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The Differences in Quality of Life in Prostate Cancer Project: Methods and Design of a Multidisciplinary Population-Based Follow-up Study

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Abstract: Problem statement: Numerous studies have examined the Health Related Quality of Life (HRQoL) in Prostate Cancer (PCa) survivors but few have examined potential differences between races. The causes for alterations in HRQoL in PCa survivors have not been thoroughly explored either, limiting insight regarding potential means to improve their quality of life. Using a large sample of approximately equal numbers of Caucasian-American (CA) and African-American (AA) PCa survivors, the Quality of Life in Prostate Cancer Project (Q-PCaP) is designed to determine if there is a disparity in HRQoL between these groups. Furthermore, QPCaP will determine to what extent certain factors, specifically Healthy Life Behaviors (HLBs), socioeconomic determinants and cultural characteristics of AA and CA PCa survivors affect HRQoL and provide an explanation for any potential disparities observed. **Approach:** Q-PCaP is a follow-up study built upon a population-based study, the North Carolina-Louisiana Prostate Cancer Project (PCaP). PCaP enrolled men with newly-diagnosed PCa from specific regions of these two states from September 2004 through August 2009. Q-PCaP is designed to collect follow up HRQoL data from the Louisiana cohort of PCaP 3-6 years after their initial baseline interview. Subjects' current HLBs, social, economical, physical and emotional status, including prostate-related symptoms and other comorbidities, as well as their self-reported experience regarding PCa treatment and health care, will be collected via telephone interviews. The presence and degree of any disparity in the HRQoL between AA and CA PCa survivors will be evaluated. **Results:** The study will generate a rich archive of follow-up data for a well-characterized population-based cohort of men with PCa to improve understanding of the determinants and disparities in HRQoL. Primary data collection activities are expected to continue through January 2013, yielding approximately 900 enrolled PCa survivors. **Conclusion:** HLBs are potentially modifiable factors affecting the HRQoL of PCa survivorship. Identifying those that contribute the most to HRQoL and instituting interventions to alter "unhealthy" behaviors may make it possible to not only improve overall HRQoL of PCa survivors, but to reduce racial disparities.

Key words: Health Related Quality of Life (HRQoL), Healthy Life Behaviors (HLBs), African-American (AA), Caucasian-American (CA), Prostate Cancer Project (PCaP)

INTRODUCTION

Although incidence continues to remain high, the mortality associated with Prostate Cancer (PCa) diagnosis has dramatically decreased over the last decades (Jemal *et al*., 2008). Improved long term survival (over 5 years) in PCa has been associated with earlier diagnoses and advancements in PCa treatments

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(Gomella *et al*., 2009). Due to policy and health care changes, the disparity in PCa mortality among African-American (AA) and Caucasian-American (CA) men have also begun to dissipate (Siegel *et al*., 2011).

The decreases in PCa mortality have unfortunately been accompanied by increases in PCa morbidity (Jemal *et al*., 2008; Gomella *et al*., 2009). Furthermore, there is disparity in PCa morbidity: although more men with PCa are surviving due to earlier detection and improved treatments, their survivorship is marked with ongoing prostate cancer-associated health impairments which appear to be more pronounced in AA PCa survivors (Gomella *et al*., 2009; Penedo *et al*., 2006).

Current treatments for PCa are well known to be associated with side effects that can increase morbidity and negatively impact survivors' Health Related Quality of Life (HRQoL). Numerous studies have demonstrated that all active treatments for PCa-prostatectomy, brachytherapy, external beam radiation and the use of androgen-deprivation therapy-are associated with alterations in HRQoL (Sanda *et al*., 2008; Miller *et al*., 2005; Litwin *et al*., 1999 Eller *et al*., 2006; Bacon *et al*., 2002; Sadetsky *et al*., 2008; Wei *et al*., 2002; Brandeis *et al*., 2000; Pietrow *et al*., 2001; Potosky *et al*., 2000). Even when the treatment chosen is active surveillance (watchful waiting/no treatment), alteration in HRQoL measures are reported (Bellizzi *et al*., 2008; Arredondo *et al*., 2008). Furthermore, alterations in HRQoL have been found to persist even many years after PCa treatment (Sanda *et al*., 2008; Litwin *et al*., 2001). Alterations in HRQoL in PCa survivors are not completely dependent on choosing treatments: studies have shown that HRQoL is also associated with stage of cancer at diagnosis, socioeconomic, physical and psychological status, comorbidities, HRQoL prior to diagnosis and health care utilization behaviors (Penedo *et al*., 2006; Jayadeyappa *et al*., 2007; Lubeck *et al*., 2001; Litwin *et al*., 2001; Ramsey *et al*., 2007; Penson *et al*., 2001).

As with morbidity, there is also a disparity in HRQoL between AA and CA survivors (Penedo *et al*., 2006; Sanda *et al*., 2008; Litwin *et al*., 1999; 2001; 2000; Jayadeyappa *et al*., 2007; Lubeck *et al*., 2001; Johnson *et al*., 2004; Freedland and Isaacs, 2005; Jenkins *et al*., 2004; Eton *et al*., 2001). Though variance in PCa treatment is thought to play a role in this disparity, it has been postulated that AA PCa survivors have lower HRQoL measurements due to lower pretreatment HRQoL, less advantageous sociodemographic characteristics, higher rate of comorbidities, later stage of disease at diagnosis and more issues regarding health care (Penedo *et al*., 2006; Jayadeyappa *et al*., 2007; Lubeck *et al*., 2001; Litwin *et al*., 2000 Ramsey *et al*., 2007; Penson *et al*., 2001). However, previous testing of these hypotheses has generally involved only small AA PCa survivor samples, limiting the conclusiveness of the results (Potosky *et al*., 2000; 1999; Schroeder *et al*., 2006). Reports from two of the largest Prostate Cancer Studies (CaPSURE and PCOS), for example, included 60 non-whites in a 1 year post-treatment analysis and 202 non-Hispanic blacks in a two-year follow-up, respectively (Potosky *et al*., 2000; Bellizzi *et al*., 2008).

Recently, cross sectional studies have demonstrated that various HLBs can affect HRQoL in PCa survivors. Studies have found that PCa survivors who reported higher levels of physical activity, healthier diet, lower Body Mass Index (BMI) and not smoking have higher HRQoL measurements (Penedo *et al*., 2006; Segal *et al*., 2003; Mosher *et al*., 2008; Demark-Wahnefried *et al*., 2004). Thus, it could be theorized that negative side effects of various PCa treatments on HRQoL may be ameliorated by engagement in HLBs by PCa survivors. Again, however, there is a general lack of data regarding HLBs of AA PCa survivors (Penedo *et al*., 2006). The few studies that reported data regarding HLBs of AA PCa survivors found that AA with PCa have a higher rate of obesity compared to CA (Freedland *et al*., 2004; Montgomery *et al*., 2006; Amling *et al*., 2004). One study observed a link between HLB and HRQoL such that lower rates of physical activity were associated with variation in HRQoL measurements in AA PCa survivors compared to their CA counterparts (Penedo *et al*., 2006). Given such limited data, any conclusion regarding the effect of HLBs on HRQoL in AA PCa survivors must be tentative.

These earlier findings regarding PCa survivors suggest the potential impact of changes to HLBs on HRQoL and associated morbidity. Further, it can also be postulated that the disparity in PCa-related health impairments could be reduced by improving the HRQoL in AA PCa survivors through altering HLBs. More data are clearly needed regarding the HLBs and HRQoL of PCa in survivors. More importantly, due to the sparseness of AA representation in many of the datasets used to conduct previous HRQoL analyses, research in this area must include a large enough sample size of AA PCa survivors to provide sufficient power to render reliable findings regarding the effect race may have on HRQoL or HLBs.

The Quality of Life in Prostate Cancer Project (Q-PCaP) has been designed to address this challenge. The study will collect the data required to assess the HRQoL of PCa survivors, evaluate the degree of any disparity in HRQoL between AA and CA survivors and determine the extent that HLBs are associated with such

disparity. The primary hypothesis of Q-PCaP is that HRQoL varies significantly between AA and CA PCa survivors and that this variance in HRQoL is associated with differences in HLBs between the two groups. The primary aim of the analyses will be to determine the effect that HLBs (which include diet, exercise, smoking, alcohol consumption and health care seeking) and non-HLB factors (which include socioeconomic and belief factors) have on HRQoL and to what extent these differences account for racial differences in HRQoL between AA and CA men with PCa. The overall goal of this study is to assess the most effective focus of public health efforts to reduce racial disparities and improve PCa survival.

To accomplish its study aims, Q-PCaP will conduct a follow up study of a sample of men initially enrolled in the Louisiana component of the North Carolina-Louisiana Prostate Cancer Project (PCaP). PCaP is a multidisciplinary population-based case-only study of racial and geographic differences in prostate cancer aggressiveness. The PCaP protocol included a comprehensive evaluation of social, individual, biological and tumor factors' influences on prostate cancer aggressiveness. The PCaP study enrolled over 1000 AA and 1000 CA men newly diagnosed with PCa from July 2004 through August 2009 from specific regions of the two states (NC 505 AA/ 527 CA, LA 632 AA/603 CA). Further details about the original study's design and protocol can be found in a paper published in 2006 (Schroeder *et al*., 2006).

Q-PCaP will collect data through a telephone interview conducted 3-6 years after the baseline PCaP study. This study describes Q-PCaP's study design and presents preliminary descriptive data regarding the study sample.

PCaP Study Louisiana Enrollment: The PCaP Louisiana (LA) study arm began enrollment in September of 2004 in 13 parishes surrounding New Orleans. However, on August 29, 2005, accrual was suspended with 122 AA and 95 CA men enrolled, due to Hurricane Katrina. Four of these men subsequently proved to be ineligible, leaving 119 AA and 94 CA in the final study sample. This portion of PCaP LA is now referred to as the Phase I sample. As a result of changes in overall demographics of the region and the dispersal of potential subjects following Hurricane Katrina, PCaP LA initiated Phase II enrollment in an expanded study area that included eight additional parishes in southern Louisiana (Fig. 1). This Phase II enrollment began in September of 2006 and was completed on August 31, 2009, with 506 eligible AA and 508 eligible CA (1,014 total) research subjects enrolled. Because of the immense impact that Hurricane Katrina had on the study population and the LA health care system, the main analyses will focus on the Q-PCaP sample from Phase II, which will present the greatest statistical power due to its size. Supplementary analyses of Phase I data and comparisons of results between the two Phases will be conducted, however and may yield additional insight into factors contributing to survivors' HRQoL.

PCaP LA subjects were identified through a Rapid Case Ascertainment process utilizing Louisiana Tumor Registry contacts. Diagnosing physicians provided consent to contact 98% of AA and 96% of CA potential subjects in Phase I and 97% of AA and 96% of CA in Phase II. Computer-generated random sampling algorithms were applied in order to under-sample CA men to the degree necessary to achieve a 50:50 distribution of race within both North Carolina's and Louisiana's sample. The percentage of all eligible CA men that needed to be recruited in order to produce a number of cases equal to that for the AA men was computed for each state separately and each ascertained case was assigned a specific random number ranging from 0-100%. Only those CA men whose numbers were less than the percentage needed to insure equal sampling probabilities were then recruited. The participation rates measured by the number of completed visits per eligible participant identified were 70% for AA and 78% for CA in LA Phase I and 63% for AA and 71% for CA in Phase II.

The mean interview time was 3.4 h for both AA and CA in Phase I and 2.9 h for AA and 3.2 h. for CA in Phase II. Ninety seven percent of subjects interviewed in Phase I and 98% of subjects interviewed in Phase II gave their consent for future contact and thus were eligible for Q-PCaP.

Demographics and socioeconomic status of the Q-PCaP Target cohort: On average, AA PCa survivors were younger at diagnosis (with a mean age of 63) than CA PCa survivors (with a mean age of 65). PCa survivors under 60 made up 37.0% of the AA participants in Phase I versus 36.0% in Phase II and 22.3% versus 29.2% for CA in the respective periods. Table 1 AA PCa survivors were less likely to be married or living as married than CA PCa survivors (64.7 Vs. 72.3% for Phase I, 66.4 Vs. 84.3% for Phase II). Indices of education and income showed large differences by race in the study population. For instance, AA men were less likely to have completed education beyond the high school level (23.5 Vs. 58.5% for Phase I; 40.3 Vs. 66.5% for Phase II).

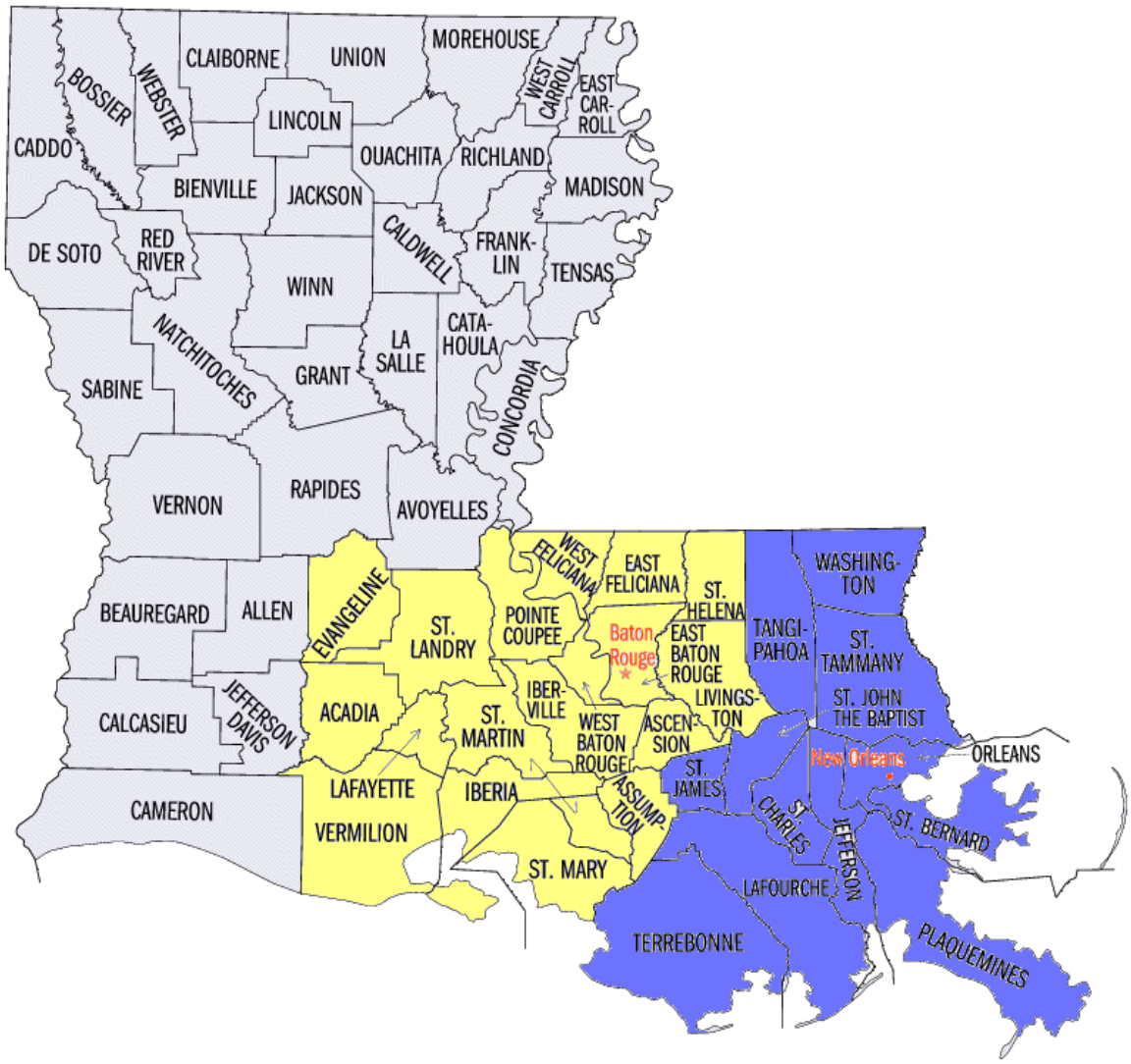

Fig. 1: PCaP Louisiana Study Area. The 13 original parishes are shown in blue. Post-Katrina expansion parishes are shown in yellow

Similarly, 43.7% of AA PCa survivors had income ≤$20, 000 compared to 19.1% of CA PCa survivors during Phase I visits; the proportion below $20,000/year dropped in the Phase II sample for both groups, but the disparity persisted, with 32.6% of AA PCa survivors vs. 10.8% of CA PCa survivors falling into that category. AA men were more likely to be unemployed or not working due to illness or disability (10.8 Vs. 3.2% for Phase I; 6.9 Vs. 3.4% for Phase II). AA PCa survivors also had a higher percentage of participants below 200% of the poverty level (as defined by the US Census Bureau in 2004) with 10.9 Vs. 4.3% for Phase I and 8.1 Vs. 2% for Phase II US Census Bureau, 2004 (Carpenter *et al*., 2009). A higher percentage of AA PCa survivors had Medicaid/welfare without other types of insurance (2.5% vs. 0 for Phase I; 3.4 Vs. 0.2% for Phase II); besides, a higher percentage of AA PCa survivors had Medicare only without other types of insurance (23.5 Vs. 13.8% for Phase I; 22.9 Vs. 10.6% for Phase II). The Rapid Assessment of Literacy in Medicine (REALM) questionnaire showed that 44.2% of AA and only 8.5% of CA had a medical literacy at or below the 6th grade level in Phase I and 39.1 Vs. 8.3% for Phase II (Carpenter *et al*., 2009) (Table 1).

Table 1: Demographic and socioeconomic characteristics of the PCaP LA cohort

	Phase I						Phase II					
	AA		CA		Total		AA		CA		Total	
	N	Pct	N	Pct	N	Pct	N	Pct	N	Pct	N	Pct
AGE group at diagnosis												
40-49	4	3.40	2	2.1	6	2.8	19	3.8	12.00	2.4	31.0	3.10
50-59	40	33.6	19	20.2	59	27.7	163	32.2	136.00	26.8	299.0	29.5 0
60-69	50	42.0	41	43.6	91	42.7	223	44.1	219.00	43.1	442.0	43.60
70-79	25	21.0	32	34.0	57	26.8	101	20.0	141.00	27.8	242.0	23.90
Marital status												
Missing	0	0.00	0	0.0	0	0.00	1	0.2	0.00	0.0	1.0	0.10
Married	77	64.7	68	72.3	145	68.1	336	66.4	428.00	84.3	764.0	75.30
Widowed	9	7.60	11	11.7	20	9.40	43	8.5	21.00	4.1	64.0	6.30
Divorced/separated	25	21.0	9	9.6	34	16.0	102	20.2	46.00	9.1	148.0	14.60
Never married	8	6.70	6	6.4	14	6.60	24	4.7	13.00	2.6	37.0	3.60
Education												
Missing	0	0	0	0.0	0	0.00	1	0.2	0.00	0.0	1.0	0.10
< High school	56	47.1	14	14.9	70	32.9	183	36.2	59.00	11.6	242.0	23.80
High school	35	29.4	25	26.6	60	28.2	117	23.1	111.00	21.9	230.0	22.60
> High school	28	23.5	55	58.5	83	39.0	204	40.3	338.00	66.5	544.0	53.40
Don't know	0	0	0	0.0	0	0.00	1	0.2	0.00	0.0	1.0	0.10
Annual income												
Missing	0	0	0	0.0	0	0.00	5	1.0	1.00	0.2	6.0	0.60
<=$20,000	52	43.7	18	19.1	70	32.9	165	32.6	55.00	10.8	220.0	21.70
$20,001-40,000	37	31.1	27	28.7	64	30.0	121	23.9	90.00	17.7	211.0	20.80
$40,001-70,000	13	10.9	19	20.2	32	15.0	79	15.6	122.00	24.0	201.0	19.80
>$70,000	8	6.7	22	23.4	30	14.1	69	13.6	175.00	34.4	244.0	24.10
Don’t know	7	5.9	1	1.1	8	3.80	29	5.7	9.00	1.8	38.0	3.70
Refused	2	1.7	7	7.4	9	4.20	38	7.5	54.00	11.0	94.0	9.30
Employment												
Missing	0	0	0	0.0	0	0.0	5.0	1.0	1.00	0.2	6.0	0.60
Paid work	41	34.2	32	34.0	73	34.1	185	36.3	253.00	49.8	438.0	43.00
Retired, age or choice	37	30.8	46	48.9	83	38.8	139	27.3	183.00	36.0	322.0	31.60
Retired, unable to work	29	24.2	12	12.8	41	19.2	141	27.6	48.00	9.4	189.0	18.60
Unemployed	0	0	1	1.1	1	0.5	10.0	2.0	5.00	1.0	15.0	1.50
Not able to work/illness	13	10.8	2	2.1	15	7.0	25.0	4.9	12.00	2.4	37.0	3.60
Other	0	0	1	1.1	1	0.5	5.0	1.0	5.00	1.0	10.0	1.00
Don’t know	0	0	0	0.0	0	0.0	0.0	0.0	1.00	0.2	1.0	0.10
Poverty level												
Above poverty level	65	54.6	76	80.9	141	66.2	329	65.0	451.00	88.8	780.0	75.10
Borderline	41	34.5	14	14.9	55	25.8	131	25.9	46.00	9.1	177.0	17.50
Below poverty level	13	10.9	4	4.3	17	8.0	41	8.1	10.00	2.0	51.0	5.00
Unknown	0	0	0	0.0	0	0	5	1.0	1.00	0.2	6.0	0.50
Health insurance												
Missing	26	21.8	7	7.4	33	15.5	57	11.3	25.00	4.9	82.0	8.10
Medicaid/welfare	3	2.5	0	0.0	3	1.4	17	3.4	1.00	0.2	18.0	1.80
Medicaid/welfare + others (no Medicare)	0	0	0	0.0	0	0	3	0.6	0.00	0	3.0	0.30
Medicare only	28	23.5	13	13.8	41	19.2	116	22.9	54.00	10.6	170.0	16.80
Medicare + Other	15	12.5	33	35.1	48	22.4	115	22.5	168.00	33.1	283.0	27.90
Other only	46	38.7	41	43.6	87	40.8	194	38.3	258.00	50.8	452.0	44.60
Don’t know/refused	1	0.8	0	0	1	0.5	4	0.8	2.00	0.4	6.0	0.60
Medical literacy												
Missing	1	0.8.0	0	0.0	1	0.5	0	0	1.00	0.2	1.0	0.10
<=6th grade level	53	44.2	8	8.5	61	28.6	198	39.1	42.00	8.3	240.0	23.70
>6th grade level	65	54.6	86	91.5	151	70.9	308	60.9	465.00	91.5	777.0	76.20

MATERIALS AND METHODS

Study population: As previously described, the Q-PCaP student population is drawn from research subjects in the Louisiana arm of the PCaP. The PCaP study’s inclusion criteria were: an initial diagnosis of primary prostate cancer during the study period; 40-79 years old at diagnosis; able to complete the study interview in English; and sufficient cognitive and physical capacity to consent and complete the data collection and interview, while not being institutionalized.

All persons enrolled in PCaP, who did not refuse further contact at the time of their initial PCaP interview or thereafter, are eligible for Q-PCaP. Men who became institutionalized subsequent to their initial PCaP interviews are considered to still be eligible for Q-PCaP. However, anyone that is unable to complete the study interview or does not currently have sufficient cognitive and physical capacity to give informed consent or provide accurate answers to the interview questions will not be eligible.

Recruitment: Research subjects in Louisiana who provided consent for future contact (98% of AA and 98% of CA through August, 2009) at the baseline PCaP visit and completed the baseline PCaP interview questionnaires are considered for recruitment. The vital status of these participants is tracked using the National Death Index, which is obtained from the National Center for Health Statistics, to preclude attempts to contact deceased subjects. Death certificates are obtained for decedents to determine cause of death. The Research subjects who can provide informed consent for Q-PCaP and complete an interview lasting approximately one hour by telephone are being recruited and scheduled for an interview. The parent PCaP Subject Tracking System has been modified to automatically identify subjects eligible for Q-PCaP and track their progress through the enrollment and data collection process.

All potential Q-PCaP subjects will receive an opt-out letter approximately 3-6 years after their baseline PCaP interview. This letter provides a brief description of Q-PCaP and includes a toll free telephone number for PCa survivors use to decline further contact regarding Q-PCaP enrollment. After an additional two weeks, Q-PCaP interviewers contact potential participants by telephone to solicit participation and schedule a telephone interview for those that are willing to enroll. The interviewers record the recruitment history for each solicited participant through a call log that incorporates information including reasons for any refusals to participate; this information is used to identify barriers to participation and ameliorate them to the degree possible as the study proceeds.

Although contact information is available from the original PCaP study, the Accurint® tracking service is used to obtain more current contact information as needed. Accurint® is a widely accepted locate-and-research tool available to government, law enforcement and commercial customers, which uses public records and non-public information that yields valid contact information for many persons who cannot otherwise be successfully traced.

Telephone interviews: The Q-PCaP project utilizes specifically trained Registered Nurses (RNs) to recruit and conduct telephone interviews. Each follow-up interview is guided by a telephone script, at the beginning of which RNs describes the Q-PCaP study, explain participation requirements, clarify the risks and benefits of participation, give details of the procedures in place to maintain confidentiality and explicitly solicit the consent of the patient to participate. Once consent is obtained, the RNs administers a series of structured survey instruments that take approximately one hour to complete. The questionnaire used is based on a modified version of the interview instrument developed for the Health Care Access and Prostate Cancer Treatment in North Carolina study (HCaP-NC, American Cancer Society RSGT-08-008-01/CPHPS). HCaPNC is a follow-up study of North Carolina PCaP research subjects focused on health care access in PCa survivors that is currently in its third year. Details of the measurement instruments are described in the Study Measures Section below.

Data management, quality control and security: Study and data management are facilitated by relational databases that consist of secure client connections to a central Oracle server with automatic failover features, daily backups and transaction logs. Data entry is facilitated through the use of the Teleform direct data entry system with built-in range and logic checks to reduce data entry errors. The PCaP Consortium Database is serving as the ultimate repository for Q-PCaP study data. Monthly and cumulative progress reports are reviewed to monitor study progress and data are monitored to ensure data quality. All electronic media and hard copy records that include protected health information are kept in locked file cabinets with restricted access and all computer files are password protected. Personal identification information in the restricted-access password-protected subject master file is being kept completely separate from study identifies.

Study timeline, organization and personnel: Q-PCaP recruitment began on February 1 in 2011 and will continue through December of 2012. We estimate that over 1100 men will be eligible for the Q-PCaP 3-6 years following their PCaP baseline interview after accounting for those who refused future contact and projected mortality and around 900 of them will be enrolled. Faculty and staff of the LSUHSC-NO School of Public Health are responsible for conducting QPCaP. All Q-PCaP study personnel are thoroughly familiar with the PCaP parent study procedures and processes, thus facilitating the compatibility and complementary relationship of the newly collected data with PCaP baseline data for eventual analyses.

Study measures: The HRQoL assessment includes measures that assess both general (SF-12 Health Survey) and PCa specific quality of life (the Expanded PCa Index Composite (EPIC) questionnaire) (Miller *et al*., 2005; Wei *et al*., 2000; Ware *et al*., 2002; Littman *et al*., 2004). The SF-12 includes Mental Health Score (MHS) and Physical Health Score (PHS) and provides complementary measures of HRQoL that can be used in conjunction with measures of prostate-specific impairment (Wei *et al*., 2000). The SF-12 was administered at baseline and can thus be directly compared with the follow-up SF-12. The EPIC instrument used for this assessment is a 26 item version (EPIC-26) that was derived by reducing the original 50-item EPIC, removing items that showed biometric or content overlap (Miller *et al*., 2005). The EPIC-26 instrument retains summary domain scores for urinary irritative-obstructive, urinary incontinence, bowel, sexual and hormonal symptoms specific to prostate cancer. The EPIC-26 was not administered during PCaP, but an array of analogous questions about symptoms which were administered in the baseline PCaP Diagnosis and Screening questionnaire will provide baseline markers for symptom progression.

Data regarding HLBs will come from a variety of tools administered during the baseline PCaP interview and/or during the Q-PCaP follow-up. Dietary assessment was administered during the PCaP interview and is based on a modified version of the National Cancer Institute-developed Dietary History Questionnaire (DHQ), incorporating 144 food items that included major regional specific food items not included on the original DHQ. Level of physical activity was assessed during baseline and will be reassessed at follow-up, as will smoking habits and alcohol use. BMI at baseline was calculated by direct measurement of the subject; for follow-up, subjects will report their current weight, which will be used to calculate current BMI. Detailed data were collected during the initial PCaP interview regarding the subject's vitamin and dietary supplement use. A modified version of this tool will be used to update the subject's current vitamin and supplement intake.

Factors associated with attitudes regarding the health care system will also come from a variety of tools administrated during the PCaP interview and/or during the Q-PCaP follow-up. Measures of health care literacy were assessed by the Rapid Assessment of Literacy in Medicine (REALM) questionnaire, which was administered at baseline (Bennett *et al*., 1998). Also measured at baseline was health care utilization (using the Habits of Health Care Utilization Index), current usual sources of health care, health seeking behaviors, perceived access to and quality of care, trust in the health care system as well as physicians and perceived levels of racism in health care settings (Safran *et al*., 1998; LaVeist *et al*., 2000; Pearson and Raeke, 2000). Specific questions regarding subject experience in seeking PCa treatment and care will also be assessed during the Q-PCaP interview.

Background characteristics such as current place of residence, marital status, health insurance, employment status, religious beliefs and current income were assessed at baseline and will be updated during the Q-PCaP interview. Other background characteristics such as education and medical literacy were only collected at baseline.

The subject's health status, including current general health and comorbidity, was assessed at baseline PCaP interview and will be reassessed during Q-PCaP. A detailed log of prescribed and over-the-counter medications being taken at the time of the initial PCaP interview was collected; medications taken in the course of PCa treatment since diagnosis will be reassessed during follow-up. A summary of specific components of the Q-PCaP interview questionnaire is provided below:

- Background characteristics: Current residence, marital status, weight, income
- Employment and insurance status
- HLBs: current physical activity, smoking habits, alcohol use, fruit and vegetable serving frequency, plus health-seeking behaviors (assessed as part of a health care module, see below)
- Nonsteroidal anti-inflammatory drugs (NSAIDs): current frequency of use for prescription and over-the-counter NSAIDs
- Vitamins and supplements: currently used dietary supplements and herbal products
- Health status: current general health and co-morbid conditions
- Health care: current usual sources of health care and insurance, health seeking behaviors, perceived access to and quality of care and trust in the health care system as well as physicians
- Prostate cancer-related tests for diagnosis: PSA tests, digital rectal exams, prostate biopsies
- Treatment: all treatments have received since PCa diagnosis
- Religion and social support: Religion, level of religious activity, social support network size and satisfaction, membership in prostate cancer support group(s)
- Prostate cancer-specific symptoms and quality of life: sexual, urinary and bowel function (via EPIC-26)

- General health-related quality of life: limitations on activity due to overall health, physical health, or emotional problems (via SF-12)

Statistical analysis: The primary aim of the analysis will be to assess risk factors associated with racial differences in HRQoL between AA and CA PCa survivors. These include risk factors related to lifestyle, socioeconomic status, beliefs and health care seeking. The Q-PCaP will collect and analyze data from both baseline PCaP and follow-up questionnaires. The baseline questionnaire and follow-up questionnaire data will be edited and merged. Most analyses will be performed using SAS statistical software (version 9.2, SAS Institute Inc, Cary, NC). The outcome variables of HRQoL measured by EPIC-26 and SF-12 will be analyzed either as continuous variables or categorical variables for each specific domain, as appropriate. We will conduct factor analyses to verify the reliability and consistency of the Q-PCaP survey questionnaires through estimating Cronbach's alpha value for each instrument. The scores for the survey questionnaires will be used as continuous variables or categorical variables and may be log-transformed if non-normal or non-linear as the data dictates. Binary summary variables may be created to combine different Likert scales where critical data will not be lost in so doing. Basic descriptive univariate analyses will be utilized to compare characteristics between AA and CA men and test for statistically significant differences using t-tests for continuous variables and chi-square tests for categorical variables. Bivariate analyses will be performed to individually evaluate the crude associations between various risk factors and long-term HRQoL between races. Multivariate analyses will be performed through unconditional logistic regression to evaluate and adjust for multiple risk factors simultaneously. Potential confounders and effect modifiers will be evaluated by assessing stratum-specific odds ratios and by including interaction terms in the multivariate logistic regression models where appropriate.

Statistical power: The primary outcome under study is HRQoL, measured on a 100-point scale. In order to estimate the power available for testing the hypothesis that HRQoL after prostate cancer differs significantly between AA and CA, standard methods for determining power in a comparison of sample means (Rosner, 2011) were applied via a program compiled in Intel Visual Fortran. Table 2 presents minimum detectable differences for a range of power and alpha specifications.

Table 2: Minimum detectable HRQoL Difference between AA and CA for Varying Analytical Sample Size (N), Power and Alpha Criteria

	N = 900		N = 750	
Power	Alpha = 0.05	Alpha = 0.01	Alpha = 0.05	Alpha = 0.01
0.70	1.94	2.41	2.097	2.611
0.75	2.06	2.53	2.223	2.738
0.80	2.19	2.66	2.364	2.879
0.85	2.34	2.81	2.529	3.044
0.90	2.53	3.00	2.736	3.250

Given 900 total subjects with equal proportions of AA and CA, the study will have 80% power to detect as statistically significant a difference in HRQoL score of 2.2 points under the conservative assumption of a two-sided test with alpha set at 0.05. Even with an analytical sample of 750, based on the assumption that only 74% of the original Phase II PCaP participants are enrolled and included in the analyses, the detectable difference remains small (2.4 points). The study is thus well powered to address modest differences between races in HRQoL.

The results from Table 2 can be extrapolated to other potential risk factors when considered as binary exposures (i.e., above-median physical activity or SES contrasted with below-median 17 activities or SES). Many of the potential predictors will be available with a finer granularity than that (e.g., perceived access to care, measured along a continuum) and exploiting this additional detail by modeling them in a continuous or ordinal discrete form, where appropriate, may further enhance study power.

RESULTS

As of March 2012, the Q-PCaP study is underway and has successfully enrolled a total of 417 PCa survivors (Fig. 2). Only 2 losses to follow-up are indicated at this point since efforts are still underway to track down all eligible survivors. The proportion of men 65 years of age or older are currently elevated by the fact that recruitment is proceeding in the order that participants joined the original PCaP study. More time will have passed for these men on average before recontact for recruitment than for men enrolled later in the study, especially given the one year's hurricane-related suspension of enrollment in the original study (Table 3).

Primary data collection activities should be completed for 900 Louisiana PCa survivors by January 2013. These activities will generate a significant high-quality archive of follow-up data from a well-characterized population-based cohort of men with PCa, ultimately including around 450 AA men and 450 CA men with at least three years of additional observation from the time of initial interview.

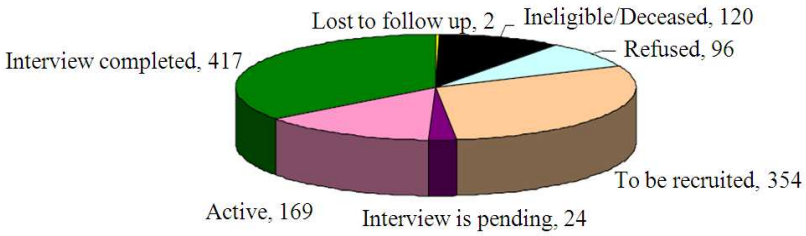

Fig. 2: Participation in Q-PCaP as of March 2012

Table 3: Characteristics of the PCa survivors enrolled in Q-PCaP as of March 2012

	Overall		AA		CA	
Age	Number	Percent	Number	Percent	Number	Percent
<55	12	2.9	5	1.2	7	1.7
55-65	104	24.9	35	8.4	69	16.5
³65	301	72.2	108	25.9	193	46.3
Total	417	100.0	148	35.5	269	64.5

DISCUSSION

Both the PCaP and its follow-up Q-PCaP study differ from most previous work in that they provide a population-based sample with sufficient numbers of AAs to conduct robust comparisons of predictors and HRQoL within this group. Furthermore, basing a follow-up study on the assembled PCaP study population yields the critical advantage of leveraging extensive baseline data from a rich variety of sources, including in-house interviews, biological samples, medical abstraction and tumor tissue analysis, with prospective follow-up data. This provides an unprecedented capability to assess and evaluate factors that may mediate the association between race and PCa outcomes in a large and diverse population-based cohort of recently diagnosed AA and CA men. Medical record acquisition to enhance details on treatment and other clinical data and extension of follow-up can be added in the future to augment the available data. A further advantage is that another funded follow-up study focused on access to care issues is currently underway in North Carolina under the PCaP aegis. The two follow-up studies can thus ultimately be combined to yield longitudinal data on the entire original PCaP cohort of over 2000 participants for future investigation.

CONCLUSION

In order to address the possible role of HRQoL in racial differences in PCa survivorship, studies must be designed that have sufficiently large AA samples to effectively test for differences in HRQoL between AA and CA PCa survivors. To elucidate the possible mechanisms at work more thoroughly, such studies should ideally also assess the differences in HLBs between races and the potential mitigating effect those HLBs may have on variation in post PCa treatment HRQoL. Answering these questions will allow both AA and CA men diagnosed with PCa to be provided with advice and care that maximizes post-treatment HRQoL and well being during survivorship.

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

Authors' contributions: CB and NS conceptually developed the idea for research. EO lead the formulation of statistical analyses for the study. CB, EO, EF and NS contributed to the development of the study protocol and the conception of the methods. EF, JLM, JTB, MM, CB and NS were centrally involved in the conduct of the baseline study. CB, EO, EF and NS contributed to the drafting of the manuscript. All of the authors have read and approved the final manuscript.

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