14 primary health care linked to CHCs and 3 gateway facilities) located in Durban metropole district, KwaZulu-Natal province, South Africa. All health care workers located in the selected primary health care facilities were invited to participate. A total of 109 health care workers (HCWs) participated in the study including professional nurses; medical doctors and ancillary health care professionals as well as the programme managers providing oversight at the selected facilities or sub-regional or district levels [16].
- **In Brazil:** 1 600 of the 42,486 health care units were randomly sampled from all regions of Brazil. From the selected units, a total of 1 600 coordinator, 534 medical doctors and 533 professional nurses were selected to participate in the study. Details about the design and sampling methods can be found elsewhere [17].

Comparison of ethics approvals reported by each study

In South Africa ethical approval for the KAP and the comparative study was obtained from the University of Antwerp, Belgium and the University of Pretoria, South Africa (Reference numbers: 20/11/127 and 434/2020). The study was also approved by the provincial Department of Health and supported by the Durban district health office and approved by facility managers or facility-based ethics committees [16].

In Brazil, the study was reviewed and approved by the Research Ethics Committee of the Federal University of Pelotas, and the institutional review boards of Washington University in St. Louis and the U.S. Centres for Disease Control and Prevention [17].

Comparison of Data collection tools reported in each study

The questionnaire included information on general demographics of the respondents and facilities and HCW characteristics including location, catchment area, number of clinical and educational years of experience. There were only 54 items included in the SA study questionnaire and 79 items in the BR study. However, the majority of questions used in SA were taken from the study in BR to facilitate comparison of the responses between the two countries.

The questionnaire was divided into three components namely:

- **Knowledge:** questions about familiarity with guidelines, different types of screening tests and the start age of routine CRC screening and intervals for screening using gFOBt, sigmoidoscopy, and colonoscopy. Experience of training on CRC screening (yes or no).
- **Attitudes:** questions about effectiveness of different types of CRC screening tests; and influence of policies or guidelines in performing CRC screening.
- **Practices:** Participants were also asked about conducting CRC screening and if they recommended screening during consultations and types of screening tests used or recommended for use [16,17].

Comparison of statistical analyses reported in each study

In both studies, descriptive analysis was performed to summarize respondent and facility characteristics, CRC screening knowledge, attitudes, and practices in both countries. Continuous

variables are presented as medians with 25th and 75th percentiles, and discrete variables are presented as frequencies and percentages. The Pearson chi-square test was used for discrete variables. Bivariate analyses were performed to predict and compare key characteristics of medical doctors that performed CRC screening using alpha of 0.05 for analysis. The South African study used SPSS version 28 (IBM, US) for data analysis and SAS v.9.3 (Cary, NC) was used to analyse data from Brazil [16,17,20]. The authors used Microsoft Excel to compare findings from both studies.

Comparison of results reported by each study

Comparison of the results on the influence of CRC screening policy/guidelines on health care worker promotion of screening in South Africa and Brazil

South Africa: Out of 21 facilities that responded to the survey, 43 (39%) were familiar with the SA National Cancer Control Framework (NCCF) and sixteen (19%) of participants from eight (38%) of facilities perceived the NCCF to be influential to facilitate cancer screening. Whereas 93 (85%) of participants from 13 (62%) of facilities perceived NCCF as not influential since CRC control is included but the screening component is excluded from the NCCF. Although community outreach cancer screening services were available for breast, prostate, cervical cancers, however, six of 8 participants reported to use community CRC screening outreach services in the 21. Only two of participants from two facilities reported facility-based CRC screening was performed using barium contrast endoscopy method [16].

Two facilities had less than 500 headcount per month and six facilities had headcount between 501-1000 per month. Four facilities were in the South region of the city; two located in west and two in the north region of the city. Four facilities serviced between 200 000-400 000; two facilities serviced less than 200 000 and two facilities serviced more than 400 000 population catchment areas. The association of the characteristics of facilities were not statistically significant [16].

The recommendation for use of CRC screening tests was higher ($p < 0.001$) in facilities that did not perceive NCCF to be influential compared to facilities that perceived NCCF to be influential, especially for flexible sigmoidoscopy use 62% vs. 38%; and 77% vs.

50% for colonoscopy recommendation. The exception was gFBOT recommendation that was higher in facilities that perceived NCCF to be influential compared to facilities that did not perceive NCCF to be influential (75% vs. 46%). The association were statistically significant ($p < 0.001$) [16].

Brazil: Of the 1 600 participants that were recruited, 1 251 responded to the survey. Just over half (655;52%), were familiar with the Brazilian National Cancer Institute (INCA) cancer screening recommendations. Four hundred (25%) of the 1 600 units conducted CRC screening outreach activities, however, only 36% ($n = 209$) of units perceived the INCA recommendations for CRC screening to be influential and used to guide CRC screening. These facilities also reported high numbers of CRC screening outreach services and use of CRC screening tests compared to the units not influenced by and not using the INCA (64% vs. 3% for outreach; 69% vs. 39% for FOBT use; 26% vs. 12% for sigmoidoscopy use; and 38% vs. 20% for colonoscopy use [17].

Eighty-one units had less than 500 headcount per month, forty-seven units had headcount between 501-1000 per month and thirty-eight units had more than 1000 headcount per month. One hundred and four units were in the South region of the country; eighty-four located in the north region and twenty-one were in west region of the country. One hundred and forty-four units serviced over 15 000; 142 units serviced less than 5 000 and 23 units serviced between 5001-15 000 population catchment areas. The association of the characteristics of facilities were not statistically significant (Table 1) [16,17].

Comparison of reported characteristics of health care workers that reported to be influenced by NCCF cancer screening and INCA recommendations for CRC screening in South Africa and Brazil

In South Africa about sixteen (15%) perceived NCCF to be very influential while ninety-three (85%) did not perceive NCCF to be very influential. Of sixteen, eleven (69%) of South African participants provided services between 501 and 1000 patients, six (19%) provided services to less than 500 patients and one (6%) consulted with over 1000 patients monthly and one of participant did not consult directly with patients. Half of the South African participants were from the south ($n = 8$), 25% (n

• South Africa

Table 1:		Influence of NCCF recommendations for Cancer screening					
		Yes			No		
Characteristic	Category	Yes	%	No	%	p-value	
Number of patients seen per month	< 500	2	25%	6	40%	0.743	
	500-1000	6	75%	7	54%		
	>1000	0	0%	0	0%		
	Not providing direct care (not applicable)	0	0%	0	0%		
	Total	8		13			
Region of facility location	West	2	25%	2	22%	0.200	
	South	4	50%	6	46%		
	North	2	25%	4	31%		
	Other/urban	0	0%	1	8%		
	Total	8		13			
Number of population within facility catchment area	Less than 200 000	2	25%	4	31%	0.058	
	200 000-400 000	4	50%	5	38%		
	More than 400 000	2	25%	2	15%		
	Other/urban	0	0%	2	15%		
	Total	8		13			
gFBOT recommended for use						<0.001	
gFBOT recommended for use	Yes	0	0%	0	0%	<0.001	
	No	8	100%	13	100%		
	Total	8		13			
Flexible sigmoidoscopy recommended for use						<0.001	
Flexible sigmoidoscopy recommended for use	Yes	3	38%	8	62%	<0.001	
	No	5	62%	5	38%		
	Total	8		13			
Colonoscopy recommended for use						<0.001	
Colonoscopy recommended for use	Yes	4	50%	10	77%	<0.001	
	No	4	50%	3	23%		
	Total	8		13			

Source: [16] Magwaza, S. et al. (2023). Health Care Worker Knowledge, Attitudes, and Practices in Colorectal Cancer Screening in South Africa.

• Brazil

Table 1:		Influence of INCA recommendations for Cancer screening					
		Yes			No		
Characteristic	Category	Yes	%	No	%	p-value	
Number of patients seen per month	< 500	83	39%	130	61%	0.02	
	500-1000	47	22%	165	78%		
	>1000	38	18%	95	46%		
	Not providing direct care (not applicable)	0	0%	0	0%		
	Total	168		391			
Region of facility location	West	23	10%	10	5%	0.002	
	South	104	50%	189	95%		
	North	34	16%	126	62%		
	Other/urban	0	0%	0	0%		
	Total	161		325			
Number of population within facility catchment area	Less than 5 000	142	87%	241	63%	0.36	
	5 000-15 000	13	8%	10	3%		
	More than 15 000	14	9%	15	4%		
	Other/urban	0	0%	0	0%		
	Total	169		366			
gFBOT recommended for use						<0.001	
gFBOT recommended for use	Yes	138	82%	10	3%	<0.001	
	No	30	18%	361	97%		
	Total	168		371			
Flexible sigmoidoscopy recommended for use						<0.001	
Flexible sigmoidoscopy recommended for use	Yes	138	82%	140	39%	<0.001	
	No	32	19%	223	61%		
	Total	170		363			
Colonoscopy recommended for use						<0.001	
Colonoscopy recommended for use	Yes	49	29%	43	12%	<0.001	
	No	119	71%	327	88%		
	Total	168		370			

Source: [17] Magwaza, S. et al. (2023). Health Care Worker Knowledge, Attitudes, and Practices in Colorectal Cancer Screening in Brazil.

Table 1: Influence of NCCF recommendations for Cancer screening.

= 4) west and 25% from the north regions of the city of Durban, South Africa. Regarding the facility whose staff perceived NCCF to be very influential, over half (n = 4; 57%); of the facilities served a population between 200 000 to 400 000 people; one (14%) served a population of less than 200 000 and two (29%) served a population of more than 400 000. Only a few HCW that perceived NCCF to be influential recommended the use of gFBOT (n = 2;13%) ; flexible sigmoidoscopy (n = 1;6%) and colonoscopy (0%) in SA compared (n = 7;8%); (n = 2;2%) and eight (9%) respectively for HCWs who did not perceive NCCF to be influential (as shown in Table 1) [16,17].

In Brazil, 209 (36%) participants perceived INCA recommendations for screening to be very influential and 375 (64%) did not perceived these as influential. Of the 209 participants in Brazil, eighty-one (38%) of Brazilian provided services to less than 500 patients, forty-seven (33%) provided services between 501 and 1000 patient and thirty-eight (31%) consulted with over 1000 patients monthly. Half of participants were from the

south region , 40% were from the north and 10% were from the west regions of Brazil. Fourteen units with staff using INCA recommendations (39%) serviced a population more than 15,000 people in Brazil; 142 (37%) served a population of less than 5 000 people; and twenty-three (29%), served a population between 5 001 and 15 000 people [17].

There were not any statistically significant association found between characteristics of facilities and participants that perceived NCCF or INCA to be or not very influential in both countries as it related to number of patients seen per month, the facility locations and facility catchment area.

In South Africa, there was less influence of the NCCP, in general, as no more than three participants reported that they would recommend the CRC screening tests. The number of participants that recommended the use of CRC screening tests, gFBOT and flexible sigmoidoscopy were higher and lower for colonoscopy use for the group that perceived NCCF to be influential when compared to the group that did not perceive the NCCF to be influential. The association was statistically significant (p < 0.001) [16].

Brazil however reported high number of participants that conducted outreach screening services among those that perceived INCA to be influential, then the number of participants that did not conduct outreach services. Similarly, more than half of participants recommended the use of gFBOT than other screening tests among the group that perceived INCA to be influential and the association was statistically significant (p = <0.001), as shown in table 1 [16,17].

Comparison the reported association between Health Care Worker characteristics and knowledge, attitudes, and practice of CRC screening in South Africa and Brazil

In South Africa, of the 109 that responded to the survey, 10 were medical doctors and 76 were professional nurses. In Brazil, of the 1 251 that responded to the survey, 182 were medical doctors and 347 were professional nurses. Half of the South African doctors were males and half were females. Four were less than 30 years and six were over 30 years and half (5;50%) had graduated more than 10 years ago. Unlike in Brazil, the majority of medical doctors were male; over 30 years of age and had graduated more than 5 years ago (Table 2) [16].

• South Africa

Characteristic	Category	Medical Doctors	Professional Nurses	p-value
Gender	Male	5	5	0.983
	Female	5	71	
	Total	10	76	
Age	<30 yrs	2	10	0.406
	30-39 yrs	2	20	
	40-49 yrs	1	67	
	Total	5	97	
Number of years since graduation	<5 yrs	0	10	0.665
	5-10 yrs	0	20	
	10-15 yrs	1	10	
	Total	1	40	
Number of patients seen per week	<100	0	10	0.665
	10-100	0	20	
	>100	0	76	
	Total	0	106	
Hours worked per week	<10	0	10	0.665
	10-20	0	20	
	>20	0	76	
	Total	0	106	
Knowledge of colorectal cancer screening	Yes	0	5	0.805
	No	0	71	
	Total	0	76	
Attitude towards colorectal cancer screening	Yes	0	5	0.805
	No	0	71	
	Total	0	76	
Practice of colorectal cancer screening	Yes	0	5	0.805
	No	0	71	
	Total	0	76	
Recommendation of colorectal cancer screening	Yes	0	5	0.805
	No	0	71	
	Total	0	76	
Referral of colorectal cancer screening	Yes	0	5	0.805
	No	0	71	
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	Total	0	76	
Referral of colorectal cancer screening	Yes	0	5	0.805
	No	0	71	
	Total	0	76	
Referral of colorectal cancer screening	Yes	0	5	0.805
	No	0	71	
	Total	0	76	
Referral of colorectal cancer screening	Yes	0	5	0.805
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Referral of colorectal cancer screening	Yes	0	5	0.805
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	Total	0	76	
Referral of colorectal cancer screening	Yes	0	5	0.805
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Referral of colorectal cancer screening	Yes	0	5	0.805
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	Total	0	76	
Referral of colorectal cancer screening	Yes	0	5	0.805
	No	0	71	
	Total	0	76	
Referral of colorectal cancer screening	Yes	0	5	0.805

(p = 0.013), than the professional nurses (49%), however, the association was not significant (p = 0.743). The Brazilian medical doctors consulted with more patients per week than nurses (p < 0.001), while professional nurses reported to work 40 hours or more per week (p < 0.001) [16].

Regarding the knowledge on CRC screening, none of the South African medical doctors were more familiar with the either the NCCF or the types of screening tests. Whereas less than 10% of the South African professional nurses, were more familiar with the NCCF and the type of CRC screening tests. Many South African medical doctors and professional nurses did not know the start age for CRC screening and the majority did not perceive any of the CRC screening test to be very effective, with exception of colonoscopy as 60% of medical doctors perceived the tests as very effective. However ,the association was not statistically significant [16].

here were 30% of Brazilian medical doctors and 14% of professional nurses (p < 0.001) that had knowledge of the start age for CRC screening. However, almost two-thirds medical doctors and nearly half of professional nurses reported not to be screening

patients and the association was statistically significant (65% vs. 47%; respectively, p < 0.001). On the types of CRC screening tests, both medical doctors and professional nurses (85% and 77%, respectively; p = 0.16) identified gFOBT as the test used screening tests for CRC, in Brazil, followed by the colonoscopy (47% and 58%; p = 0.14) screening test and lastly, flexible sigmoidoscopy (25% and 38%; p = 0.04) . The association on perceived effectiveness of colonoscopy and influence of INCA recommendations, in Brazil were not statistically significant . However, the association on knowledge of start age, screening practice, and type of screening tests were statistically significant (Table 2) [17].

Comparison of reported association of Health Care Worker knowledge, attitudes, and practice of CRC screening in South Africa and Brazil

In South Africa, there were only eleven (10%) of participants reported to have conducted CRC screening before in South Africa and 98 (90%) of participants had never performed the screening before (Table 3) [16].

• South Africa

Characteristics	Health Care Workers (N= 40) Physicians who do not screen (n= 10)		Health Care Workers (N= 40) Physicians who screen (n= 30)		p-value
	Median	Q1, Q3	Median	Q1, Q3	
Age	35	25.50	45	25.50	0.145
Years since graduation	3	0-20.00	7.5	3.4	0.400
Hours worked per week	40	36-40	40	36-40	0.001
Patients seen per Week	250	100-50	50	50-120	0.000
	Number	%	Number	%	p-value
Gender					0.500
Male	11	33%	3	10%	
Female	27	67%	27	90%	
Region					0.440
West	10	30%	4	13%	
South	10	30%	6	20%	
North	3	9%	3	10%	
Central	8	24%	0	0%	
	31		11		
Knowledge, Attitudes, Practices					
Perception of NCCF recommendations for CRC screening	Number	%	Number	%	p-value
Very influential	0	0%	0	0%	0.304
Not very influential	25	60%	2	2%	
Familiarity with gFOBT					<0.001
More familiar	0	0%	2	7%	
Less familiar	30	90%	4	13%	
Familiarity with sigmoidoscopy					<0.001
More familiar	0	0%	2	7%	
Less familiar	30	90%	5	17%	
Perception of gFOBT effectiveness					0.001
Very effective	0	0%	4	13%	
Not very effective	30	90%	2	7%	
Perception of sigmoidoscopy effectiveness					0.001
Very effective	0	0%	5	17%	
Not very effective	30	90%	2	7%	
Perception of colonoscopy effectiveness					0.002
Very effective	0	0%	6	20%	
Not very effective	30	90%	0	0%	

Source: [16]Magwaza, S. et al. (2023). CRC screening knowledge, attitudes, and practices of health care workers in South Africa and Brazil. *Acta Scientific Gastrointestinal Disorders* 6.2 (2023): 03-15.

• Brazil

Characteristics	Physicians who do not screen (n= 43)		Physicians who screen (n= 92)		p-value
	Median	Q1, Q3	Median	Q1, Q3	
Age	42	33.54	33	28.44.5	<0.001
Years since graduation	13	6.28	5	1.14	<0.002
Hours worked per week	40	4-12	40	4-25	0.00
Patients seen per Week	100	15-6	120	16-9	0.12
	Number	%	Number	%	p-value
Gender					0.13
Male	42	51%	57	62%	
Female	41	49%	35	38%	
Region					0.07
West	13	16%	6	7%	
South	38	46%	59	64%	
North	33	38%	27	29%	
Knowledge, Attitudes, Practices					
Perception of INCA recommendations for CRC screening	Number	%	Number	%	p-value
Very influential	27	33%	27	40%	0.29
Not very influential	56	67%	55	60%	
Familiarity with gFOBT					0.03
More familiar	56	70%	77	84%	
Less familiar	24	30%	15	16%	
Familiarity with sigmoidoscopy					0.13
More familiar	36	45%	52	57%	
Less familiar	44	55%	40	43%	
Perception of gFOBT effectiveness					0.03
Very effective	52	63%	43	47%	
Not very effective	31	37%	49	53%	
Perception of sigmoidoscopy effectiveness					0.06
Very effective	67	81%	74	80%	
Not very effective	16	19%	18	20%	
Perception of colonoscopy effectiveness					0.20
Very effective	75	91%	87	97%	
Not very effective	7	9%	3	3%	

Source: [17]Braz, S. et al. (2023). CRC screening knowledge, attitudes, and practices of health care workers in South Africa and Brazil. *Acta Scientific Gastrointestinal Disorders* 6.2 (2023): 03-15.

Table 3: Comparison of KAP stratified by CRC screening experience.

Of the eleven participants (nine were females and two were males, with the median year since graduate of 7.5 years; median age of 45 years, median number of patients of 50 patient a month , and median number of hours of 40 hours per week. Only the number of hours worked has statistically significant association in South Africa [16].

There was an association identified although not statistically significant, between the medical doctors and professional nurses in South Africa, regarding perceived influence of NCCF, familiarity and perceived effectiveness of CRC screening tests (Table 3) [16].

The participants, in South Africa, that had conducted screening before were very familiar with all CRC screening tests than the group that had not screened before. The association was statistically significant ($p < 0.001$). There were 18% of participants in the screening group that were very familiar with gFBOT than 3% of the group that had not screened before. In terms of attitudes, 36% of those that had screened before perceived gFBOT to be very effective than 8% ($p = 0.001$) of those that had not screened before. Nearly half (45%) of the group that had screened before perceived flexible sigmoidoscopy to be very effective than 15% of those that had not screened before ($p = 0.003$). Over half (55%). In South Africa, those that had screened before perceived colonoscopy to be very effective than 28% that had not screened before ($p = 0.002$) [16].

In Brazil, there were 92 (60%) HCWs who performed CRC screening and 83 (4-%) of 209 medical doctors that reported not screening for CRC. Of those that screened, the median age was 33 years, median years since graduation was 6 years, median number of hours worked per week was 40 hours and median number of patients seen per month was 120 patients per month. The association were statistically significant for age, years since graduation and number of work hours per week ($p = <0.001$; <0.002 and 0.08, respectively) [17].

The Brazilian medical doctors that screened were mostly familiar with both gFBOT and flexible sigmoidoscopy than those that did not screen (77% vs. 33%; $p < 0.001$).

Over half (51%) were familiar with flexible sigmoidoscopy than 11% that did not screen ($p < 0.001$). However, both groups

perceived gFBOT and flexible sigmoidoscopy to be very effective in reducing CRC mortality (75% vs. 56%; $p < 0.001$) and (92% vs. 82%; $p < 0.01$) respectively. Both groups perceived colonoscopy to be very effective (94% vs. 97% ; $p = 0.22$), even though the association were not statistically significant in Brazil (Table 3) [17].

Comparison of reported factors associated with screening practices among medical doctors in South Africa and Brazil

The South African health care workers (both medical doctors and professional nurses) that conducted CRC screening were more likely to work at least 40 hours per week, perceived the National CRC guidelines to be more influential, perceived CRC screening tests as very effective (gFBOT, flexible sigmoidoscopy and colonoscopy). The association was statistically significant ($p = <.001$) as shown in table [16,17].

The Brazilian medical doctors that were not conducting CRC screening were younger ($p < 0.001$), new graduates ($p < 0.001$), were more familiar with FOBT ($p = 0.03$) but did not perceive gFBOT as very effective in reducing CRC mortality ($p = 0.03$). Female medical doctors (OR 2.18, 95% CI 1.07-4.42), ; located in the North were less likely to conduct screening when comparing with those practicing in the South (OR 5.99, 95% CI 1.10-32.67). The frequency of screening increased inversely to the number of years since graduation, with more years since graduation reporting less screening practice with odds ratio 1.37 (95% CI 1.17-1.60) for each 5-year increase in years since graduation (Table) [16,17].

Discussion based on the narrative comparative review of both studies

Both studies followed the STROBE guidelines and enabled the narrative comparison.

The overall comparison of the studies points to poor CRC capacity in facilities or units due to lack of national screening programme and infrastructure in both countries [11,16-17]. There are also few outreach screening services in both countries and the utilisation of CRC screening tests is also low, although much higher in BR units that are using the INCA recommendations. It is anticipated that by 2022, the utilisation has gradually increased since the introduction of a national CRC programme in Brazil. In both countries, gFBOT screening test was most recommended than other screening tests.

The comparison of both studies found differences in the perceptions on guidelines and influence on screening, with Brazil's presence of guidelines mostly influencing the use of CRC tests, similarly to other screening in Brazil [18,19]. Whereas the general NCCF were less influential in South African study. However, exposure to training promoted some CRC screening in South Africa.

Regarding to HCW characteristics, in Brazil, the professional nurses had poor knowledge of CRC screening more than the doctors, whereas this was opposite for South Africa. In general, nearly a third (30%) of participants from both countries knew the start age for starting routine CRC screening among the patients (age 50-55-year). This demonstrates poor knowledge of the eligible criteria as per guidelines in both countries. This is contrary to the study conducted in Malaysia, where there was no association between knowledge score and screening practice [21]. Training has potential to change attitudes regarding the perceived effectiveness of the tests and boost confidence to talk more about screening and motivate HCWs to recommend and conduct CRC screening during clinical assessment with patients [21,22].

There were more medical doctors in South Africa that perceived the tests to be very effective than the professional nurses. However, the numbers of professional nurses that perceived tests to be very effective were almost the same as the medical doctors in Brazil, except for gFBOT screening tests where 19% professional nurses perceived the test to be very effective more than the doctors. The association between the groups were statistically significant only in Brazilian study. Both South African and Brazilian studies reported medical doctors and nurses to have perceived colonoscopy as very effective, compared to the South African professional nurses. The advantage of colonoscopy is the ability to detect and remove lesions at the same time and is the oldest method, perceived to be a gold standard, for screening when compared to other modalities [23,24]. This signals that there may be other factors at play that influence practice, as identified in the South African studies and Brazil such as age, years since graduation; number of patients seen in each week. Hence, advocacy and training are recommended to promote early screening as it affects prognosis [25].

The South African study reported that the HCW that were screening for CRC were older than those in Brazil, had almost 8 years clinical experience since graduation and worked at least

40 hours per week. Whereas, in Brazilian study, the HCWs were younger, with six- years clinical experience but also worked at least 40 hours per week, although they consulted more clients than the South African HCWs in the study.

In both studies, the number of years since graduation of HCWs did not influence for CRC screening, unlike the data reported by other studies showing a significant increase in referral of patients for CRC screening by HCWs with an increased number of years of experience [26,27].

Some of the barriers to CRC screening cited by other studies include the lack of guidelines, training and exclusion of CRC screening as part of the PHC service package [20,27-30,38-39]. Training was found to be associated with CRC screening practice however was not found to be a significant predicting factor for CRC screening in the multivariate regression. Instead, perception of cost-effectiveness and adequate resources were factors affecting screening [20]. Furthermore, other strategies implemented, as reported by the National Cancer Institute, to close the CRC screening gaps have been recommended including enhancing cancer screening communication; equitable access to services, partnership and collaboration between the service providers and ensuring appropriate cancer risk assessment through information technology [31].

In South Africa, the study was conducted in the public health system, whereas, in Brazil, the study was conducted in a country with national insurance system [16,17]. Noting a strong private health sector system in South Africa, it is important to assess similar knowledge, attitudes and practices in this sector as most of the clients that perform CRC screening access it through the private care access system. As an example, a study from South Africa reported that there were 150 000 colonoscopies conducted in the private sectors compared to only 70 000 in public health facilities and they offer both static and mobile outreach programs [32,33,38-39]. Similarly, the study from Brazil, recommended that further work need to be explored in the private sector to determine CRC screening status [17].

When comparing the factors affecting CRC screening analysed in both studies, the statistically significant variables between HCWs that have or have not conducted CRC screening before, include

number of hours worked per week; number of patients seen per week, perceived effectiveness of screening tests and influence of NCCP for the South Africa study. While the Brazilian study reported gender and number of years since graduation as statistically significant. To gain optimal screening effectiveness, other studies have recommended that patients, providers, and health systems related factors must be addressed together [34,35]. Additionally, addressing health systems factors affecting screening supply and uptake have been reported to support continuum of care among high-risk population [36-39].

Narrative review limitations

The strength of the narrative review is the focus on two cross sectional studies conducted in different countries but with similar questionnaires. Although the search strategy included many popular databases, however, it may not have been comprehensive, as some of the databases such as EMBASE were excluded, hence, there may be other similar studies published from Brazil that could have met the inclusion criteria for comparison. Nonetheless, the paper compares two studies that were conducted at a time, when there was not any national screening programme in both countries, which makes it possible to compare the status of CRC screening in both countries. In addition, both studies used sampling strategies that ensured a balance representation on both countries within the public health system. However, both studies had also reported study limitations including:

- Response bias, due to low response rates among medical doctors in both countries. Word of mouth or reported use, familiarity without any verification. Self-administered questionnaire in South Africa and interviews in Brazil may influence responses given towards what is expected and acceptable norm rather than practice.
- Coverage: the SA study was limited to 1 city in South Africa whereas, it was across all state in Brazil.

Conclusion

To the best of our knowledge, this is the first study to compare two studies and data on knowledge, attitudes, and practices of health care workers between the two middle-income countries that are also part of the BRICS partnership. Both studies confirmed the importance of availability of CRC national screening policy and programme and can be used as a baseline for future comparisons,

once both countries have national CRC screening programmes. The SA results can inform development of training, screening programme development as well as health service preparedness for consideration by other countries ready to implement CRC screening. Most importantly, the study results points to a need for targeted approach to address the gap in CRC knowledge and lack of screening services across all regions to promote early detection and referral for appropriate CRC clinical management.

Implications for policy-makers

- There are currently missed opportunities for promoting and screening patients by HCWs however, greater opportunities to integrate CRC screening with other cancer screening programs already implemented in PHC and CHCs to increase coverage through existing headcount in facilities.
- The study forms a baseline and facilitates opportunities for south-to-south partnership to better understand how to address gaps in KAP integrate screening with other types of cancer screening services learning from Brazil.

Conflict of Interest

The authors declare that they have no conflict of interest.

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Authors Contribution

S Magwaza: Conceptualisation; methodology; data search and collection and cleaning, project administration, data analysis and interpretation, ethical approval, writing - original draft, and revision. G Van Hal: Conceptualisation; data collection tool

development, guidance on methodology ; data analysis and interpretation , ethical approval, review and editing of draft manuscript. M Hoque: Conceptualisation; review of data collection tool development, guidance on methodology ; data analysis review and interpretation and editing of draft manuscript.

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