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A successful nationwide implementation of the 'FIFA 11 for Health' programme in Brazilian elementary schools

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ABSTRACT

Objectives To deliver a nationwide implementation of the 'FIFA 11 for Health' programme in Brazil and to compare the outcomes with results obtained previously in Sub-Saharan Africa.

Method A cohort study among 3694 Brazilian children aged 9–12 years within 128 elementary schools situated in 12 cities in the five Regions of Brazil. The 'FIFA 11 for Health' programme contains 11 90 min sessions: the first 45 min serve to encourage physical activity through the development of football skills (Play Football) and the second 45 min provide a vehicle for delivering 10 health messages (Play Fair). We measured preintervention and postintervention health knowledge (29-item questionnaire) and the children's evaluation of the programme (6-item questionnaire).

Results Mean age of the children across the five Regions was 10.6 years (range 9.2–11.6). The mean preintervention health knowledge score for the five Regions was 60.2% (range 53.8–65.3%); the mean postintervention score was 78.6% (range 70.7–86.8%); thus the mean increase in health knowledge was 18.4% (range 13.6–29.1%). 91% of the children gave a positive evaluation for the programme (range across five Regions: 82.3–96.7%).

Summary The study showed that the 'FIFA 11 for Health' programme, which was originally developed in English and translated into another language, was delivered successfully with results equivalent to those previously obtained in Sub-Saharan Africa. The programme was effective across the five Regions of Brazil.

INTRODUCTION

The 'FIFA 11 for Health' is a health education programme that was intended to be a medical legacy for Africa following the 2010 FIFA World Cup South Africa.[1–4] In brief, the programme was developed to educate children aged from 10 to 13 years about the prevention of the most prevalent communicable and non-communicable diseases (NCDs) in Sub-Saharan Africa; programme delivery was based around the game of football. The 'FIFA 11 for Health' programme contains 11 90 min sessions: the first 45 min of each session are used to encourage physical activity through the development of football skills (Play Football) and the second 45 min of each session are used to deliver health education (Play Fair). The first 10 Play Fair sessions address health topics such as drug and alcohol abuse, sexually transmitted diseases, vaccination, diet, inactivity, quality of drinking water and sanitation;[1–3] the 11th session revises those 10 key health messages. As recommended by the WHO,[5] course material is delivered using a variety of interactive teaching techniques, including educational exercises, role-playing activities, group discussions and home-based assignments designed so that children share the session health messages with their family and friends.

Following implementations of the 'FIFA 11 for Health' programme, significant gains in children's health knowledge were reported in eight English-speaking countries in Sub-Saharan Africa.[1–3] This led to requests for the programme to be delivered in other continents, countries and cultures, with translation when required. The Brazilian Football Confederation, with the support of Brazil's Ministries of Health, Education and Sport, requested delivery of the health education programme in the lead up to the 2014 FIFA World Cup Brazil. This request presented significant linguistic and logistic challenges because the official language in Brazil is Brazilian-Portuguese, and Brazil has the fifth largest land mass (~8.5 million km^2) and the fifth largest population (~200 million) of all countries in the world.[6] Additionally, the country is divided into more than 5000 municipalities within 26 administrative states spread across five Regions of widely different geographic size (North: 45% of total Brazilian land mass; North-east: 18%; Centre-West: 19%; South-east: 11%; South: 7%) and population (North: 8% of total Brazilian population; North-east: 27%; Centre-West: 7%; South-east: 43%; South: 14%),[7] which results in three regions with high population densities (North-east: 32 people/km^2; South-east: 84; South: 48) and two regions with low population densities (North: 4 people/km^2; Centre-West: 9).[7]

Although national health indicators such as life expectancy at birth (74 years) and under 5 mortality rate (14 deaths/1000 live-births) in Brazil are close to the world median values,[8] there are large regional variations: for example, the under 5 mortality rates in the North and North-east are twice those in the South and South-east.[9] Early mortality in Brazil is mainly related to NCDs (table 1), with ~70% of premature deaths caused by conditions such as cardiovascular and respiratory diseases, stroke, diabetes and cancers.[10] A general concern in Brazil is the proportion of the adult population that is categorised as overweight (48.5%) and obese (15.8%); however, of greater concern is the growing number of overweight (33.5%) and obese (14.3%) children in the 5–9 year age group.[10]

The Ministry of Health in Brazil has been responsible for delivering a free healthcare system

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Table 1 Leading health-related causes of death, life expectancy and under 5 mortality rate

Rank	World[11]	Brazil[11]
1	Coronary heart disease	Coronary heart disease
2	Stroke	Stroke
3	Influenza and pneumonia	Diabetes mellitus
4	Lung disease	Influenza and pneumonia
5	Diarrhoeal diseases	Hypertension
6	HIV/AIDS	Lung disease
7	Lung cancers	Lung cancers
8	Tuberculosis	Liver disease
9	Diabetes mellitus	Inflammatory heart disease
10	Hypertension	Stomach cancer
Life expectancy, years[8]	70	74
Under 5 mortality rate/1000 live-births[8]	48	14

(the 'Unified Health System') since 1988. The Ministry of Health is also responsible for public health programmes and has implemented successful national campaigns against communicable diseases such as yellow fever, smallpox, malaria, influenza and poliomyelitis.[10] In 2011, the Ministry of Health established a strategic plan to address the growing threat from NCDs. This 10-year plan focuses on cardiovascular diseases, cancers, chronic respiratory diseases and diabetes, together with the associated risk factors of smoking, alcohol abuse, physical inactivity, unhealthy diet and obesity.[11]

The aim of the present study was to report the implementation strategy, outcomes and conclusions from a collaborative (FIFA, Brazilian Football Confederation and Brazilian Ministries of Health, Education and Sport) nationwide implementation of the 'FIFA 11 for Health' programme aimed at educating children about the risks and prevention strategies for a range of communicable and NCDs in the five Regions of Brazil. A secondary aim of the study was to compare the results obtained from the 'FIFA 11 for Health' programme implementation in Brazil with the results previously obtained from implementations in Sub-Saharan Africa.[1–3]

METHOD

The general procedures for implementing the 'FIFA 11 for Health' programme have been reported previously.[4] In Brazil, a series of face-to-face meetings were held between representatives of FIFA's Medical Assessment and Research Centre (F-MARC), the Brazilian Football Confederation and the Ministries of Health, Education and Sport to discuss the content and implementation of the 'FIFA 11 for Health' programme. The programme previously used in Africa[1–3] was reviewed with representatives from the Ministry of Health to confirm its relevance to the health issues prevalent in Brazil.

As a result, minor changes to words and phrases were made within various Sessions and Session 5 (play football: shielding; play fair: use a treated bed net) was replaced with a new Session 5 (Play Football: Control the ball; Play Fair: Control your weight); this latter change was made because malaria was considered only to be a significant health problem in the North Region, whereas overweight was viewed to be important in all Regions of Brazil. The Play Football and Play Fair sessions included within the revised programme and the health issues addressed in each session are summarised in table 2. In addition, one of the health statements ("Not having sex is an effective way to avoid getting HIV/AIDS") used in Sub-Saharan Africa to assess children's knowledge about the prevention of HIV/AIDS and sexually transmitted diseases was not included in the Brazilian questionnaire at the request of the Ministry of Health, as it was considered to be inconsistent with Brazilian culture. The revised 'FIFA 11 for Health' course manual, activity cards and preintervention and postintervention health knowledge questionnaires were translated from English into Brazilian-Portuguese.

The Ministry of Education agreed to deliver the 'FIFA 11 for Health' programme within the curriculum of elementary schools (children aged 6–14 years); the appropriate municipal education authority gave final approval for individual schools.

A National Project Leader and 12 city coordinators were recruited from the Brazilian Football Confederation to work with the F-MARC 'FIFA 11 for Health' Project Leader to facilitate the implementation. The planned timetable for the project, from May 2013 to June 2014, took account of the academic year, national holidays, school curricula and examination schedules and the availability of F-MARC master instructors to deliver the teacher training courses. The 12 host cities for the 2014 FIFA World Cup Brazil (North: Manaus; North-east: Fortaleza, Natal, Recife, Salvador; Centre-West: Brasilia, Cuiabá; South-east: Belo Horizonte, Rio de Janeiro, São Paulo; South: Curitiba, Porto Alegre) were venues for implementation. Schools recruited within each of the cities were selected by the local education authorities and were intended to represent the range of academic abilities within the cities. The numbers of

Table 2 'FIFA 11 for Health' programme content and health issues addressed by each session

Session	'Play Football' activity	'Play Fair' health topic	Health issues addressed in Session
1	Warming up	Play football (exercise)	Cardiovascular disease, stroke, diabetes, overweight, obesity
2	Passing	Respect girls and women	Gender violence, rape, mental abuse, HIV/AIDS, STDs
3	Heading	Protect yourself from HIV and STDs	HIV/AIDS, syphilis, chlamydia, gonorrhoea
4	Dribbling	Avoid drugs, alcohol and tobacco	Lung disease, kidney disease, gender violence, mental health
5	Controlling	Control your weight	Obesity, overweight, diabetes, cardiovascular disease
6	Defending	Wash your hands	Diarrhoea, cholera, dysentery, typhoid
7	Trapping	Drink clean water	Diarrhoea, cholera, dysentery, typhoid
8	Building fitness	Eat a balanced diet	Overweight, obesity, diabetes, cardiovascular disease
9	Shooting	Get vaccinated	Influenza, polio, smallpox, meningitis, tuberculosis, tetanus
10	Goalkeeping	Take your prescribed medication	Cardiovascular disease, hypertension, diabetes, HIV/AIDS
11	Teamwork	Fair play	Review of all health issues discussed in Sessions 1 to 10

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schools and children that took part in the interventions in each Region are shown in table 3. Every school involved in the intervention received an equipment bag (1), footballs (8), football carrying net (1), football pump/needle (1), bibs (20), cones (25), stopwatches (2), whistles (2), activity cards (2 sets), course manuals (2) and 'FIFA 11 for Health' poster (1) to support the programme implementation.

For the first stage of the implementation, two F-MARC master instructors (1 male, 1 female) delivered a 5-day training course to 22 male and female teachers; these teachers received instruction about the philosophy, structure, content and delivery of the 'FIFA 11 for Health' programme and the implementation of the data collection instruments. These teachers then presented the programme to children aged 9–12 years who attended their schools over a 3-month period.

Following this, for the cascade-training stage of the implementation, the same 22 teachers received a further 5-day training course on how to teach other teachers to deliver the programme. These 22 teachers were then divided into 11 mixed-gender teacher-pairs who travelled to three regional training centres in Brasilia (3 teacher-pairs), Natal (4) and São Paulo (4) where they taught 227 teachers how to deliver the programme to children. The overall numbers of schools, teachers and children taking part in the five separate Regions of Brazil over the two stages are recorded in table 3.

The overall population included in the intervention was based on an agreement between the Brazilian Ministry of Education and F-MARC, which took into account factors such as costs, logistics, inclusion of the 12 host cities of the 2014 FIFA World Cup Brazil and being representative of the five Regions of Brazil. A sample size calculation was used to determine an appropriate evaluation subpopulation within the overall population; this subpopulation would receive and respond to the preintervention and postintervention health knowledge questionnaires. The calculation was based on an anticipated 65% level of preintervention health knowledge and a 15% postintervention increase in health knowledge based on previous studies in Sub-Saharan Africa.[1–3] We calculated that at least 130 questionnaires would need to be administered in each Region for a study with 90% power and 95% confidence. For this reason, children from half the schools taking part within each Region were selected to complete preimplementation and postimplementation health knowledge questionnaires. The data collected in these questionnaires included: demographic data (gender, age); a 29-item preintervention and postintervention health knowledge questionnaire using 3-point scales (true, false, do not know)—there were three questions related to each health topic presented apart from Session 3, which included only two questions; and a 6-item postimplementation evaluation of the course using 5-point Likert scales (strongly agree, agree, neither agree nor disagree, disagree, strongly disagree). The National Project Leader provided the F-MARC Project Leader with on-going feedback about the progress of the implementation in each of the Regions. The percentage change in health knowledge (postintervention value—preintervention value) was calculated as (1) a mean value for each question, and (2) a mean value for each health topic (session) derived from the mean values for the three individual health topic questions. Differences between the preintervention and postintervention health knowledge values for each question and each topic were compared in each Region and across the total sample population using Z tests for proportions: p values for significant differences are reported at levels of $p \leq 0.05$, $p \leq 0.01$, $p \leq 0.005$ and $p \leq 0.001$.

RESULTS

The numbers and demographics of the children (gender, age) responding to the preintervention and postintervention health knowledge questionnaires are included in table 3. The overall mean age of the evaluation subpopulation was 10.6 years but children in the South Region were younger (9.2 years) than those in the other four Regions (range 10.8–11.6 years). The overall proportions of boys and girls in the evaluation subpopulation were similar (boys 47.3%; girls 52.7%), although the proportions were significantly skewed towards boys in the South-east Region (boys 61%; girls 39%). Responses to the health knowledge questionnaires showed that children from the five Regions had similar preintervention levels of health knowledge with the lowest level being recorded in the North Region (53.8%) and the highest in the Centre-West (65.3%). Postintervention, the level of health knowledge increased significantly in all Regions for the majority of the 29 health-related questions (North: 25 questions; North-east: 24; Centre-West: 19; South-east: 27; South: 29): the lowest overall levels of health knowledge recorded postintervention were in the North and North-east Regions and the highest were in the South and South-east Regions, see table 4. The average increase in knowledge for all health topics, across all Regions, was

Table 3 Number of cities, schools, teachers and children taking part in the intervention and the evaluation sample population completing pre and postintervention questionnaires

Parameter (values at start of intervention)	Region North	North-east	Centre-West	South-east	South	ALL regions
Intervention population						
Number of cities	1	4	2	3	2	12
Number of schools	11	40	19	33	25	128
Number of teachers	23	79	35	64	48	249
Number of children	374	1209	557	893	661	3694
Evaluation subpopulation						
Number of cities	1	4	2	3	2	12
Number of schools	11	18	5	14	16	64
Gender*; % boys/% girls	48.7/51.3	51.1/48.9	51.4/48.6	61.0/39.0	51.7/48.3	52.7/47.3
Age of children*; mean, years (SD)	11.0 (1.2)	11.3 (1.0)	11.6 (1.5)	10.8 (1.0)	9.2 (1.0)	10.6 (1.4)
Prequestionnaires (number of children)	310	494	146	338	412	1700
Postquestionnaires (number of children)	310	458	118	269	400	1555

*As recorded at the start of the intervention.

Table 4 Preintervention and postintervention health knowledge, as a function of country

		Region and stage of intervention (% correct responses)											
		North		North-east		Centre-West		South-east		South		ALL Regions	
Session number and health statement		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
S-1	Football injuries can be prevented by warming up correctly	57.6	67.3§	62.0	73.7+	62.0	83.1+	65.8	83.5+	64.0	86.7+	62.4	78.2+
	Regular exercise helps to prevent being overweight	65.1	79.0+	72.4	82.9+	77.1	87.3§	71.7	78.8§	79.4	89.7+	73.0	83.5+
	Minimum daily amount of exercise required to stay healthy	35.1	69.6+	57.9	72.2+	47.8	74.1+	63.0	82.7+	39.4	85.8+	49.2	77.3+
S-2	Important for boys to listen to girls	62.3	83.6+	69.2	81.6+	64.5	82.1	64.7	82.2+	58.2	95.0+	64.0	85.6+
	Boys should help to protect girls from harm	84.6	89.4	80.0	86.4#	77.9	83.8	85.0	87.6	80.5	94.2+	81.8	89.0+
	Football is just for boys	83.9	91.0#	87.1	89.4	95.1	94.9	90.4	95.1§	87.9	94.2¶	88.1	92.4+
S-3*	You can get HIV by touching someone with HIV/AIDS	40.1	78.7+	54.7	80.5+	53.9	79.5+	48.6	76.5+	25.0	84.8+	43.5	80.5+
	You can tell whether people have HIV by the way they look	39.1	60.5+	43.9	63.3+	56.3	71.3#	47.6	69.8+	33.4	81.1+	42.3	69.1+
S-4	It is possible to become addicted by starting to smoke cigarettes	76.7	85.1#	80.8	84.6	84.5	95.7¶	81.0	88.1§	83.0	94.0+	80.9	88.6+
	People who smoke cigarettes have more health problems	90.5	92.8	89.3	90.8	95.8	97.4	94.6	96.3	91.7	96.0§	91.7	94.0#
	It is my choice whether or not I take drugs	45.6	59.5+	63.6	78.0+	69.0	80.2§	65.1	82.1+	53.1	80.7+	58.5	76.0+
S-5	Drinking too much water can cause obesity	61.8	69.9§	76.0	83.1#	81.7	84.6	80.5	91.4+	77.6	85.2¶	75.1	82.5+
	Obesity can cause high blood pressure	47.2	57.7#	58.5	69.6+	60.0	71.9§	56.7	71.7+	43.8	84.0+	52.6	71.5+
	There is no cure for obesity	55.5	71.1+	73.1	80.0#	75.2	82.9	70.1	82.4+	57.2	85.2+	65.6	80.2+
S-6	After washing, it is OK to dry my hands on my shirt	62.5	80.8+	69.0	82.2+	60.7	87.2+	72.3	87.3+	57.9	92.0+	65.1	85.7+
	You can see germs on your hands	47.6	72.5+	60.7	77.6+	72.4	84.6§	67.4	82.1+	66.5	91.7+	62.0	81.5+
	How long should I wash my hands to remove germs	33.9	54.7+	39.7	65.5+	36.4	62.3+	37.7	58.3+	35.4	69.6+	36.9	63.1+
S-7	You can tell if water is safe to drink by its appearance	26.5	54.6+	32.9	50.1+	37.3	65.8+	34.8	62.2+	30.4	82.6+	31.9	62.6+
	Storing river water for 3 days makes it safe to drink	46.7	58.9¶	55.3	69.3+	63.9	69.3	61.9	78.3+	59.9	83.1+	56.9	72.4+
	Length of time water should be boiled to make it safe to drink	8.9	59.5+	17.5	57.9+	18.2	62.8+	26.8	68.2+	16.4	85.9+	17.5	67.8+
S-8	A balanced diet contains food of many colours	58.4	77.8+	68.4	83.7+	81.6	96.6+	70.4	87.6+	70.0	95.5+	68.5	87.2+
	Eating a lot of fruit makes you obese	72.1	75.9	82.5	82.5	78.5	84.3	83.2	89.4§	71.2	86.3+	77.7	83.5+
	It is healthy to eats lots of fried food	6 6.0	77.9+	68.2	77.8+	84.7	84.6	78.0	89.6+	75.2	90.2+	72.9	83.6+
S-9	Vaccinations are dangerous	64.2	82.5+	63.3	78.0+	77.8	75.4	67.0	83.3+	65.9	88.7+	66.1	82.4+
	All vaccinations last your lifetime	33.0	48.0+	44.7	64.7+	44.8	57.4§	43.4	58.9+	44.5	78.4+	42.2	63.4+
	All vaccinations are received as injections	28.3	47.5+	42.4	66.5+	56.6	74.8+	51.4	75.9+	37.2	79.5+	41.6	68.4+
S-10	I can stop taking medication as soon as I feel better	44.9	70.7+	54.9	76.3+	62.4	83.2+	57.7	82.1+	45.0	86.9+	51.9	79.5+
	People with diabetes can die if untreated	79.5	76.5	79.6	81.0	72.0	79.3	73.6	86.7+	78.6	89.9+	77.5	83.3+
	The right medication can help people with HIV to live longer	43.4	58.7+	51.5	64.4+	45.4	63.2+	51.2	65.0+	44.6	79.8+	47.8	67.3+
Mean values:		**53.8**	**70.7**	**62.0**	**75.6**	**65.3**	**79.3**	**64.2**	**80.1**	**57.7**	**86.8**	**60.2**	**78.6**

Bold face is used in table 4 for the mean values for all the sessions to differentiate these values from all the other values shown in the table.
Statistical tests refer to comparisons of the postintervention and preintervention values for the same Region.
§p≤0.05; #: p≤0.01; ¶: p≤0.005; +: p≤0.001.
*The Ministry of Health would not allow children to be asked the question "Not having sex is an effective way to avoid getting HIV/AIDS" (which has been used in previous interventions).

18.4% with the lowest increase being observed in the North-east Region (13.6%) and the highest in the South (29.1%).

The overall preintervention and postintervention levels of health knowledge together with the overall change in health knowledge in each Region, as seen in figures 1 and 2, show the

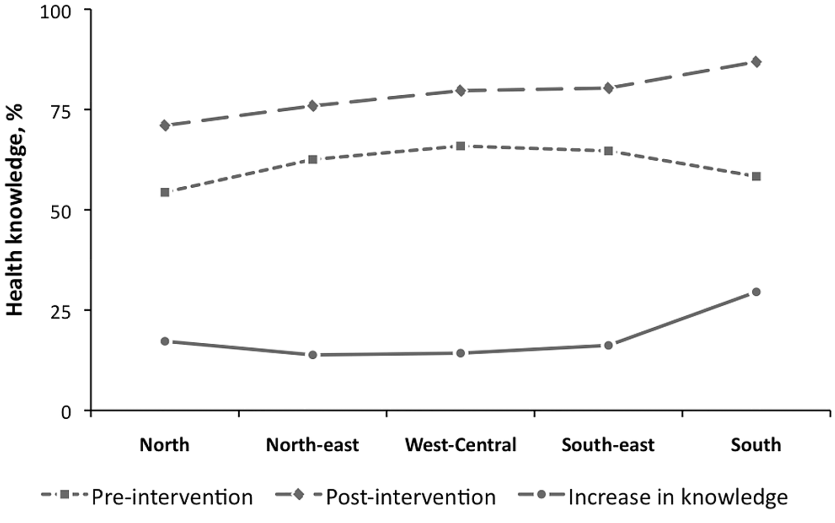

Figure 1 Overall preintervention and postintervention health-knowledge and change in health-knowledge in each Region.

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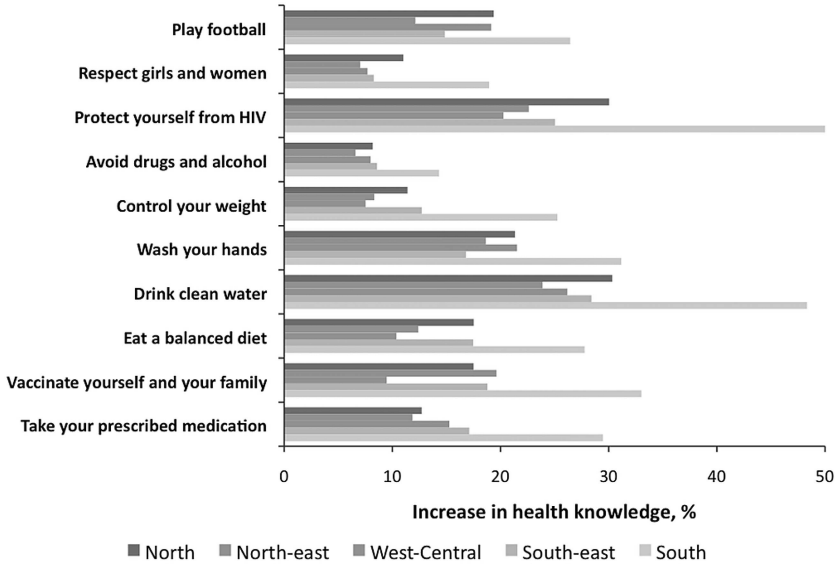

Figure 2 Change in health topic knowledge (%, absolute change from preintervention value).

change in health knowledge for each health topic (session) within each Region. The children's overall ratings for the programme (table 5) were all high: the lowest scores being recorded in the South-east Region (82.3%) and the highest in the South (96.7%), which may reflect the high postintervention knowledge scores recorded in the South Region.

Table 6 provides a comparison between the 'FIFA 11 for Health' intervention results obtained in the five Regions of Brazil with results previously reported for eight countries in Sub-Saharan Africa.[1–3]

DISCUSSION

The 10 highest ranked health-related causes of premature death, life expectancy and the under 5 mortality rate for Brazil are compared with values for the rest of the world in table 1. The top seven health-related causes of early mortality in Brazil also appear in the top 10 diseases causing early mortality for the world as a whole. Life expectancy in Brazil (74 years) is higher than the world average (70), but in South America, only Bolivia (68) and Guyana (63) have lower values than Brazil.[8] In contrast, the under 5 mortality rate in Brazil (14/1000 live-births) is much lower than the world average and lower than that in all South American countries apart from Chile (9) and Uruguay (7).[8]

Comparing the results obtained in this study with those reported previously for eight countries in Sub-Saharan Africa shows that the overall results on both continents were similar for all measurement parameters: preintervention and postintervention knowledge levels, change in knowledge levels following the intervention, and the children's overall satisfaction with the programme. Furthermore, the range of results recorded across the five Regions of Brazil also mirrored the range of results obtained across the eight individual countries in Sub-Saharan Africa. These similarities in health knowledge and learning are surprising considering the differences in social, economic, education, health and infrastructure facilities on the two continents.[6 8] This result can be viewed in two ways: either the health knowledge of children in Africa is higher than expected or the health knowledge of children in Brazil is lower than might be expected; it is not possible to resolve this question from the data currently available but it is perhaps a question worthy of future investigation, as it could affect the ways in which health education is pursued on both continents.

Lessons learned

It is important to reflect on the lessons learned from implementing the 'FIFA 11 for Health' programme in a country the size of Brazil. The results obtained from the intervention can be considered to represent the individual Regions and Brazil as a whole, as the total intervention population comprised children from 12 cities within the five Brazilian Regions and the evaluation subpopulation represented schools from each of these cities. In addition, the evaluation subpopulation met the criteria obtained from the sample size calculation. From this perspective, the results could be used to support arguments for the expansion of the programme throughout Brazil. The implementation received extensive media coverage before and during the 2014 FIFA

Table 5 Children's perceptions of the 'FIFA 11 for Health' programme

	Region; proportion of positive responses*, %					
Perception	**North**	**North-east**	**Centre West**	**South-east**	**South**	**ALL Regions**
1. I found sessions easy to understand	88.3	89.3	90.4	82.5	88.4	87.7
2. I learned about health issues	95.4	94.4	97.4	94.3	98.0	95.8
3. My attitude to health issues has changed	82.9	81.4	83.2	81.2	89.4	84.0
4. I found the sessions enjoyable	83.0	82.4	92.0	87.4	92.2	86.8
5. I would recommend the programme to friends	90.7	93.1	93.9	89.4	93.5	92.1
6. My overall rating of the programme	91.9	88.7	92.7	82.3	96.7	90.7

*Positive responses equated to a response of 'agree' or 'strongly agree' for questions 1–5 and a rating of four or five for question 6.

Table 6 A comparison of the results recorded for Brazil and the results reported previously for countries in Sub-Saharan Africa[1–3]

Country	Mean values				
		Health knowledge questionnaire results, %			Overall programme rating, %
	Age, years	Preintervention	Postintervention	Change	
Ghana	13.5	61.3	86.4	25.1	94.7
Malawi	13.1	74.7	85.0	10.3	*
Mauritius	12.9	69.3	87.1	17.8	88.5
Namibia	11.4	57.9	85.3	27.4	97.8
South Africa	13.3	55.2	69.3	14.1	92.3
Tanzania	11.3	71.3	86.4	15.1	97.7
Zambia	11.7	57.5	74.7	17.2	93.2
Zimbabwe	11.5	57.8	76.2	18.4	96.8
Sub-Saharan Africa	**12.3**	**63.1**	**81.3**	**18.2**	**94.4**
North Region	11.0	53.8	70.7	16.9	91.9
North-east Region	11.3	62.0	75.6	13.6	88.7
Centre-West Region	11.6	65.3	79.3	14.0	92.7
South-east Region	10.8	64.2	80.1	15.9	82.3
South Region	9.2	57.7	86.8	29.1	96.7
Brazil	**10.6**	**60.2**	**78.6**	**18.4**	**90.7**

Bold face is used in table 6 for the mean values for sub-Saharan Africa as a whole and for Brazil as a whole to differentiate these values from the values for the individual countries in Africa and the individual regions in Brazil.
*Satisfaction questionnaire not distributed in Malawi.

World Cup Brazil,[12–14] which generated interest and enhanced the status of the programme among the children attending the course. Of particular benefit was the support provided by government ministers and 2014 FIFA World Cup Brazil location physicians from the Brazilian Football Confederation who attended media events to add their support to the programme.[12–14]

A limitation during the first stage of teacher training was the absence of Brazilian-Portuguese speaking master instructors; however, this was addressed by the use of experienced Spanish/English-speaking instructors, who could converse effectively with the teachers, and through the availability of local physicians who were fluent in Brazilian-Portuguese and English and who could therefore act as translators for the instructors to assist in answering detailed medical questions raised in relation to individual health topics. Language was not an issue during the larger second round of cascade-training courses, as the 22 local teachers who had implemented the programme during the first stage, presented these courses with the support of experienced Spanish/English-speaking master instructors.

A major limitation of the study from the perspective of future expansion of the programme across Brazil was that none of the implementations took place in a Brazilian favela, where the benefits of the programme would be expected to be high but where implementation issues would be expected to be different from those encountered in the areas and schools included in the study.

From the beginning, it was anticipated that implementing the 'FIFA 11 for Health' programme in Brazil would present challenges related to language and logistics and the implementation schedule was designed to address these issues; however, two further factors arose during the planning stages. Owing to the size and population of Brazil (Regional populations ranged from 15 to 85 million), the implementation created the same number of human resource requirements and logistic issues as would be required to deliver simultaneous implementations in five medium-size countries in Africa. This situation was compounded by the devolved nature of healthcare and education delivery in Brazil,[15] as this meant that an agreement reached with a Ministry at Federal level did not necessarily translate to an agreement with local authorities at the State or Municipal level: a situation that resulted, on occasion, in differences of opinion on the course content and the implementation strategy, which led to stretched time-lines in order to reach compromise arrangements.

The WHO 2013–2020 Global Action Plan for NCDs proposed worldwide targets to reduce the risk of premature mortality from cardiovascular disease, cancer, diabetes and chronic respiratory diseases by 25% and to reduce the level of physical inactivity by 10%;[16] these targets are very pertinent to Brazil as these issues have been identified as the major causes of premature death in the country.[10 17] Unsurprisingly, therefore, the Brazil Ministry of Health's 10-year health plan focuses on addressing the prevalence and causes of these diseases.[10] The 'FIFA 11 for Health' programme addresses each of these issues and the results from the present study have demonstrated that the programme offers an effective health education option for children in all Regions of Brazil. From a wider perspective, it is anticipated that the 'FIFA 11 for Health' programme and its associated course materials could be translated successfully into other languages and could be implemented equally successfully in many other countries and cultures.[18]

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Contributors CWF designed and coordinated the implementation; analysed and interpreted the data; wrote the draft paper; approved the final submission. EST, MF, DN acted as local project coordinators in Brazil; collected questionnaire data; reviewed the draft paper; approved the final submission. AJ assisted with the implementation; reviewed the draft paper; approved the final submission. JD liaised with the Brazilian Ministries of Health, Education and Sport and the Brazilian Football Confederation; reviewed the draft paper; approved the final submission.

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Competing interests CWF acts as a research consultant to F-MARC; EST, MF and DN are employed by the Brazilian Football Confederation; AJ is employed by F-MARC; JD is Chairman of F-MARC.

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REFERENCES

1 Fuller CW, Junge A, DeCelles J, *et al*. 'Football for Health'—a football-based health-promotion programme for children in South Africa: a parallel cohort study. *Br J Sports Med* 2010;44:546–54.
2 Fuller CW, Junge A, Dorasami R, *et al*. '11 for Health', a football-based health education programme for children: a two-cohort study in Mauritius and Zimbabwe. *Br J Sports Med* 2011;45:612–18.
3 Fuller CW, Junge A, Amaning J, *et al*. FIFA 11 for Health programme: implementation in five countries in Sub-Saharan Africa. *Health Educ J* 2015;74:103–19.
4 Dvorak J, Fuller CW, Junge A. Planning and implementing a nationwide football-based health-education programme. *Br J Sports Med* 2012;46:6–10.
5 World Health Organisation. *Skills for health. Information series on School health; document 9*. Geneva: WHO, 2003.
6 The World Bank. *Data*. http://data.worldbank.org (accessed 19 Feb 2015).
7 The Brazil Business. *Brazilian Regions*. http://www.thebrazilbusiness.com/article/brazilian-regions (accessed 19 Feb 2015).
8 World Health Organisation. *World health statistics 2014*. Geneva: WHO, 2014.
9 Pan American Health Organisation. *Health in the Americas—Brazil*. Washington: Pan American Health Organisation, 2012:129–145http://www.paho.org/saludenlasamericas/index.php?option=com_content&view=article&id=9&Itemid=14&lang=en (accessed 19 Feb 2015).
10 Castro MC. Overview of health risk factors in Brazil. In: Roger B, Nabholz C, Woodward S, eds, *Health Risk Factors—Brazil*. Ruschlikon: SwissRe Centre for Global Dialogue, 2015:15–20.
11 LeDuc Media. *Country Health Profiles*. http://www.worldlifeexpectancy.com/world-health-rankings (accessed 19 Feb 2015).
12 BMJ Blogs. FIFA 11 for Health reaching out to 4,000 children in Brazil. http://blogs.bmj.com/bjsm/2014/05/07/fifa-11-for-health-reaching-out-to-4000-children-in-brazil/ (accessed 19 Feb 2015).
13 AIPS. FIFA, LOC and Brazilian government discuss positive legacy of Brazil 2014 for health. http://www.aipsmedia.com/index.php?page=news&cod=13051&tp=n#.VOXL1SiJLHN (accessed 19 Feb 2015).
14 Maizupath. A total of 4000 children to benefit from "FIFA 11 for Health" programme. http://maizupath.com/4000-children-to-benefit-from-fifa-11-for-health-programme-202 (accessed 19 Feb 2015)
15 Pierce A. Decentralisation and social policy in Brazil: an analysis of health and education policies of the new republic. *J Int Affairs* 2013. http://jia.sipa.columbia.edu/online-articles/decentralization-and-social-policy-in-brazil/ (accessed 19 Feb 2015).
16 World Health Organisation. *Global action plan for the prevention and control of noncommunicable diseases; 2013–2020*. Geneva: WHO, 2014.
17 Schmidt MI, Duncan BB, Silva GA, *et al*. Chronic non-communicable diseases in Brazil: burden and current challenges. *Lancet* 2011;377:1949–61.
18 Barriguete Melendez JA, Dvorak J, Córdova Villalobos JA, *et al*. FIFA 11 for Health in Mexico: a school-based intervention for the prevention of obesity and non-communicable diseases. *Br J Sports Med* 2014;48:940–1.