

## RESEARCH ARTICLE

# Pioneering Annual Colorectal Cancer Screening and Treatment Targeting Low Income Communities in Malaysia (2010-2015)

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## Abstract

The aim of this study was to assess the rate of uptake of a customised annual Colorectal Cancer Awareness, Screening and Treatment Project (CCASTP) using faecal immunohistochemical test (FIT) kits in low income communities in Malaysia. The immediate objectives were (1) to evaluate the level of adherence of CRC screening among low-income groups, (2) to assess the knowledge and awareness of the screened population and (3) to assess the accuracy of FIT kits. A total of 1,581 FIT kits were distributed between years 2010 to 2015 to healthy asymptomatic participants of the annual CCASTP organized by Empowered - the Cancer Advocacy Society of Malaysia. Data for socio-demographic characteristics, critical health and lifestyle information of the registered subjects were collected. Findings for use of the FIT kits were collected when they were returned for stool analyses. Those testing positive were invited to undergo a colonoscopy examination. A total of 1,436 (90.8%) of the subjects returned the FIT-kits, showing high compliance. Among the 129 subjects with positive FIT results, 92 (71.3%) underwent colonoscopy. Six cases (6.5%) of CRC were found. Based on the data collected, the level of awareness of stool examination and knowledge about CRC was poor amongst the participants. Gender, age group, ethnicity and risk factors (i.e. smoking, lack of exercise and low consumption of fresh fruits) were associated with positive FIT-kit results. In conclusion, CRC screening can be performed in the community with a single FIT-kit. Although CRC knowledge and awareness is poor in low-income communities, the average return rate of the FIT kits and rate of colonoscopy examination were 91.2% and 70.3%, respectively.

**Keywords:** Colorectal cancer screening - cancer awareness - low-income communities - Malaysia

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## Introduction

Colorectal cancer (CRC) has been identified as the most common cancer in men and second most common cancer in women in Malaysia (National Cancer Registry, Malaysia Cancer Statistic, 2006). It contributes to the fourth most common cause of cancer deaths in the world (Haggard and Boushey, 2009).

Although CRC screening in average and high-risk individuals is an established practice in developed parts of the world, it has not as yet been widely applied in most parts of the developing world (Pourhoseingholi, 2014). The low uptake and implementation of screening in many countries has been associated with limited resources, little health authority support and very low public awareness. Prior to 2014, Malaysia did not have an organized national CRC screening program (Lim, 2014; Schreuders et al., 2015). Malaysia started its first nationwide screening programme in selected health clinics identified by the State

Health Authority. It was based on selective opportunistic screening approach targeting asymptomatic Malaysian male and female aged 50–70 years old with a single immunological faecal occult blood test (iFOBT).

CRC screening is key to achieving disease prevention and mortality reduction. Past research in Malaysia has shown that low socioeconomic class are more prone to late or advanced stage at diagnosis of CRC and poorer survival rate (Kong et al., 2010) while other parallel studies in the UK also suggested that higher socioeconomic group are more likely to take up screening (Frederiksen et al., 2010; McCaffery et al., 2002). This provides the rationale of starting the project among the low-income group in this work. EMPOWERED, The Cancer Advocacy Society of Malaysia has been executing its customised annual Colorectal Cancer Awareness, Screening and Treatment Project (CCASTP), which targets the lower income and under resourced Malaysian communities since 2010. The objectives of this project were (1) to evaluate the level of

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adherence of CRC screening among low-income groups (2) to assess the knowledge and awareness of the screened population (3) to assess the accuracy of FIT kits.

This paper highlights the level of compliance of the residents towards returning the faecal immunohistochemical test (FIT)-kits for analysis and undergoing colonoscopic assessment and subsequent treatments for our subjects who are found to have blood in the stool. Analysis of the registration forms and questionnaires were done to correlate the residents with positive FIT results to their respective socio-demographic characteristics, critical health and lifestyle information.

## Materials and Methods

The Colorectal Cancer Awareness, Screening and Treatment Project (CCASTP) took place in targeted low income communities' areas in Sentul (2010), Selayang and Gombak districts - PPR Intan Baiduri, PPR Taman Wahyu and PPR Taman Prima Selayang (2011), Lembah Subang (2012), Setapak (2013), Cheras - Perumahan Awam Seri Sabah (2014) and PPR Hiliran Ampang (2015). This project received full approval from the Medical Research Ethics Committee, Ministry of Health on 19th March 2010. EMPOWERED collaborated with numerous welfare, medical and paramedical organisations (both governmental and non-governmental) as well as grass root community leaders, to implement this annual mass scale one year long project in four phases: *i*). Pre-Selection and Colorectal Cancer Awareness Workshop - EMPOWERED will work with the community leaders to conduct demographic surveys which aim to identify the number of individuals at risk of developing colorectal cancer within the pre-selected communities. The careful selection of EMPOWERED's target multi-ethnic communities are made on the basis of estimated population size at risk of colorectal cancer, the availability of suitable facilities and infrastructure, and committed participation of the community leaders and volunteer groups. Interactive and fun-filled Colorectal Cancer Awareness Workshops are organized at the communities to raise awareness about colorectal cancer through customized educational sessions about the disease, healthy

diet and lifestyle. Pre-event activities would include four training workshops for our medical student volunteers as well as three strategic meetings with our key community leaders and project partners. Additionally, other pre-event activities include mass distribution of flyers as well as putting up campaign posters and banners at strategic locations within the communities. Trained volunteer medical students conducted multiple rounds of door-to-door knock to conduct census, promote the campaign and raise awareness about colorectal cancer. These vital door knock exercises were conducted in three local languages of Bahasa Malaysia, Mandarin and Tamil; *ii*). Screening Workshop - The screening workshops were also conducted in the three local languages. Residents aged 50 years and above and those younger but with a family history of colorectal cancer were registered. The registration process entailed a detailed interview and history taking session conducted by trained medical students about the subjects' demographics, medical and lifestyle information. The registered subjects were subsequently instructed in a tutorial fashion, on how to use, when and where to return the faecal immunohistochemical test (FIT) kit. Two types of FIT kits were used between 2010 and 2015, namely OC-Auto Sampling Bottle 3/EIKEN Chemical Co. Ltd. (from 2010-2012) and Clearview FOB Extraction Buffer/ Inverness Medical (from 2013-2015). The former gives quantitative FOBT results while the later provides qualitative findings; *iii*). Return of Used Test (FIT) Kits - Registered subjects were given two to three days to have their stool sample collected using the FIT kits at home. Participating residents at respective collection stations within their communities drop off used FIT kits. The kits were collected and sent off for laboratory processing at a collaborating medical centre. The results of the FIT test were fed back to the residents within 2 weeks after the kits are collected; *iv*) Patient Support Program - EMPOWERED's trained nurse volunteers broke news to the affected residents, in the privacy of their homes, about the positive blood findings in their stool. Appointments for colonoscopy at appointed screening hospitals (General Hospital Kuala Lumpur in 2010 and Hospital Selayang from 2011 onward) were pre-arranged and given during these news-breaking sessions.

**Table 1. Overview of Subjects Compliance and Efficiency of FIT-kit for Cancer Detection**

Year	2010	2011	2012	2013	2014	2015
Registered subjects received FIT-kits	243	138	240	224	511	225
Registered subjects returned FIT-kits	235	138	192	198	470	203
Return rate of FIT-kits	96.7%	100.0%	80.0%	88.4%	92.0%	90.2%
No. of subjects with abnormal FIT-kits results	14	19	14	19	40	23
Pick-up rate for blood using FIT-kits	6.0%	13.8%	7.3%	9.6%	8.5%	11.3%
No. of subjects with abnormal FIT-kits results followed through with colonoscopy	11	12	9	13	31	16
Percentage of subjects followed through with colonoscopy	78.6%	63.2%	64.3%	68.4%	77.5%	69.6%
No. of subject with cancer	1	1	1	0	3	0
Pick-up rate of cancer using FIT-kits	7.1%	5.3%	7.1%	0.0%	7.5%	0.0%
No. of subject with polyps	3	6	3	5	14	5
Pick-up rate of polyps using FIT-kits	21.4%	31.6%	21.4%	26.3%	35.0%	21.7%
No. of subject with other diagnosis (e.g. ulcers, haemorrhoids)	3	1	1	1	0	2
Pick-up rate of other diagnosis using FIT-kits	21.4%	5.3%	7.1%	5.3%	0%	8.7%
No. of subject with normal	4	4	4	7	14	9
False positive pick-up rate using FIT-kits	28.6%	21.1%	28.6%	36.8%	35.0%	39.1%

**Table 2. Pick-Up Rate for Blood Using FIT-kit Based on Gender and Ethnic Groups**

Year	2010	2011	2012	2013	2014	2015
No. of female subjects	166	84	147	136	341	142
No. of male subjects	77	54	93	88	170	83
No. of female subjects with abnormal FIT-kits results	11	11	10	11	21	14
Pick-up rate for blood using FIT-kits among female subjects	6.6%	13.1%	6.8%	8.1%	6.2%	9.9%
No. of male subjects with abnormal FIT-kits results	3	8	4	8	19	9
Pick-up rate for blood using FIT-kits among male subjects	3.9%	14.8%	4.3%	9.1%	11.2%	10.8%
No. of Malay subjects	109	62	152	5	284	221
No. of Chinese subjects	76	26	14	180	113	0
No. of Indian subjects	49	47	70	31	112	4
No. of Malay subjects with abnormal FIT-kits results	5	9	8	0	20	23
Pick-up rate for blood using FIT-kits among Malay subjects	4.6%	14.5%	5.3%	0.0%	7.0%	10.4%
No. of Chinese subjects with abnormal FIT-kits results	8	4	1	14	9	0
Pick-up rate for blood using FIT-kits among Chinese subjects	10.5%	8.5%	7.1%	7.8%	8.0%	0.0%
No. of Indian subjects with abnormal FIT-kits results	1	6	5	3	11	0
Pick-up rate for blood using FIT-kits among Indian subjects	2.0%	12.8%	7.1%	10.0%	9.8%	0.0%

**Table 3. Socio-Demographic Characteristics among the Subjects with Positive FIT-kit Results**

Variable	Categories	2010	2011	2012	2013	2014	2015	Total
Sex	Male	3	8	4	8	19	9	51
	Female	11	11	10	11	21	14	78
Age	50-59	8	8	5	8	18	10	57
	60-69	4	9	7	5	19	9	53
	>70	2	2	2	6	3	4	19
Race	Malay	5	9	8	0	20	23	65
	Chinese	8	4	1	14	9	0	36
	Indian	1	6	5	3	11	0	26
Family monthly income (RM)	≥ 1000	7	6	8	10	17	14	62
	< 1000	5	9	6	9	23	9	61
	N/A	2	4	-	-	-	-	6

Appropriate medical management was administered for all diagnosed conditions including surgery, peri-operative radiation therapy and chemotherapy for colorectal cancer. Transportation in the form of bus and car rides, for all hospital visits, was provided for the patients. An elaborate support mechanism was put in place to provide the beneficiaries with complete emotional and moral support throughout their medical journey.

## Results

A total of 1581 eligible residents aged 50 and above received FIT-kits as part of the screening project from 2010 to 2015. The return rate of FIT-kits remained high every year ( $\geq 80.0\%$ ) as shown in Table 1. Similarly, the average percentage of subjects that followed through with colonoscopy assessment throughout the six years duration was encouraging at 70.3%. The average pick-up rate for blood using FIT-kits and the average pick-up rate of cancer using FIT-kits were 9.42% and 4.50%, respectively. The average false positive pick-up rate of 31.5% was lower than the average of the pick-up rate of polyps (26.2%) and other diagnosis (8% e.g. ulcers, haemorrhoids).

There were more female subjects as compared to male subjects that participated in this program (Table 2). The pick-up rate for blood using FIT-kits for both genders was about the same with exception for year 2014 (11.2% male, 6.2% female). It is interesting to note that although the Malay ethnic group formed the majority of the subjects, the Chinese and Indian groups showed higher pick-up rate for blood using FIT-kits in 2010 (4.6% Malay, 10.5%

Chinese, 2.0% Indian), 2012 (5.3% Malay, 7.1% Chinese, 7.1% Indian) and 2014 (7.0% Malay, 8.0% Chinese, 9.8% Indian).

In terms of socio-demographic characteristics among the subjects with positive FIT-kit results (Table 3), the majority were female (60.5%), from Malay ethnic group (51.2%), within the age ranging from 50 to 59 years old (44.2%) and with family monthly income equal or less than RM1000 (48.1%). The age group ranging from 60 to 69 years old came close to a total of 41.1% and was the majority group in year 2011, 2012 and 2014.

Looking at the critical health information (Table 4), interestingly, 18.6% of the subjects were smokers. It is also notable that the subjects with either family history of colon cancer (7 subjects from 2010-2015) or history of inflammatory bowel disease (4 subjects from 2010-2015) had not undertaken any forms of prior screening tests for colorectal cancer.

Table 5 illustrated the lifestyle among the residents with positive FIT-kit results. Up to one third of the subjects practiced daily brisk walk for exercise (35.7%) and the majority (50.4%) practiced less than 2 hours a day of inactivity (watching TV, working at the computer), 53.5% ate fresh vegetables every meal, 40.3% ate fresh fruits 2-3 times a week, 86.4% had infrequent consumption of processed food, 68.2% had infrequent consumption of red meat consumption. However, 31.0% of the subjects did not exercise at all and the rest 2-3 times per week (10.1%), occasionally (15.5%) and once a week (7.8%). In total, four out of six subjects diagnosed with cancer followed through with all recommended treatments, which include

**Table 4. Critical Health Information of the Subjects with Positive FIT-kit Results**

No	Variable	2010 (n=14)		2011 (n=19)		2012 (n=14)		2013 (n=19)		2014 (n=40)		2015 (n=23)	
		Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
1	History of Colorectal Polyps	0	14	0	19	0	14	0	19	0	40	0	23
2	Previous Colon Cancer	0	13	0	19	0	14	0	19	0	40	0	23
3	History of Blood in Stool	0	14	0	19	0	14	0	19	0	40	0	23
4	History of Bleeding Piles	1	13	0	19	0	14	0	19	0	40	0	23
5	History of Change in Bowel Habits	0	14	0	19	0	14	0	19	0	40	0	23
6	History of Weight Loss	0	14	1	18	0	14	0	19	0	40	0	23
7	History of Tenesmus	-	-	0	18	0	14	0	19	0	40	0	23
8	Smoker	0	14	4	14	3	11	5	14	9	31	3	20
9	Family History of Colon Cancer	3	11	0	19	1	13	0	19	2	32	1	22
10	History of Inflammatory Bowel Disease	1	13	0	19	1	13	0	19	1	39	1	22
11	History of Breast Cancer	1	13	1	18	0	14	1	18	0	40	0	23
12	History of Ovary Cancer	0	14	0	19	0	14	0	19	0	40	0	23
13	History of Uterus Cancer	0	14	0	19	2	12	0	19	1	39	0	23
14	Undergone Faecal Test Before	1	13	3	16	0	14	1	18	5	35	0	23
15	Undergone Colonoscopy Before	1	13	2	14	1	13	1	18	4	36	0	23

**Table 5. Lifestyle among the Residents with Positive FIT-Kit Results**

Variable		Categories	2010	2011	2012	2013	2014	2015	Total
Brisk walk for exercise	No		3	6	3	7	16	5	40
	Once a week		1	1	1	0	5	2	10
	Occasionally		2	5	3	3	2	5	20
	2-3 times per week		2	1	0	2	3	5	13
	Daily		6	6	7	7	14	6	46
Hours a day watching TV or at the Computer or sitting in	<2		7	8	6	7	23	14	65
	2 to 3		2	4	7	5	8	3	29
	>3		5	7	1	7	9	6	35
Intake of fresh vegetables	Very seldom		0	0	2	2	2	1	7
	2-3 times a week		3	4	3	7	4	1	22
	Once a day		1	4	3	3	7	13	31
	Every meal		10	11	6	7	27	8	69
Intake of fresh fruits	Very seldom		0	5	4	4	6	2	21
	2-3 times a week		9	7	3	7	12	14	52
	Once a day		3	6	3	7	13	4	36
	Twice a day		1	-	-	-	-	-	1
	Every meal		1	1	4	1	9	3	19
Intake of processed food	Very seldom		11	15	12	17	35	21	111
	2-3 times a week		2	4	2	2	5	2	17
	Once a day		1	0	0	0	0	0	1
	Every meal		0	0	0	0	0	0	0
Intake of red meat	Very seldom		5	15	11	11	30	16	88
	2-3 times a week		8	3	3	5	7	7	33
	Once a day		1	0	0	2	1	0	4
	Every meal		0	1	0	1	2	0	4

surgery, chemotherapy and radiotherapy.

## Discussion

The high return rate of FIT-kits and the encouraging average percentage of subjects that followed through with colonoscopy assessment from 2010 to 2016 clearly highlighted the high rate of compliance of the community towards this program. The rates of uptake into the screening programme are higher than previously reported population CRC screening programs in Asia (Chiu et al., 2015). The average false positive pick-up rate was lower than the average of the pick-up rates of polyps and other diagnosis combined, indicating a fair sensitivity of the FIT-kits. FIT has been shown in recent studies to have superior detection rates of advanced colonic lesions as

compared with the older guaiac-based faecal occult blood test (FOBT) with greater simplicity of sample collection and better patient adherence rate (Petty et al., 1992; Smith et al., 2006; Syful et al., 2015).

The subjects with positive FIT kit results were well and asymptomatic. However, 18.6% of the subjects are smokers and 2/6 among the subjects diagnosed with cancer are also smokers. This may support past reports that smoking increases the risk of CRC (Aizat et al., 2013). The finding that none of the high risk subjects (i.e. either with family history of colon cancer or history of inflammatory bowel disease) were aware of the need to screen for CRC would suggest that our selected pool of subjects were less informed about this disease. One of the subjects with history of inflammatory bowel disease was diagnosed with cancer. Studies in Malaysia have previously noted

that the majority of the participants had poor knowledge of the disease (Su et al., 2013; Hilmi et al., 2010; Koo et al., 2012). Another study also reported that the main barriers for not undergoing colorectal cancer screening were embarrassment and perceived discomfort associated with the screening procedure (Yusoff et al., 2012).

The observations that 10.1% of the subjects with positive FIT kit results exercised 2-3 times per week, 7.8% exercised once a week, 15.5% exercised occasionally, 31.0% did not exercise at all, and that the majority of subjects had an intake of fresh fruits only 2-3 times a week or less was also reflected in the subjects diagnosed with cancer. Previous research has also shown that lack of exercise is a risk factor for CRC (Giacosa et al., 1999) while high fruit intake is beneficial to health and supported the inverse association towards colorectal cancer risk (Azeem et al., 2015). Four out of six subjects diagnosed with cancer followed through with treatments. The patients diagnosed with cancer in the caecum (pT1N0), in the sigmoid colon (pT2N0) were subjected to open surgery. Another patient with cancer in the rectum (pT2N2) underwent laparoscopic surgical resection and subsequently underwent chemotherapy and radiotherapy whilst another patient diagnosed with adenocarcinoma within a rectal polyp (pT1N0) underwent an anterior resection. It is necessary to note that the diagnosis of cancer could have been missed in those individuals who refused to undergo colonoscopy despite having a positive FIT test. Importantly, the fact that two patients who were diagnosed with colorectal cancer but did not follow through with treatment showed that lower socioeconomic group of Malaysians are less aware of the impact and implications of cancer diagnosis and non-treatment.

In conclusion, the level of awareness about CRC and screening practices among the low-income communities in Malaysia is very poor. It is crucial to conduct a customized awareness and screening program to ensure effective implementation of a CRC screening program in this group of subjects. A simple and inexpensive test with relatively good sensitivity and specificity utilizing FIT-kits should be used to ensure adherence and compliance to the screening test. However, intensive and extensive strategies including multiple rounds of door-to-door knock to promote the campaign, focused awareness workshops, close follow-up with the residents about their FIT-kits results, implementing a patient support program with execution of further medical management with colonoscopy and subsequent interventional therapies are additional crucial steps to ensure the overall success of this programme. Continuous efforts must be carried out to educate the public particularly the low-income communities in Malaysia of the disease because early detection save lives.

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