

Evaluating a Program to Build Data Capacity for Core Public Health Functions in Local Maternal Child and Adolescent Health Programs in California

Geraldine Oliva · Jennifer Rienks · Gilberto F. Chavez

Published online: 28 September 2006
© Springer Science+Business Media, LLC 2006

Abstract *Objectives:* To improve local Maternal and Child Health programs' capacity to collect and analyze data to support core public health functions, the California Maternal and Child Health Branch (CAMCHB) and the University of California San Francisco Family Health Outcomes project (FHOP) entered into a cooperative agreement. FHOP utilizes a 6-pronged strategy: face-to-face training, telephone technical assistance, on-site consultation, development of automated analytic tools, development of written guidelines, and web dissemination of data and materials. We evaluated the acceptability and effectiveness of these approaches. *Methods:* Local Health Jurisdiction (LHJ) staff completed a self-administered questionnaire on use of and satisfaction with FHOP's services. A 34-item assessment tool was used to independently evaluate each 5-year community assessment plan submitted by LHJs to the CAMCHB. Administrative data on the use of FHOP's service was also considered. Correlational analyses were done to determine if use of FHOP services and materials was related to more adequate plans. *Results:* LHJs with higher overall adequacy scores on their plans had an overall higher level of use of FHOP's products and services. LHJs with higher adequacy scores reported calling FHOP for technical assistance more frequently, using FHOP's book – "Developing an Effective Planning Process: A Guide for Local MCH Programs," and using FHOP's au-

tomated tools including EpiBC, an EpiINFO based program for birth certificate analysis, and Microsoft Excel data analysis templates. *Conclusion:* This 6-pronged strategy is well utilized and accepted by local MCH staff and appears to have some degree of association with better quality of local MCH plan documents.

Keywords Building data capacity · Maternal and child health · Evaluation · California · Technical assistance · Data collection · Analytic capacity · Title V

Introduction

In its 1988 report, *The Future of Public Health*, the Institute of Medicine described the status of public health service provision in the United States. The report concluded "Decisions are made largely on the basis of competition, bargaining, and influence rather than comprehensive analysis" [1]. To improve evidence-based decision-making and resource allocation, the report recommended that efforts should be undertaken at the national and state level to build technical capacity to collect and analyze public health data at the local level.

As a partial response to the IOM report, the Omnibus Budget Reconciliation Act of 1989 (OBRA 89) [2] includes a mandate that states receiving Federal Title V Maternal and Child Health (MCH) Block Grant funds conduct needs assessments and include documentation of their monitoring, planning, and assurance activities as part of their Title V grant application [3]. In addition, every five years State Title V agencies are now required to submit comprehensive community needs assessments identifying and prioritizing health problems and 5-year plans that include quantifiable objectives relating to

G. Oliva (✉) · J. Rienks · G. F. Chavez
Family Health Outcomes Project,
University of California San Francisco,
3333 California Street, Suite 365, San Francisco,
CA 94118, USA
e-mail: Olivag@fcm.ucsf.edu

G. F. Chavez
California Department of Health Services,
Sacramento, CA, USA

identified problems and interventions to address identified needs.

The Federal MCH Bureau and the Centers for Disease Control and Prevention (CDC) responded to the situation at the national level by funding state level data capacity building projects that experimented with a variety of strategies [4–6]. A case study of the effectiveness of nine state MCH agency epidemiology programs found that the five with epidemiologists who were trained through the CDC MCH Epidemiology Program (MCHEP) had overall higher scores on the components assessed [7]. The level of empowerment of the state MCH Director, the priority given to building epidemiologic capacity, and the presence of analytic leadership were determinants of the differences among states.

Several authors have examined the functioning of local level public health departments vis à vis the adequacy of performance of core public health functions [8–12]. And all, including one completed in 2004, have reported serious deficiencies in the use of data. Several assessments of MCH programs have also been completed [13, 14]. These studies, which relied primarily on self-administered questionnaires and staff interviews, have also revealed similar deficiencies in the use of data to support public health functions.

To assist in the preparation of its federally required Title V 5-year needs assessment, the Maternal and Child Health Branch of the California Department of Health Services (CAMCHB) required that 5-year community assessments and plans be submitted by all 61 Local Health Jurisdictions (LHJs). Plans were required to include evidence of the use of data/evidence in planning, intervention development and assurance activities. CAMCHB developed a cooperative agreement with the University of California Family Health Outcomes Project (FHOP) to provide training and technical assistance to the LHJs to support this effort. Early in 1993, as part of a process to identify and design program strategies, FHOP mailed a self-administered 250-item questionnaire (FHOP Needs Assessment) to the MCH Directors/Coordinators of the 61 local health jurisdictions in California.

The responses from 55 MCH directors revealed that only 49% had a formal planning process and less than half were comprehensive, 90% received core county level data reports from the state, few had access to county-level program data, and only 55% used computers to analyze data [15]. These findings suggested that the biggest barrier to performance of the core public health functions at the local level in California was inadequate capacity in the area of quantitative data analysis, the organization and presentation of data, and the ability to conduct a formal planning process utilizing available data. The level and type of automation, including automated report production and the interpretation of data, needed to be improved. In addition, CAMCHB Program Consultants who visited LHJs felt their local agencies lacked commitment at

the senior administrative and governmental levels to assign the resources to develop a data-based health planning process for women and children.

Past LHJ MCH assessments and plans submitted to CAMCHB were also reviewed. In addition, observations of participants at FHOP's first few trainings revealed a need for training in basic interpretation of simple two-way data tables, use of statistical confidence intervals or other tests of significance, and use of computer programs other than word processing. Participants reported that they did not have the time or staff support to adequately collect, analyze, and report data. Other barriers to completing needs assessments included competing priorities and need for trained staff.

In response to the findings and observations above, FHOP, in collaboration with the CAMCHB developed a 6-pronged strategy that includes: 1) face-to-face skill development training; 2) technical assistance via the telephone; 3) consultation through on-site visits; 4) development of automated analytic tools that included EXCEL data templates to calculate rates, confidence intervals and produce trend graphs and software built with the Center's for Disease Control Epi-Info for analyzing birth certificate (EpiBC) and hospital discharge (EpiHOSP) data; 5) production of written guidelines for analysis and planning; and 6) dissemination of materials and tools through the web and an electronic newsletter. The CAMCHB also purchased computer hardware and software for every county MCH program and mandated the inclusion of a comprehensive needs assessment as part of their annual funding application.

Beginning in March of 1999, FHOP evaluated the impact of its strategy on the use of data to support core public health functions. The objectives of this evaluation were to assess: 1) the extent to which counties were using FHOP services and products; 2) the self reported acceptability of FHOP products and services; 3) the extent to which LHJs used data in their assessment, planning and evaluation activities as reflected in their 5-Year Plans, and 4) the extent to which counties continued to use FHOP services in the period following the completion of their 5-Year Plans.

Methods

To evaluate the impact of the FHOP 6-pronged strategy, a variety of methods and data sources were employed. These include: 1) an MCH Branch Survey (MCHBS) of MCH Directors to assess counties' utilization of and acceptance/satisfaction with FHOP products and services 2) a Title V Plan Evaluation Tool (PET) completed by FHOP and State staff to assess the quality of LHJs MCH 5-year plans and 3) FHOP Administrative Data which includes comments and letters to FHOP staff from health jurisdictions regarding FHOP services.

Study instruments

MCH branch survey (MCHBS)

In 1999, to assess counties' use of FHOP's products and services, the CAMCHB mailed a 26-question, 95-item self-administered questionnaire to the 61 local MCH Directors. Responses were collected via mail. Questions were asked about attendance at FHOP trainings, number of calls to FHOP for technical assistance and use of FHOP products. Measures of acceptability included 1) counties ratings of the usefulness of FHOP trainings and automated tools, and 2) voluntary attendance at more than one FHOP training. Two questions were asked to assess satisfaction with the overall project: "Is the CAMCHB support of FHOP to provide technical assistance to counties a good use of Title V funds?" and "Does FHOP assist counties in improving services for women and children?"

Title V plan evaluation tool (PET)

In California, each LHJ is required to develop a 5-Year Community Assessment and Plan that documents its capability to perform the 3 core public health functions. A 17-question, 34-item evaluation tool was developed jointly by FHOP and CAMCHB to assess the adequacy of county 5-Year Plans completed in 2000. The tool covered content that is mandated by the CAMCHB and described in a procedure manual given to all local MCH programs. Required contents included: data on a minimum set of required indicators and performance measures to comply with assessment and assurance requirements; adequate interpretation of indicators results and inclusion of qualitative data to supplement the quantitative data where possible); appropriate analysis of data (including the use of tests for statistical significance and the appropriate use of small numbers analyses); and development of priorities and objectives consistent with community assessment data. FHOP and state MCH Program Consultants independently used the PET to evaluate the 5-Year Plans. The assessment tool required evaluators to rate the plans for each of the key areas using a 3-point scale: adequate, some assistance needed, and more assistance needed.

FHOP administrative data

The CAMCHB requires the reporting of very detailed administrative data on all contacts between county MCH and epidemiology staff and FHOP. Records are kept on each telephone call for technical assistance that includes the name, job title, county, reason for the call, type of service provided and FHOP staff involved, the amount of time spent on the problem and how the problem was resolved. Each site visit is documented in a detailed summary that is more narrative in

nature. Attendance lists and participant evaluation forms are also maintained for all trainings. The number and sources of hits to the FHOP website are monitored along with which areas of the site were visited and what products were downloaded.

Procedures

MCH branch survey (MCHBS)

Data from the State MCH Branch survey were analyzed using SAS statistical software to determine the extent of counties' exposure to FHOP strategies, including attendance at FHOP trainings; use of data templates, EpiBC, and EpiHOSP; use of FHOP's 4 written publications and the MCH County Data Book; and the number of times FHOP was telephoned for assistance. Frequencies were generated for use of each of the services and products and the proportion of LHJs using each service or product. Frequencies were also generated for Counties' rating of the usefulness of FHOP's products and trainings and whether contracting with FHOP is a good use of Title V funds.

A summary variable of total exposure to FHOP strategies was created for each county by summing the total number of trainings attended by the MCH Director and staff, the number of FHOP publications used the number of automated tools used, and the times FHOP was called for assistance. Data from this survey are conceived of as the independent variables.

Title V plan evaluation tool (PET)

Five FHOP staff members and six State MCH Program Consultants independently assessed the adequacy of plans in the areas targeted by FHOP. The areas include: adequacy of the community profile, consistency of selected health status indicators with those requested by the MCH Branch, use of data templates, summary of each indicator, interpretation of indicators, appropriate analyses of indicators, use of statistical tests for differences, description of the process used to prioritize identified problems, and the way the selected priorities led to the development of objectives and interventions included in the 5-Year Plan. Table 5 provides a complete listing of the key rating areas. Each plan area is assessed on two dimensions. The first is whether or not the area is present in the plan (1 = present and 0 = not present). The second is a rating of the adequacy of that area (3 = adequate, 2 = some assistance is needed, and 1 = more assistance needed).

Data from the evaluations were analyzed using SAS statistical software. Plan scores are thought of as dependent measures to determine whether the usage of the FHOP's activities prior to writing the 5-Year Plans is related to counties producing better 5-Year Plans. Evaluation scores

from FHOP staff and State MCH Program Consultants were also compared using Cronbach's alpha to determine the degree of reliability between FHOP ratings and the State ratings.

Using the 5-Year Plan Evaluations Tool (PET) data, we created a summary score for each county of the total number of target areas covered by the 5-Year plans that received an adequate rating (vs. a rating for some assistance needed or more assistance needed). Three summary variables were also created by combining scores for various target areas covered in the 5-Year Plans, including summary measures of 1) data analysis adequacy, 2) adequacy of template use and data interpretation and 3) adequacy of problem analysis and prioritization (see Table 6).

To create the summary score for data analysis adequacy, scores for 2 areas, appropriate analyses and use of statistical tests of difference, were combined in the following way. The county receives one point for having each of these areas covered in their 5-Year Plan, and additional points based on the adequacy rating: 1 point if the area was rated "More assistance needed," 2 points if the area is rated as "Some assistance needed" or 3 points if the area is rated as "Adequate." This score is then divided by the maximum number of possible points, which in this case would be 8 points (2 points for having each of the areas present and 6 points for receiving an adequate rating on each of the 2 areas) to create a percentage score for the summary variable. Combining scores for the use of data templates and the summary and interpretation of indicators as described above created a summary measure of adequacy of template use and data interpretation. A third summary measure of adequacy of problem identification and prioritization was similarly created by summing scores for their problem identification being consistent with the indicator prioritization described and the prioritization guiding the plan. A summary score of the two most frequently used automated analytic tools was also created by summing the use of EpiBC (1 point for use, 0 for no use) with the use of the data templates (1 point for use, 0 for no use).

Data from both the MCHBS and MCH 5-Year Plan evaluation were merged into one data set by county. Correlation coefficients were calculated to test for associations between key variables and Cronbach's alpha was computed to test the reliability between FHOP and State MCH Program Consultants summary overall adequacy scores for the 5-Year Plan evaluations.

Correlation coefficients allow us to assess whether or not there is a statistically significant association between two variables and the direction of that association [16]. Two variables are negatively associated if increases in one are related to decreases in another. By squaring the correlation coefficient, we are also able to determine the amount of variance in the data that can be accounted for by the relationship between the two variables. Although correlation analyses

cannot be used to determine if changes in one variable cause the changes in another, in the present study design, time lends support to a direction of causation in that the assessment of the use of FHOP services was completed before the development and rating of the 5-Year Plans.

FHOP administrative data

Administrative data are summarized by year using an EXCEL spreadsheet that presents for each county the number of contacts by category. The categories include face-to-face training, on site technical assistance, telephone technical assistance, receipt of newsletters and number of web hits. This data was used to provide data on strategies not fully developed in 1999 and also evidence of sustained use of FHOP services over time.

Results

MCH branch survey (MCHBS)

Use and Acceptability of FHOP's Products and Services
Overall, we found significant use of FHOP products and services. Tables 1–4 present a summary of exposure to FHOP services as assessed by the MCHBS prior to the completion of the Title V plans.

Use of automated analytic tools

Out of the 58 respondents who completed the MCHBS, 77.6% ($n=45$) reported using the data templates (see Table 1). Almost half of the responders (48.3%, $n=28$) reported using EpiBC and 34.5% ($n=20$) reported using EpiHOSP. Of the users, over 90% reported that both EpiBC and EpiHOSP were useful or very useful.

Table 1 Number and percentage of Counties reporting use of FHOP's automated tools

Type of automated tool used	# of counties ($n=58$)	% of counties
EpiBC ^a	28	48.3
Data templates ^b	45	77.6
EpiHOSP ^c	20	34.5

^aEpiBC is an EpiInfo based software product developed by FHOP to facilitate analysis of birth certificate data. EpiInfo is a public-domain software product developed by the Centers of Disease Control to collect and analyze public health data.

^bExcel based data templates are used to display data on a set of MCH indicators. The spreadsheets automatically calculate rates or percents, calculate confidence intervals, produce trend graphs, and provide statewide data for comparison.

^cEpiHOSP is an EpiInfo based software product developed by FHOP to facilitate analysis of hospital discharge data.

Table 2 Number and percentage of Counties' reporting use of FHOP's published materials

Type of FHOP published material used	# of counties (n = 58)	
	# of counties	% of counties
MCH county data book	41	71.9
Developing an effective planning process: A guide for local MCH programs	45	78.9
Selecting health indicators for public health surveillance in a changing health care environment (only 24 counties have this)	19	35.2
Guidelines for the analysis of public health indicators in small geographic areas or where there are small numbers of events	28	50.0
Selecting indicators for performance monitoring and needs assessment	9	35.2

Use of written guidelines for analysis and planning

As shown in Table 2, *Developing an Effective Planning Process: A Guide for Local MCH Programs*, is the most widely used FHOP publication, with 78.9% (n = 45) of counties sur-

Table 3 Number and percentage of Counties that attended each type of FHOP training

Type of FHOP training attended	# of counties (n = 58)	
	# of counties	% of counties
EpiBC ^a	45	77.6
EpiFIMR ^b	23	31.6
EpiHOSP ^c	33	56.9
Data templates	51	87.9
Developing objectives	23	39.7
Selecting health indicators	36	62.1
Prioritizing health problems	35	60.3
Interpreting needs assessment data	31	53.4
Interpreting data when there are small numbers of events	41	70.7
Problems analysis	31	53.4
Developing performance measures	30	51.7
Survey development	6	10.3
Unique Identifiers and Patient Confidentiality	9	15.5
Mean number of trainings attended by a county director/staff = 6.4		

^aEpiBC is an EpiInfo based software product developed by FHOP to facilitate analysis of birth certificate data. EpiInfo is a public-domain software product developed by the Centers of Disease Control to collect and analyze public health data.

^bEpiFIMR is an EpiInfo based software product developed by FHOP to facilitate analysis of fetal infant mortality review data.

^cEpiHOSP is an EpiInfo based software product developed by FHOP to facilitate analysis of hospital discharge data.

Table 4 Frequency of Counties' use of FHOP telephone assistance

Times county called FHOP for assistance in the last 12 months	# of counties (n = 58)	
	# of counties	% of counties
Never called FHOP for assistance	12	20.7
called fhop 1–2 times	20	34.5
Called FHOP 3–5 times	14	24.1
Called FHOP 6–8 times	5	8.6
Called FHOP 9 or more times	7	12.1

veyed reporting usage. The majority of counties also use the annual County Data Book (71.9%, n = 41).

Attendance at face-to-face skill development training

Prior to the 1999 MCHBS, FHOP conducted trainings on thirteen different subjects. The total number of trainings counties reported attending ranged from 0 to 11, with 6.4 being the mean number attended. Approximately 93% of counties attended at least one training. Over 48% (n = 28) of counties attended between 8 and 11 trainings. As seen in Table 3, 87.9% of counties attended data template training and 77.6% attended an EpiBC training. Overall, trainings were well attended by the counties, with 7 out of the 11 trainings offered being attended by more than 50% of counties. Attendees included a mix of MCH directors, epidemiologists, and other staff designated by the MCH director.

Technical assistance by telephone

Technical assistance over the telephone is one of the most widely used ways that FHOP provides assistance to counties. As indicated in Table 4, in the 12 months prior to the MCHBS, 80% of counties called FHOP for technical assistance at least once and 45% of counties called 3 or more times.

Acceptability of FHOP Products

Survey respondents gave very positive overall ratings on FHOP activities. Ninety-five percent (95%) thought, "contracting with FHOP to provide technical assistance was a good use of Title V funds." Eighty-three percent (83%) reported that FHOP services resulted in improved services for women and children in their counties. In terms of the trainings conducted by FHOP, 88% of counties rated the trainings as good or excellent in terms of their usefulness and applicability. Seventy-eight percent (78%) of users rate the templates as useful or very useful. Over 90% of those who used EpiHOSP and EpiBC rated them as useful or very useful on the survey.

Table 5 Number and percentage of Counties that completed key areas of their 5-Year plans and the adequacy ratings received for those areas

Key plan areas	Plan area present ^b		Adequacy rating of 5-Year Plan areas ^a (N = 61)					
			Adequate		Some assistance needed		More assistance needed	
	# of counties	% of counties	# of counties	% of counties	# of counties	# of counties	# of counties	% of counties
Community profile	61	100	33	54.1	25	41.0	3	4.9
Health and human services description	61	100						
Agency capacity	61	100						
Indicators consistent with MCH	60	98.4	46	76.7	8	13.3	6	10.0
Use of data templates	51	83.6	26	50.0	17	32.7	9	17.3
Summary of each indicator	52	85.3	27	51.9	20	38.5	5	9.6
Adequate Interpretation	56	91.8	25	44.6	18	32.1	13	23.2
Appropriate analyses	59	96.7	26	44.1	22	37.3	11	16.3
Statistical test for difference	52	85.3	45	86.5	4	7.7	3	5.8
Appropriate small numbers analysis	40	65.6	20	50.0	5	12.5	15	37.5
Prioritization described	44	72.1	18	40.9	16	36.4	10	22.7
Problem consistent with indicators	52	85.3	11	21.2	27	51.9	14	26.9
Prioritization leading to plan	47	77.1	14	29.8	19	40.4	14	29.8
Evaluation	43	70.5	8	18.6	12	27.9	23	53.5

^aAdequacy ratings are ratings of the level of adequacy of local health jurisdictions' 5-Year Plans. When computing the percentage of counties that received a given rating (adequate, some assistance needed or more assistance needed) on a specific plan area, the number of counties completing that specific plan area is used as the denominator.

^bData in these columns illustrate the number of counties and percentage of counties that included specific key areas in their 5-Year Plans. Not all counties completed all possible areas in their 5-Year Plans.

Plan evaluation tool (PET)

Evaluation of the reliability between the State MCH Program Consultants' and FHOP's rating of counties' 5-Year Plans as assessed by Cronbach's alpha for summary score of number of plan categories rated as adequate ($\sigma = .81$) indicates good reliability. Because there were a few more missing ratings on specific plan areas in the MCH Program Consultants' evaluations of the 5-Year Plan, only FHOP's evaluations are used in the remainder of the analyses. Since the missing ratings appeared to be random, we believe that the likelihood for the introduction of bias into our results is negligible.

Table 5 shows scores for the evaluated areas and overall scores. Most counties (77%) received an adequate rating for including indicators consistent with those requested by the MCH Branch and for statistical tests for differences (87%). Only 21% received an adequate score for identifying problems on which to focus their action plans through the consistent use of data.

Table 6 shows percentile breakdowns for how counties did on the 3 summary measures of 5-year plan quality. Approximately 44% of counties scored at least 76% or more of

the possible points on the summary measure of data template use and data interpretation, as did, 41% of counties on the summary measure for appropriate data analysis. Only 34% of counties scored at least 76% or more of the possible points for the summary measure of problem identification and prioritization adequacy. Twenty-one percent (21%) received 25% or less of the possible points.

FHOP administrative data

Review of FHOP administrative data subsequent to the completion of the plans showed continued use of FHOP services for ongoing assessment, planning and monitoring activities. Data for 2001–2002 showed that all but one county utilized at least one FHOP service and in 2002–2003 all but 2 counties did.

Administrative data for both 2001–2002 and 2002–2003 showed that over 60% of counties called for technical assistance during each year

At the time of the MCHBS in 1999, the FHOP web site was not fully operational and we had not yet begun to publish an electronic newsletter so these activities were not included

Table 6 Description of 5-Year plan summary rating measures and percentage of Counties receiving that score

Name of summary measure	Ratings included in measure	Score			
		0–25% of possible points	26–50% of possible points	51–75% of possible points	76–100% of possible points
Template use and data interpretation adequacy	Use of data templates and the summary and interpretation of indicators	6.6	11.5	37.7	44.3
Data analysis adequacy	Appropriate analyses of health indicators, use of statistical tests of difference, and use of appropriate small number analyses	8.2	14.8	36.1	41.0
Problem identification and prioritization adequacy	Problem identification consistent with indicator, prioritization described and prioritization guiding the plan	21.3	21.3	23.0	34.4

in the CAMCH survey. FHOP administrative data for 2001–2002 showed that 32 LHJs accounted for a total of 5459 county hits to the website. In 2002–2003, 38 LHJ's made 18,172 hits. Surprisingly, by 2003 many local MCH directors were still limited in their ability to use the Internet and instead preferred to have FHOP FAX or mail materials instead of downloading them. In both 2001–2001 and 2002–2003, 59 LHJs subscribed to the newsletter.

Correlations between use of FHOP's products and services, as measured by the MCHBS, and counties' 5-Year plan evaluation scores

Correlation analyses reveal that there is a significant positive correlation between our overall summary measure of total exposure to FHOP products and services and the overall 5-Year Plan summary adequacy score ($r = .42, p < .001$) (see Table 7). Approximately 18% of the variance in overall adequacy scores can be explained by total exposure to FHOP's products and services. Overall total FHOP exposure also correlates significantly with the 3 key summary measure from the 5-Year Plan evaluations, including the summary measure of template use and data interpretation adequacy ($r = .35, p < .008$), the summary measure for data analysis adequacy ($r = .41, p < .002$), and the summary measure for problem identification and prioritization adequacy ($r = .34, p < .01$).

The summary measure combining use of EpiBC and the use of data templates is associated with higher scores on the summary variable of number of plan categories rated as adequate ($r = .32, p < .02$). This summary measure of automated analytic tool use is also associated with better scores on 3 main summary measures of the 5-Year Plans: data analysis adequacy ($r = .31, p < .02$), template use and data interpretation adequacy ($r = .35, p < .007$), and problem identification and prioritization adequacy ($r = .33, p < .01$).

Past use of specific FHOP automated tools correlates with more adequate ratings on many measures of the 5-Year Plans. Prior use of the data templates, as reported on the MCHBS, is associated with higher scores on the summary measure of data analysis adequacy ($r = .27, p < .04$). Past data template use is also associated with higher scores on the 5-Year Plan summary variable for use of data templates and data interpretation adequacy ($r = .34, p < .009$). Prior use of EpiBC is associated with higher scores on the summary measure of problem identification and prioritization adequacy ($r = .31, p < .02$) and a higher overall adequacy score.

Use of the guide, *Developing an Effective Planning Process: A Guide for Local MCH Programs*, is associated with a higher overall adequacy score ($r = .31, p < .02$), higher scores on the summary measures of data analysis adequacy ($r = .46, p < .0003$), and problem identification and prioritization adequacy ($r = .40, p < .002$).

Total number of trainings attended is not significantly associated the overall 5-Year plan adequacy measure, or any of the three key plan summary measures. Attending more training sessions is associated with higher adequacy scores for specific plan areas, including better adequacy ratings for use of appropriate analyses in the 5-Year Plan ($r = -.41, p < .001$) and better ratings on the use of statistical tests for differences ($r = -.34, p < .009$). Attending at least one FHOP training is significantly associated with higher scores on the use of data templates in the 5-Year Plans ($r = -.30, p < .02$). Use of appropriate analyses in the 5-Year Plan correlates with attending 3 types of FHOP trainings: selecting health indicators ($r = -.35, p < .005$), using data templates ($r = -.29, p < .03$), and interpreting needs assessment data ($r = -.31, p < .03$).

Frequency of FHOP telephone assistance is positively correlated with overall plan adequacy ($r = .42, .001$). It is also positively correlated with the number of plan categories

Table 7 Correlations between exposure to FHOP's product and services and overall 5-Year plan adequacy

	Overall 5-Year Plan adequacy ^a		5-Year Plan summary adequacy measures					
	<i>r</i>	<i>p</i>	Template use and data interpretation		Data analysis		Problem identification and prioritization	
			<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>
Summary measure of total FHOP exposure ^b	0.42	0.001	0.34	0.008	0.40	0.002	0.34	0.01
Training								
Summary measure of total number of trainings attended by MCH director and staff	ns		ns		0.29	0.03	ns	
Telephone assistance								
Times called FHOP for assistance	0.42	0.001	0.38	0.003	0.31	0.02	0.25	0.06
Use of written materials								
MCH county data book	ns		ns		ns		ns	
Developing an effective planning process : A guide for local MCH programs	0.31	0.020	ns		0.46	3E-04	0.40	0.002
Selecting health indicators for public health surveillance in changing (only 24 counties have this)	ns		ns		ns		ns	
Guidelines for the analysis of public health indicators in small geographic areas or where there are small numbers of events	0.28	0.004	ns		ns		0.28	0.04
Selecting indicators for performance monitoring	ns		ns		ns		ns	
Automated software tools								
EpiBC	0.37	0.004	0.27	0.04	0.30	0.02	0.33	0.01
EpiFIMR	ns		ns		ns		ns	
EpiHOSP	ns		ns		ns		ns	
Data templates	0.30	0.020	0.29	0.03	0.30	0.02	ns	
Summary of use of EpiBC and data templates	0.38	0.003	0.35	0.008	0.37	0.004	0.37	0.008

^aOverall Plan Adequacy is a summary score that includes ratings of the presence and adequacy of 13 areas.

^bSummary measure of total FHOP exposure includes total number of trainings attended by the MCH Director and staff, the number of FHOP publications used, the number of automated tools used, and the times FHOP was called for assistance.

completed ($r = .36, p < .006$) and with the summary measures of data template use and data interpretation adequacy ($r = .38, p < .0003$) and the summary measure for data analysis adequacy ($r = .31, p < .04$).

Discussion

Evaluating the impact of a multi-faceted project over time presented many challenges. To address these, FHOP used multiple avenues to assess different aspects of effectiveness and acceptability that included self reports of exposure to and satisfaction with interventions, ongoing collection of administrative data on technical assistance calls, training attendance, observations made during on-site consultations and face-to face trainings, and quantitative rating of plans developed by LHJs. FHOP was aided with the direct observations by the MCH Program Consultants who also visited LHJs. The direct observations are particularly useful in identifying the underlying causes of an identified deficiency so that we can more effectively intervene. In addition, the ability to make these observations consistently over a 10-year period allows us to continue to reinforce information and skills and to identify those times when a person may be more receptive to learning these skills.

The results of this study reveal that the great majority of counties utilize FHOP for training and technical assistance and find it useful. Most are also using FHOP publications and at least one FHOP software product. Counties expressed the belief in the positive impact of FHOP's activities on improving services. The strategies implemented in this project are associated with better use of data for community assessment, more rational planning, and better use of MCH grant funds as reflected in more adequate local MCH 5-Year Needs Assessments and Plans.

Obviously, there are many factors that will likely impact the quality of the 5-Year plans submitted by LHJs. These factors might include the training and skill level of the MCH director and staff, length of time the Director has held that position and level of staff turnover, the resources available to complete the plan, access to epidemiologists and statisticians, and available community resources. Given all these potential factors, we were pleased to find that the total exposure to FHOP products and services accounted for approximately 18% of the variance in overall adequacy scores.

Repeated literature reviews revealed few studies documenting effects of efforts to improve data capacity in local health jurisdictions. One paper reported that the LHJs that adopted and used the Assessment Protocol for Excellence in Public Health or participated in formal public health leadership training showed improvement in core functions [10]. However, the study did not identify those components of these programs that were associated with the improvement.

Two other reports described capacity building efforts but only reported anecdotal information on outcomes [17, 18]. In another study, a training to build capacity in evidence-based public health used post training self-assessment to document participant satisfaction and intention to use the information [19]. In this study, FHOP was able to isolate specific components of the program and assess effects on clearly defined tasks. Self report on use and satisfaction with products and services was coupled with objective review of written reports and monitoring of service and product use over time. These data can be used to inform future program activities.

While the results of this study suggest that FHOP's strategy has been effective, there are a number of limitations to the study. First, FHOP staff evaluated counties' 5-Year Plans and completed the plan evaluation tool for each county plan. At the time that FHOP staff reviewed and scored components of the 5-year plans, the stated purpose was to provide feedback to counties on the adequacy of their plans and make suggestions for revisions. Staff were not aware that we would later compare scores with exposure to FHOP services as a part of our self evaluation. This makes it unlikely that there was bias in FHOP's scoring process. Further support for lack of bias is the finding that the scoring by state MCH staff who evaluated the plans and the scores estimated by FHOP staff were highly correlated.

Another limitation was that the small number of plans ($n = 61$) and responses to the questionnaire ($n = 58$), reduces statistical power in data analyses and makes it harder to detect statistically significant differences. Although the correlation coefficients, while statically significant, were not very high, the fact that 18% of the variance in overall plan scores was accounted for by overall exposure to FHOP products and services suggests that these results are meaningful.

The strength of the effect may have been diluted because there is a high level of local staff turnover, sometimes as high as 25% per year, meaning some staff that attended FHOP trainings and completed the survey may no longer have been employed when it came to completing the 5-Year Plans. FHOP now addresses staff turnover by making trainings available to a greater number of local staff so that a critical mass of informed staff will be available over time. In addition the findings that those LHJs that used FHOP written materials and automated tools did better on the plans suggests that these may make it easier for old staff to pass on information and tools to newer staff. An annual orientation for new staff, a monthly newsletter and ready accessibility to data, written guidelines and automated tools via the web allow more rapid orientation for newer staff.

Administrative data collected since the completion of the 5-year plans demonstrates sustained use of FHOP assistance, with current LHJ staff being directed to the project by outgoing staff. As mentioned in the results, in 2002–2003, all but two LHJs used FHOP's services and were receiving

the newsletter. Thirty-eight counties are regularly using the website.

Conclusion

The process of utilizing multiple avenues for building and assessing the capacity of LHJs for using data for core public health functions would be beneficial to State MCH agencies interested in data capacity building. Self reported survey data alone does not provide the in-depth information necessary to evaluate and understand the underlying factors influencing the performance of public health staff.

An ongoing cooperative relationship between a State MCH agency and a university that continually assesses and responds to the needs of LHJs is one way to support state efforts to promote data-based planning and program development. This process has the potential to increase the impact of limited Title V program funds and to create the data to justify other funding proposals.

The 6-pronged strategy utilized by California, which was effective with rural counties, urban counties, mixed counties, and MCH staff of widely varying backgrounds and training, could be useful to other states as well as internationally. The training curriculum, written guidelines, and automated tools are available for others free of charge via the FHOP web site and could be easily adapted for a wide variety of environments.

Acknowledgments Funding for the Family Health Outcomes Project comes from the California Department of Health Services Maternal and Child Health Branch Contract Number: 03-75001. We wish to thank Dr. Rugmini Shah, Dr. Terence Smith, Shabbir Ahmad, Gene Takahashi and Dr. Suzanne Steinberg for their support of the project. We also wish to thank Clarissa Kripke for editorial assistance in manuscript preparation.

References

1. Institute of Medicine. The future of public health. Washington, D.C.: National Academies Press; 1988.
2. Omnibus Budget Reconciliation Act, Pub. L. No. 101–239 (1989).
3. Title V of the Social Security Act, 42 U.S.C. 701–710, Sect. 506 (1989).
4. Handler A, Kennelly J, Rosenberg D. Building the analytic capacity of the State Maternal and Child Health workforce: a history of the HRSA/MCHB Academic Partnership. *J Public Health Manag Pract* 2001;7(4):83–90.
5. National Center for Health Statistics. CDC assessment initiative funds seven states. *Stat Surveill* 1992;1:1–4.
6. Scutchfield FD, Beversdof CA, Hiltabiddle SE, Violante T. A survey of state health department compliance with the recommendations of the Institute of Medicine report, The future of public health. *J Public Health Policy* 1997;18:13–29.
7. Handler A, Geller S, Kennelly J. Effective MCH epidemiology in state health agencies: Lessons from an evaluation of the Maternal and Child Health Epidemiology Program (MCHEP). *Matern Child Health J* 1999;3(4):217–24.
8. Mays GP, Halverson PK, Miller CA. Assessing the performance of local public health systems: A survey of state health agency efforts. *J Public Health Manage Pract* 1998;4(4):63–78.
9. Koplin AN. A national program to restructure local public health agencies in the United States. *J Public Health Policy* 1993;14:393–402.
10. Miller CA, Moore KS, Richards TB, Monk JD. A proposed method for assessing the performance of local public health functions and practices. *Am J Public Health* 1994;84(11):1743–9.
11. Turnock BJ, Handler A, Hall W, Lenihan DP, Vaughn E. Capacity-building influences on Illinois local health departments. *J Public Health Manag Pract* 1995;1(3):50–8.
12. Mays GP, Halverson PK, Baker EL, Stevens R, Vann JJ. Availability and perceived effectiveness of public health activities in the nation's most populous communities. *Am J Public Health* 2004;94(11):1019–1026.
13. Mayer JP, Konstant L, Wartman GC. Typology of local health departments based on maternal and child health core functions. *J Public Health Manag Pract* 1997;3(5):1–10.
14. Farel A, People-Sheps MD, Schwarte EU, Waller CJ. Southeastern Title V program staff perceptions of state-level maternal and child health assessment skills. *Matern Child Health J* 1997;1(4):267–72.
15. Oliva G, Chavez G. Unpublished data November 1993.
16. Keppel G, Sautfley WH. Introduction to design and analysis. New York, NY: W.H. Freeman and Company; 1980.
17. Assaro PV. Making Public Health Data Available to Community Level decision makers-goals, issues and a case report. *J Public Health Manag Pract* 2001;7(5):58–63.
18. Stafford-Alewine S, Land GH. The Missouri experience in providing tools and resources to promote community assessment. *J Public Health Manag Pract* 2002;8(4):9–14.
19. O'Neal MA, Brownson RC. Teaching evidence-based public health to public health practitioners. *Ann Epidemiol* 2005;15(7):540–4.